Office of
Energy
Projects

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FERC/DEIS-270D

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Volume I

NEXUS Gas Transmission Project and Texas Eastern Appalachian Lease Project

Source: State of Ohio Office of Information Technology

NEXUS Gas Transmission, LLC	**Docket Nos.:** CP16-22-000
Texas Eastern Transmission, LP	CP16-23-000
DTE Gas Company	CP16-24-000
Vector Pipeline L.P.	CP16-102-000

Federal Energy Regulatory Commission
Office of Energy Projects
Washington, DC 20426

Cooperating Agencies:

U.S. Environmental Protection Agency **U.S. Fish and Wildlife Service**

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas 2
NEXUS Gas Transmission, LLC
Texas Eastern Transmission, LP
DTE Gas Company
Vector Pipeline L.P.
Docket Nos. CP16-22-000
CP16-23-000
CP16-24-000
CP16-102-000

FERC/EIS-270D

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared a draft environmental impact statement (EIS) for the NEXUS Gas Transmission (NGT) Project and Texas Eastern Appalachian Lease (TEAL) Project (jointly referred to as “Projects”), proposed by NEXUS Gas Transmission, LLC (NEXUS) and Texas Eastern Transmission, LP (Texas Eastern) in the above-referenced dockets. NEXUS and Texas Eastern request authorization to construct a new Greenfield pipeline and expand an existing pipeline system from the Appalachian Basin to deliver 1.5 million dekatherms per day to consuming markets in Northern Ohio, Southeastern Michigan, and Ontario, Canada. DTE Gas Company and Vector Pipeline L.P. are requesting approval to lease capacity on their systems to NEXUS.

The draft EIS assesses the potential environmental effects of the construction and operation of the Projects in accordance with the requirements of the National Environmental Policy Act. The FERC staff concludes that approval of the Projects would result in some adverse environmental impacts; however, most of these impacts would be reduced to less-than-significant levels with the implementation of NEXUS’s and Texas Eastern’s proposed mitigation measures and the additional recommendations in the draft EIS.

Some of the route alternatives suggested during scoping would affect landowners that have not been part of the FERC’s environmental scoping process, as further discussed on page 5. **Therefore, by this letter we are notifying these parties of our evaluation and requesting comments about the following alternative routes presented in section 3 of the draft EIS: City of Green Route Alternative, Chippewa Lake C Route Variation, and Reserve Avenue Route Variation.**

The U.S. Fish and Wildlife Service (FWS) and U.S. Environmental Protection Agency (EPA) participated as cooperating agencies in the preparation of the draft EIS. Cooperating agencies have jurisdiction by law or special expertise with respect to resources potentially affected by the proposal and participate in the National Environmental Policy Act analysis. Although the FWS and EPA provided input to the conclusions and recommendations presented in the draft EIS, the FWS and EPA will each present its own conclusions and recommendations in its respective record of decision or determination for the Projects.

The draft EIS addresses the potential environmental effects of the construction and operation of both the NGT and TEAL Projects. The NGT Project consists of about 255.9 miles of pipeline composed of the following facilities:

- 208.9 miles of new 36-inch-diameter natural gas pipeline in Ohio;
- 47 miles of new 36-inch-diameter natural gas pipeline in Michigan;
- associated equipment and facilities.

The TEAL Project would include two main components:

- 4.4 miles of new 36-inch-diameter loop pipeline in Ohio;
- 0.3 mile of new 30-inch-diameter interconnecting pipeline Ohio; and
- associated equipment and facilities.

The Projects' proposed aboveground facilities include five new compressor stations in Ohio; additional compression and related modifications to one existing compressor station in Ohio; five new metering and regulating stations in Ohio; one new metering and regulating station in Michigan; and minor modifications at existing aboveground facilities at various locations across Ohio.

The FERC staff mailed copies of the draft EIS to federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American tribes; potentially affected landowners and other interested individuals and groups; and newspapers and libraries near the Projects. Paper copy versions of this draft EIS were mailed to those specifically requesting them; all others received a CD version. In addition, the draft EIS is available for public viewing on the FERC's website (www.ferc.gov) using the eLibrary link.

A limited number of copies are available for distribution and public inspection at:

Federal Energy Regulatory Commission
Public Reference Room
888 First Street NE, Room 2A
Washington, DC 20426
(202) 502-8371

Any person wishing to comment on the draft EIS may do so. To ensure consideration of your comments on the proposal in the final EIS, it is important that the Commission receive your comments on or before **August 29, 2016**.

For your convenience, there are four methods you can use to submit your comments to the Commission. In all instances, please reference the Projects' docket numbers (CP16-22-000 for the NGT Project and CP16-23-000 for the TEAL Project) with your submission. The Commission encourages electronic filing of comments and has expert staff available to assist you at (202) 502-8258 or efiling@ferc.gov.

1) You can file your comments electronically using the eComment feature on the Commission's website (www.ferc.gov) under the link to Documents and Filings. This is an easy method for submitting brief, text-only comments on a project.

2) You can file your comments electronically by using the eFiling feature on the Commission's website (www.ferc.gov) under the link to Documents and Filings. With eFiling, you can provide comments in a variety of formats by attaching them as a file with your submission. New eFiling users must first create an account by clicking on "eRegister." If you are filing a comment on a particular project, please select "Comment on a Filing" as the filing type.

3) You can file a paper copy of your comments by mailing them to the following address:

    Nathaniel J. Davis, Sr., Deputy Secretary
    Federal Energy Regulatory Commission
    888 First Street NE, Room 1A
    Washington, DC 20426

4) In lieu of sending written or electronic comments, the Commission invites you to attend one of the public comment meetings its staff will conduct in the Project areas to receive comments on the draft EIS. We[1] encourage

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[1] "We," "us," and "our" refer to the environmental staff of the FERC's Office of Energy Projects.

interested groups and individuals to attend and present oral comments on the draft EIS at any of the meeting locations provided on page 4.

There will not be a formal start of the meeting nor a formal presentation by Commission staff, but FERC staff will be available to answer your questions about the environmental review process. You may arrive at any time after 5:00 PM and we will stop taking comments at 10:00 PM Eastern Time Zone. The primary goal is to have your verbal environmental comments on the draft EIS documented in the public record.

Date	Location
August 10, 2016	Swanton High School 604 North Main Street Swanton, OH 43558 (419) 826-3045
August 11, 2016	Tecumseh Center for the Arts 400 North Maumee Street Tecumseh, MI 49286 (517) 423-6617
August 15, 2016	Quality Inn, Freemont 3422 Port Clinton Road Fremont, OH 43420 (419) 332-0601
August 16, 2016	Elyria High School Performing Arts Center 601 Middle Avenue Elyria, OH 44035 (440) 284-5209
August 17, 2016	Wadsworth High School – James A. Mcilvaine Performing Arts Center 625 Broad Street Wadsworth, OH 44281 (330) 335-1369
August 18, 2016	Green High School 1474 Boettler Road Uniontown, OH 44685 (330) 896-7575

Verbal comments will be recorded by court reporter(s) and transcriptions will be placed into the docket for the Projects and made available for public viewing on FERC's eLibrary system (see page 5 for instructions on using eLibrary). It is important to note that verbal comments hold the same weight as written or electronically submitted comments. If a significant number of people are interested in providing verbal comments, a time limit of 3 to 5 minutes may be implemented for each commenter to ensure all those wishing to comment have the opportunity to do so within the designated meeting time. Time limits will be strictly enforced if they are implemented.

Any person seeking to become a party to the proceeding must file a motion to intervene pursuant to Rule 214 of the Commission's Rules of Practice and Procedures (Title 18 Code of Federal Regulations Part 385.214).[2] Only intervenors have the right to seek rehearing of the Commission's decision. The Commission grants affected landowners and others with environmental concerns intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding that no other party can adequately represent. **Simply filing environmental comments will not give you intervenor status, but you do not need intervenor status to have your comments considered.**

Route Alternatives

As indicated on page 1, some landowners are receiving this draft EIS because their property has been identified as potentially being affected by certain route alternatives recommended or being considered by FERC staff to avoid or lessen environmental impacts along NEXUS's proposed pipeline route in several locations. Refer to discussions in section 3.3.3 of the draft EIS for the City of Green Route Alternative, section 3.4.10 for the Chippewa Lake C Route Variation, and section 3.4.12 for the Reserve Avenue Route Variation. Please note that while staff has recommended the use of the last two listed alternatives, a decision whether or not to recommend the use of the City of Green Route Alternative has not been made. The Commission staff wants to ensure that all potentially affected landowners have the opportunity to participate in the environmental review process, thus staff is soliciting comments to assist with the environmental analysis of these route alternatives, which will be presented in the final EIS.

Questions?

Additional information about the Projects is available from the Commission's Office of External Affairs, at **(866) 208-FERC,** or on the FERC website (www.ferc.gov) using the eLibrary link. Click on the eLibrary link, click on "General Search," and enter the docket number excluding the last three digits in the Docket Number field (i.e., CP16-22). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at FercOnlineSupport@ferc.gov or toll free at (866) 208-3676; for TTY, contact (202) 502-8659. The eLibrary link also provides access to the texts of formal documents issued by the Commission, such as orders, notices, and rulemakings.

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[2] See the previous discussion on the methods for filing comments.

In addition, the Commission offers a free service called eSubscription that allows you to keep track of all formal issuances and submittals in specific dockets. This can reduce the amount of time you spend researching proceedings by automatically providing you with notification of these filings, document summaries, and direct links to the documents. Go to www.ferc.gov/docs-filing/esubscription.asp to subscribe.

Nathaniel J. Davis, Sr.,
Deputy Secretary

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LIST OF ACRONYMS

°F	degrees Fahrenheit
µg/m3	micrograms per cubic meter
ACHP	Advisory Council on Historic Preservation
ACR	Abandonment and Capacity Restoration Project
ACS	American Community Survey
AG-PEM	agricultural palustrine emergent
AMSL	Above Mean Sea Level
ANR	ANR Pipeline Co.
ANR East	ANR East Pipeline Project
APBA	Applicant-Prepared BA
APE	area of potential effect
AQCR	Air Quality Control Regions
ATWS	additional temporary workspace
AWS	agricultural water supply
BA	Biological Assessment
BCC	Birds of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practices
CAA	Clean Air Act of 1970 and its 1977 and 1990 amendments
CAUV	Current Agricultural Use Value
CAZ	critical assessment zone
CEQ	Council on Environmental Quality
Certificate	Certificate of Public Convenience and Necessity
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	Methane
Chippewa MWCD	Chippewa Subdistrict of the Muskingum Watershed Conservancy District
CMNH	Cleveland Museum of Natural History
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
Columbia	Columbia Gas Transmission
Commission	Federal Energy Regulatory Commission
CORN	Coalition to Reroute NEXUS
CREP	Conservation Reserve Enhancement Program

LIST OF ACRONYMS

CRP	Conservation Reserve Program
CS	compressor station
CVSR	Cuyahoga Valley Scenic Railroad
CWA	Clean Water Act
CZMA	Coastal Zone Management Area
dBA	A-weighted decibels
dbh	diameter at breast height
DDAGW	Division of Drinking and Ground Water
DEO	Dominion East Ohio
DHHS	U.S. Department of Health and Human Services
Dominion	Dominion Transmission
DOE	Department of Energy
DOT	U.S. Department of Transportation
DTE Gas	DTE Gas Company
Dth/d	dekatherms per day
E&SCP	*Erosion and Sediment Control Plan*
EI	Environmental Inspector
EIS	Environmental Impact Statement
EM	electromagnetic
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FERC OEP	FERC's Office of Energy Projects
FERC *Plan*	*Upland Erosion Control, Revegetation, and Maintenance Plan*
FERC *Procedures*	*Wetland and Waterbody Construction and Mitigation Procedures*
FHWA	Federal Highways Administration
FSA	Farm Service Agency
FWS	U.S. Fish and Wildlife Service
g	gravity
GHG	greenhouse gases
GIS	geographic information system
gpm	gallons per minute
GWP	global warming potential
HAP	hazardous air pollutant
HCA	high-consequence area

LIST OF ACRONYMS

HDD	horizontal directional drill
HDD Plan	HDD Monitoring and Inadvertent Return Contingency Plan
hp	horsepower
HPSA	Health Professional Shortage Area
HUC	Hydrologic Unit Code
IMP	Integrity Management Program
IPCC	Intergovernmental Panel on Climate Change
ISMP	Invasive Species Management Plan
IWS	industrial water supply
kV	kilovolt
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
M&R	metering and regulating
MAC	Michigan Administrative Code
MAOP	maximum allowable operating pressure
MBCP	*Migratory Bird Conservation Plan*
MBTA	Migratory Bird Treaty Act
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MDOT	Michigan Department of Transportation
Memorandum	Memorandum of Understanding on Natural Gas Transportation Facilities
MLV	mainline valve
MMBtu/hr	million British thermal units per hour
MNFI	Michigan Natural Features Inventory
MP	milepost
MUA/P	Medically Underserved Area or Population
MWH	modified warm water habitat
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NCNST	North Country National Scenic Trail
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants for Source Categories
NEXUS	NEXUS Gas Transmission, LLC
NGA	Natural Gas Act
NGT Project	NEXUS Gas Transmission Project

LIST OF ACRONYMS

NHA	National Heritage Area
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NNSR	Nonattainment New Source Review
NOAA	National Oceanic and Atmospheric Administration
NOI	*Notice of Intent*
NOP	National Organic Program
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRI	National Rivers Inventory
NSA	noise-sensitive area
NSPS	New Source Performance Standards
NSR	New Source Review
NWI	National Wetland Inventory
OAC	Ohio Administrative Code
OCRM	Ocean and Coastal Resource Management
ODGS	Ohio Division of Geologic Survey
ODNR	Ohio Department of Natural Resources
ODOT	Ohio Department of Transportation
OEMA	Ohio Emergency Management Agency
OEP	Office of Energy Projects
OEPA	Ohio Environmental Protection Agency
OFTL	Ohio Forest Tax Law
OPEN	Ohio Pipeline Energy Network
ORAM	Ohio Rapid Assessment Method
ORV	outstandingly remarkable value
OSW	Ohio Special Waters
PADEP	Pennsylvania Department of Environmental Protection
Panhandle Eastern	Panhandle Eastern Pipe Line
Pb	(airborne) lead
pCi/L	picocuries per liter
PEM	palustrine emergent
PFO	palustrine forested

LIST OF ACRONYMS

PGA	peak ground acceleration
PHMSA	Pipeline and Hazardous Materials Safety Administration
PM_{10}	inhalable particulate matter with an aerodynamic diameter less than or equal to 10
$PM_{2.5}$	inhalable particulate matter with an aerodynamic diameter less than or equal to 2.5
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
PSS	palustrine scrub-shrub
PTE	potential to emit
PTIO	Permit-to-Install-and-Operate
PUB	palustrine unconsolidated bottom
PVC	polyvinyl chloride
PWS	Public Water System
RACER	Revitalizing Auto Communities Environmental Response
RCP	Residential Construction Plan
REX	Rockies Express Pipeline
RHA	Rivers and Harbor Act
Rover	Rover Pipeline, LLC
RR	Resource Report
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SPCC Plan	Spill Prevention, Control, and Countermeasure Plan
SSA	sole source aquifer
SSURGO	Soil Survey Geographic database
Structure II-A	Muskingum Watershed Conservation District’s Structure II-A
SWAP	Source Water Assessment Program
SWAPP	Source Water Assessment and Protection Program
TEAL Project	Texas Eastern Appalachian Lease Project
Texas Eastern	Texas Eastern Transmission, LP
TGP	Tennessee Gas Pipeline Company, LLC
tpy	tons per year
TSA	Transportation Safety Administration
USACE	U.S. Army Corps of Engineers
USC	United States Code

LIST OF ACRONYMS

USDA	U.S. Department of Agriculture
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
Vector	Vector Pipeline L.P.
VOC	volatile organic compound
WHPA	Wellhead Protection Area
WHPP	Wellhead Protection Program
WNS	White Nose Syndrome
WWH	warm water habitat

EXECUTIVE SUMMARY

INTRODUCTION

On November 20, 2015, NEXUS Gas Transmission, LLC (NEXUS) filed an application with the Federal Energy Regulatory Commission (FERC or Commission) in Docket No. CP16-22-000 pursuant to Section 7(c) of the Natural Gas Act (NGA) and Parts 157 and 284 of the Commission's regulations. NEXUS is seeking a Certificate of Public Convenience and Necessity (Certificate) to construct, own, and operate a new natural gas pipeline system in Ohio and Michigan. NEXUS' proposed project is referred to as the NEXUS Gas Transmission Project (NGT Project).

On November 20, 2015, Texas Eastern Transmission, LP (Texas Eastern) filed an abbreviated application with FERC in Docket No. CP16-23-000 pursuant to Sections 7(b) and 7(c) of the NGA and Parts 157 and 284 of the Commission's regulations for a Certificate to construct, own, and operate a natural gas pipeline and related facilities in Ohio as well as approval to abandon by lease to NEXUS the capacity created by the Texas Eastern Appalachian Lease Project (TEAL Project) facilities. Collectively the applications are referred to as the "Projects."[1]

The purpose of this environmental impact statement (EIS) is to inform FERC decision-makers, the public, and the permitting agencies about the potential adverse and beneficial environmental impacts of the Projects, as well as alternatives, and recommend mitigation measures that would reduce adverse impacts to the extent practicable. We[2] prepared this EIS to assess the environmental impacts associated with construction and operation of the Projects as required under the National Environmental Policy Act of 1969 (NEPA), as amended. Our analysis was based on information provided by the applicants and further developed from data requests; field investigations; scoping; literature research; contacts with or comments from federal, state, and local agencies; and comments from individual members of the public.

The U.S. Environmental Protection Agency (EPA) and U.S. Fish and Wildlife Service (FWS) are participating as cooperating agencies in the preparation of this EIS.[3]

PROPOSED ACTION

The NGT and TEAL Projects include about 260.6 miles of pipeline composed of the following facilities:

- NEXUS' mainline, which consists of about 255.7 miles of new 36-inch-diameter mainline pipeline in Ohio and Michigan;
- NEXUS' interconnecting pipeline, which consists of about 0.9 mile of new 36-inch-diameter interconnecting pipeline in Ohio;

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[1] In a related matter, on November 24, 2015, DTE Gas Company (DTE Gas) filed an application with FERC in Docket No. CP16-24-000 seeking approval of a lease of capacity on DTE Gas's system to NEXUS. On March 11, 2015, Vector Pipeline L.P. (Vector) filed an application with FERC in Docket No. CP16-102-000 seeking approval of a lease of capacity on Vector's system to NEXUS. Any new or modified facilities associated with these actions are proposed to be constructed under an existing Blanket Certificate or are under the jurisdiction of another agency or country.

[2] "We," "us," and "our" refer to the environmental staff of FERC's Office of Energy Projects.

[3] A cooperating agency has jurisdiction by law or special expertise with respect to environmental impacts involved with the proposed project and is involved in the NEPA analysis.

- Texas Eastern's pipeline loop, which comprises about 4.4 miles of new 36-inch-diameter loop pipeline in Ohio; and
- Texas Eastern's connecting pipeline, which comprises about 0.3 mile of new 30-inch-diameter interconnecting pipeline in Ohio.

The Projects' aboveground facilities include:

- NEXUS' 4 new compressor stations, 6 new metering and regulating (M&R) stations, and 17 new mainline valves;
- Texas Eastern's new compressor station, modifications of an existing compressor station, two new pig[4] launchers/receivers, and temporary pig launcher/receiver; and
- additional new facilities and modifications, such as pig launchers/receivers, communication towers, and regulators, installed at other aboveground facility sites.

Subject to the receipt of FERC authorization and all other applicable permits, authorizations, and approvals, the applicants anticipate starting construction as soon as possible, with an in-service date of November 2017, except for Texas Eastern's modifications to its existing compressor station, which has an in-service date of October 2018.

The Projects would provide for the transportation of 1.5 million dekatherms per day of natural gas from the Appalachian Basin to consuming markets in Northern Ohio and Southeastern Michigan as well as the Dawn Hub in Ontario, Canada. Supply also would be able to reach the Chicago Hub in northern Illinois and other Midwestern markets through interconnections with other pipelines. NEXUS indicated that the need for the Projects originates from an increase in demand for natural gas in the region for electric generation, home heating, and industrial use, coupled with a decrease of imports of natural gas to the region by traditional supply sources, mainly western Canada and the Gulf Coast. The Projects would meet this need by importing natural gas to the region from newly available sources, mainly the Appalachian Basin.

PUBLIC INVOLVEMENT

On January 9, 2015, and January 26, 2015, FERC began its pre-filing review of the NGT Project and TEAL Project, respectively, and established pre-filing Docket Nos. PF15-10-000 and PF15-11-000 to place information related to the Projects into the public record.

On April 8, 2015, FERC issued a *Notice of Intent to Prepare an Environmental Impact Statement for the Planned Nexus Gas Transmission Project and Texas Eastern Appalachian Lease Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meetings* (*NOI*). The *NOI* was published in the Federal Register on April 15, 2015, and mailed to 4,319 interested parties, including federal, state, and local agencies; elected officials; environmental and public interest groups; Native American tribes; potentially affected landowners; local libraries and newspapers; and other stakeholders who had indicated an interest in the NGT and TEAL Projects. Publication of the *NOI* established a 30-day public comment period for the submission of comments, concerns, and issues related to the environmental aspects of the Projects.

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[4] A pig is an internal tool that can be used to clean and dry a pipeline and/or to inspect it for damage or corrosion. A pig launcher/receiver is an aboveground facility where pigs are inserted into or received from the pipeline.

Between April 28, 2015, and May 7, 2015, FERC conducted public scoping meetings in Grafton, Wadsworth, Louisville, Swanton, and Fremont, Ohio; and Tecumseh, Michigan to provide an opportunity for agencies, stakeholders, and the general public to learn more about the planned pipeline Project and participate in the environmental analysis by commenting on the issues to be addressed in the draft EIS.

On April 15, 2016, the Commission issued a letter to certain affected landowners describing route modifications on the NGT Project, inviting newly affected landowners to participate in the environmental review process, and opening an additional 30-day scoping period.

Substantive environmental issues identified through this public review process are addressed in this EIS. The transcripts of the public scoping meetings and all written comments are part of FERC's public record for each Project and are available for viewing using the appropriate docket number.

ENVIRONMENTAL IMPACTS AND MITIGATION

We evaluated the potential impacts of construction and operation of the Projects on geology; soils; water resources; wetlands; vegetation; wildlife and aquatic resources; threatened, endangered, and special status species; land use, recreation, and visual resources; socioeconomics; cultural resources; air quality and noise; reliability and safety; and cumulative impacts. Where necessary, we recommend additional mitigation measures to minimize or avoid these impacts. In Section 3 of this EIS, we summarize the evaluation of alternatives to the Projects, including the no-action alternative, system alternatives, major route alternatives, and minor route variations. Sections 5.1 and 5.2 of the EIS contain our conclusions and a compilation of our recommended mitigation measures, respectively.

Construction of the Projects would affect a total of 5,250.9 acres of land, including land for the pipeline facilities, aboveground facilities, contractor yards, staging areas and access roads. Permanent operations would require about 1,707.4 acres of land, including land for the new permanent pipeline rights-of-way, aboveground facility sites, and permanent access roads. The remaining 3,543.5 acres of land disturbed during construction would be restored and allowed to revert to its former use.

Important issues identified as a result of our analyses, scoping comments, and agency consultations include impacts on geology; water resources, and wetlands; vegetation, wildlife, and aquatic species; special status species; land use, recreation, and visual resources; cultural resources; air quality and noise; safety and reliability; and cumulative impacts.

Geology

The overall effect of the Projects on geologic resources would be minor. Geologic impacts would be limited to disturbance to the existing topography within the Projects area. All areas disturbed during construction, including in rugged terrain, would be returned as closely as possible to preconstruction contours during cleanup and restoration.

The removal of bedrock, including by blasting, may be required if bedrock is encountered within the pipeline trench or at aboveground facility sites. We have reviewed the applicants' *Blasting Plans* and find them acceptable.

The potential for the Projects to be adversely affected by seismic activity, active faults, or soil liquefaction is low due to the low probability of significant earthquakes in the area. The potential for the NGT Project to be adversely affected by landslide also is low; however, the TEAL Project is in an area of elevated landslide risk. During final design, Texas Eastern has committed to conducting geotechnical investigations to further evaluate landslide risk in areas of steep slopes, and would implement best management practices as outlined in its *Erosion and Sediment Control Plan* (*E&SCP*) to manage surface water and maintain slope stability. We have reviewed the *E&SCP* and found it consistent with our *Upland Erosion Control, Revegetation, and Maintenance Plan* and *Wetland and Waterbody Construction and Mitigation Procedures*. Where the *E&SCP* differed from our plans, we found the modifications acceptable. To ensure landslide risks are appropriately mitigated, Texas Eastern would file the results of the geotechnical studies and final landslide mitigation measures with the Commission for review and approval prior to construction.

There are areas along the NGT Project where a karst hazard may be present; no karst hazards exist along the TEAL Project. NEXUS has routed the NGT Project to avoid known sinkholes and conducted electromagnetic geophysical surveys to identify additional karst. All construction supervisory staff and inspectors would be trained to recognize the signs of sinkhole formation. If previously undocumented karst features are encountered during construction, NEXUS would implement a minor reroute, if possible, to avoid the feature, or stabilize the feature to avoid further sinkhole development.

Ground subsidence could occur in areas where abandoned underground mines are crossed. NEXUS has routed the NGT Project to avoid all known abandoned underground mines. Texas Eastern has routed the TEAL Project above abandoned underground mines at the same location as its existing facilities, which have been unaffected by mine subsidence. NEXUS would implement additional investigation (and mitigation, if necessary) in the event that a previously undocumented abandoned underground mine is discovered prior to or during construction.

Flash flooding is a potential hazard in the Projects area. NEXUS and Texas Eastern would bury the pipeline to a depth that would provide at least 5 feet of cover below the existing streambed. In addition, NEXUS and Texas Eastern would implement the measures in their respective *E&SCPs* to reduce the likelihood of sedimentation and erosion during flash flood events.

With the implementation of NEXUS' and Texas Eastern's *E&SCPs*, *Blasting Plans*, plans to further evaluate landslide risk, and procedures to be followed in the event of discovery of previously undocumented karst features or abandoned underground mines, we conclude that impacts on geological resources would be adequately minimized.

Groundwater, Surface Water, Water Use, and Wetlands

Construction of the Projects could result in increased turbidity and alteration of flow in shallow aquifers if encountered within trench depth or during grading and excavation at aboveground facilities. These impacts would be minimized by measures included in the applicants' *E&SCPs*. An inadvertent release of fuel, lubricants, and other substances would be minimized and mitigated by implementing the applicants' Project-specific *Spill Prevention, Control, and Countermeasure Plans (SPCC Plans)* that identify contractor training, the use of environmental inspectors, procedures for the safe storage and use of hazardous materials, and remedial actions that would be taken to address a spill. We have reviewed the *SPCC Plans* and find them acceptable.

A total of 245 wells and 6 springs were identified within 150 feet of the Projects. Additionally, the NGT Project would cross 16 wellhead protection areas; the TEAL Project would not cross any wellhead protection areas. To mitigate impacts on wells, springs, and wellhead protection areas, the applicants would offer to conduct pre- and post-construction testing of water quality and yield in all wells within 150 feet of the construction workspace. The applicants would also implement their *SPCC Plans* to avoid, minimize, and mitigate any chemical spills, and would prohibit fueling within 200 feet of a private well and within 400 feet of a public well. In addition, the applicants would repair or replace any wells that are adversely affected, or would otherwise compensate the well owner.

NEXUS proposes to use the horizontal directional drill (HDD) construction method at several locations. Texas Eastern would not use the HDD construction method. An inadvertent release of drilling mud could occur during drilling operations, affecting groundwater quality. NEXUS would implement measures detailed in its Project-specific *HDD Monitoring and Inadvertent Return Contingency Plan* to avoid or minimize the inadvertent release of drilling mud, which we have reviewed and find acceptable.

NEXUS identified 112 sites with known or suspected soil and groundwater contamination within 0.25 mile of the NGT Project. Texas Eastern did not identify any sites within 0.25 mile of the TEAL Project. The majority of these sites were determined to be unlikely to impact groundwater quality beneath the NGT Project; however, we recommend that NEXUS further assess the potential for 11 of the sites to impact groundwater quality beneath the NGT Project and to provide site-specific plans to manage pre-existing contamination, if applicable, to the Commission for our review and approval.

The Projects would not significantly affect groundwater resources because the majority of construction would involve shallow, temporary, and localized excavation. Potential impacts would be avoided or further minimized by the use of construction techniques and mitigation measures described in the applicants' *E&SCPs*, *SPCC Plans*, and NEXUS' *HDD Monitoring and Inadvertent Return Contingency Plan*, as well as our recommendations.

The Projects would cross a total of 475 waterbodies (208 perennial, 156 intermittent, 90 ephemeral, 1 named reservoir, 5 ponds, and 5 unclassified). The applicants would use the HDD method at 18 waterbody crossings, including all Section 10 navigable, National River Inventory-designated, and Ohio Environmental Protection Agency (OEPA)-designated outstanding and superior water quality streams. The applicants would use the conventional bore method to cross 69 waterbodies. The remaining waterbodies would be crossed using dry (dam-and-pump or flume) and open-cut wet crossing methods. Successful implementation of HDD or bore methods would avoid impacts on waterbodies. Impacts on waterbodies that would be crossed using dry and open-cut wet crossing methods would be minimized by implementing mitigation measures outlined in the applicants' *E&SCPs* and other project-specific plans. We recommend that NEXUS file additional geotechnical feasibility data at several locations prior to beginning HDD construction and also file, in the event of an unsuccessful HDD, contingency crossing plans for these waterbodies, for our review and written approval.

The Projects would cross 12 surface water protection areas and 5 waterbodies that have public water intakes within 3 miles downstream. The applicants would avoid or minimize impacts by implementing the BMPs detailed in each Project's *E&SCP* and *SPCC Plan*, and the NGT Project *Blasting Plan*, if needed, and would use HDD and conventional bore crossing methods for several stream crossings.

The applicants requested use of additional temporary workspace (ATWS) in several areas where they concluded that site-specific conditions do not allow for a 50-foot setback of extra workspace from waterbodies. Based on our review, we believe that NEXUS has provided adequate justification for the need of the ATWS at all locations on the NGT Project. We recommend that Texas Eastern provide further justification for several ATWS on the TEAL Project, or move the workspaces to a distance of 50 feet or greater from waterbodies.

No long-term effects on surface waters would result from construction and operation of the Project. No designated water uses would be permanently affected. During maintenance activities in or near streams, the applicants would employ protective measures similar to those proposed for construction of the Projects. Consequently, we conclude that any maintenance-related effects would be short term.

The applicants would use both surface water and water trucks as sources for hydrostatic testing, the HDD construction method, and dust suppression. The source of water transported by trucks could be from municipal or groundwater sources. Impacts associated with the withdrawal of surface water would be effectively minimized by using pumps placed adjacent to the waterbody with hoses placed into the waterbody with floating intake structures that would be screened to prevent the uptake of aquatic organisms and fish. Additionally, water withdrawals would be conducted in compliance with all necessary permits required for surface water extraction. Discharge of water to upland areas could contribute to erosion, which would be minimized by adhering to the measures contained in the Projects' *E&SCPs*.

Based on the mitigation measures developed by the applicants as described in this summary, as well as our recommendations, we conclude that the Projects would not have significant adverse impacts on surface water resources.

Construction of the pipeline facilities associated with the Projects would temporarily affect a total of 191.6 acres of wetlands. No wetlands would be permanently filled. Impacts on emergent wetlands would be relatively brief because the emergent vegetation would regenerate quickly, typically within one to three years. Impacts on scrub-shrub and forested wetlands would be long-term or permanent because the woody vegetation would take several years to grow back. Additionally, the applicants would maintain a 10-foot-wide corridor centered over the pipeline in an herbaceous state and would selectively cut trees within 15 feet of the pipeline centerline. Approximately 39.9 acres would be converted from forested or scrub-shrub wetland to emergent or scrub-shrub wetland.

Construction and operation-related impacts on wetlands would be mitigated by the applicants. NEXUS would create a project-specific *Wetland Mitigation Plan* in consultation with the U.S. Army Corps of Engineers (USACE), Michigan Department of Environmental Quality (MDEQ), and OEPA, where mitigation would include the purchase of wetland mitigation credits from established wetland mitigation banks, the use of an in-lieu fee program, or a combination of the two. Texas Eastern would create a project-specific *Wetland Mitigation Plan* in consultation with USACE and OEPA. Mitigation would include the purchase of wetland mitigation credits from established wetland mitigation banks, the use of an in-lieu fee program, or a combination of the two. We recommend that each applicant file its final *Wetland Mitigation Plan* with the Commission prior to construction.

The applicants requested use of ATWS in several areas where they concluded that site-specific conditions do not allow for a 50-foot setback of extra workspace from wetlands. Based on our review, we believe that NEXUS has provided adequate justification for the need of the ATWS at all locations on the NGT Project. We recommend that Texas Eastern provide further justification for several ATWS on the TEAL Project, or move the workspaces to a distance of 50 feet or greater from wetlands.

Based on the types and amounts of wetlands that would be impacted and the applicants' measures to avoid, minimize, and mitigate wetlands impacts as described in their construction and restoration plans, as well as our recommendations, we conclude that impacts on wetlands would be effectively minimized or mitigated. These impacts would be further minimized and mitigated by the applicants' compliance with USACE Section 404 and state permit requirements, including the purchase of wetland mitigation credits and use of in-lieu fee programs.

Vegetation, Wildlife, and Aquatic Resources

Construction of the Projects would affect 371.5 acres of forested upland, 43.3 acres of forested wetland, 571.8 acres of open upland, 43.8 acres of emergent wetland, and 19.5 acres of scrub-shrub wetland. The remaining 4,202.7 acres are agricultural land, developed land, or open water. Operation of the Projects would affect 148.0 acres of forested upland, 26.7 acres of forested wetland, 154.5 acres of open upland, 21.0 acres of emergent wetland, and 10.0 acres of scrub-shrub wetland. The remaining 1,347.4 acres are agricultural land, developed land, or open water.

Impacts on upland open land, emergent wetlands, and agricultural lands would be short term as these vegetation cover types would likely return to their pre-construction states within one to three growing seasons after restoration is complete. Impacts on forested uplands, forest wetlands, and scrub-shrub wetlands would be long-term or permanent. However, due to the prevalence of forested habitats within the Projects area, the ability to co-locate the proposed facilities adjacent to existing rights-of-way (46 percent of the route would be co-located), and the eventual regrowth of forested areas outside of the permanent right-of-way, we conclude that the permanent conversion of forested lands would not result in a significant impact. In addition, impacts on forested and non-forested vegetation types would be further mitigated through implementation of the applicants' construction and restoration plans, as well as our recommendations.

The NGT Project would cross approximately 9.7 miles of the Oak Openings Region in Henry and Fulton Counties, Ohio. Roughly 99 percent of the ecosystem has been altered and fragmented by agricultural development, primarily through tree clearing and wetland draining. Botanical surveys confirmed two remnant communities totaling about 0.5 mile in length would be crossed by the NGT Project: the Swamp White Oak-Pin Oak Flatwoods and the Black Oak-White Oak/Blueberry Forest Plant communities. Neither of these areas contained all of the indicative species that would be present in high-quality remnant communities, and most of the clearing would be adjacent to the existing forest edge. Therefore, based on our review, impacts on the Oak Openings Region would be minor.

Construction of the Projects would temporarily impact about 1,049.9 acres of pollinator habitat (including upland forest, forested wetland, upland open land, emergent wetland, and scrub-shrub wetland). The applicants would revegetate both the temporary workspaces and permanent rights-of-way immediately after the pipeline facilities are installed with herbaceous and riparian seed mixes in consultation with the Natural Resources Conservation Service. Once revegetated, the restored workspaces and permanent rights-of-way would provide pollinator habitat after the first or second growing season, and may naturally improve pollinator habitat along the Projects area. We recommend that the Applicants provide a plan describing the feasibility of incorporating plant seeds that support pollinators into the seed mixes used for restoration of construction workspaces.

The applicants have identified several areas where noxious weeds or invasive species are present or are located near the construction right-of-way. NEXUS and Texas Eastern have each developed *Invasive Species Management Plans* to minimize and control the spread of the noxious and invasive species, which we reviewed and find acceptable.

The Projects could have both direct and indirect impacts on wildlife species and their habitats, including the displacement of wildlife, potential individual mortality, and reduction in habitat. Forest fragmentation would increase in certain locations due to clearing, thus reducing the amount of habitat available for interior forest species (i.e. movement and dispersal corridors). With habitat conversion and forest fragmentation, there is also a risk of intrusion by invasive or noxious species. To minimize wildlife impacts, the applicants have routed the pipelines to avoid a number of sensitive areas, co-locate with existing rights-of-way where practical, and reduce workspace in wetlands and interior forest areas. The applicants also would adhere to their respective *E&SCPs* and *Invasive Species Management Plans*.

A variety of migratory bird species, including Birds of Conservation Concern, are associated with the habitats that would be affected by the Projects. NEXUS has prepared a draft *Migratory Bird Conservation Plan* in coordination with the FWS Region 3 office for the portions of the NGT Project in

Michigan. The purpose of the plan is to reduce direct and indirect effects on migratory birds and their habitats. We recommend that NEXUS provide final *Migratory Bird Conservation Plans* for both Michigan and Ohio facilities prior to construction. During operations, the applicants would avoid mortalities or injuries of breeding birds and their eggs or young by conducting vegetation clearing and maintenance activities outside of the breeding season to the extent practicable, particularly in key habitat areas. Vegetative maintenance in the permanent right-of-way would take place no more than once every 3 years, and impacts on ground-nesting birds in upland areas would be minimized by conducting maintenance activities outside the nesting season (i.e., March 31 to August 1).

Based on the presence of suitable adjacent habitat available for use and given the impact avoidance, minimization, and mitigation measures proposed by NEXUS, as well as our recommendations, we conclude that the construction and operation of the Projects would not have a significant adverse effect on wildlife.

The Projects would involve crossing 465 waterbodies, many of which support fisheries and aquatic habitat. All of the waterbodies are classified as warmwater fisheries. Construction and operation of the Projects could result in temporary and permanent impacts on fisheries and aquatic habitat. To minimize impacts on fisheries and aquatic habitat, the applicants would follow their respective *E&SCPs*. Further, all waterbodies identified as fisheries of concern (potentially containing federally or state-listed species) would be crossed using dry crossing methods or HDDs. Based on our review of the potential impacts, we conclude that construction and operation of the Projects would not significantly impact fisheries or aquatic resources.

Threatened, Endangered, and Other Special Status Species

To comply with Section 7 of the Endangered Species Act (ESA), we consulted either directly or indirectly (through the applicants' informal consultation) with the FWS and state resource agencies regarding the presence of federally listed, proposed for listing, or state-listed species in the Projects area. Based on these consultations, we identified 11 federally listed or proposed species as potentially occurring in the Projects area. We determined that the northern riffleshell, the snuffbox mussel, Mitchell's satyr butterfly, the Poweshiek skipperling, the Karner blue butterfly, and the eastern prairie fringed orchid would not be affected by construction and operation of the Projects. We also determined that the Projects may affect, but would not likely adversely affect, the Indiana bat, Kirtland's warbler, the rayed bean mussel, and the eastern massasauga rattlesnake. The Projects may affect, and are likely to adversely affect, the northern long-eared bat; however, under the current 4(d) rule, incidental take of this species is not prohibited.

NEXUS is preparing an Applicant-Prepared Biological Assessment (APBA) as a contingency for adjustments to construction schedules and constraints regarding access to properties, and in the event the 4(d) rule is no longer applicable for the northern long-eared bat due to pending legal challenges. The APBA would define anticipated impacts on both Indiana bats and northern long-eared bats in the event that spring and/or summer clearing may be required, and would provide the data necessary for the FWS to calculate levels of take for both species. We recommend that NEXUS continue Section 7 consultations with the FWS and file all results of its consultations with the Secretary for review prior to construction.

In addition, because spring emergence surveys are pending for the eastern massasauga rattlesnake (currently proposed for listing under the ESA) we recommend that prior to construction of the NGT Project, NEXUS should file with the Secretary the 2016 survey results and any mitigation measures developed in consultation with the FWS for the eastern massasauga rattlesnake.

The bald eagle retains federal protection under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act, which prohibit the taking of eagles, their eggs, or their nests. NEXUS conducted aerial bald eagle nest surveys along the NGT Project route in spring 2015. No bald eagle nests were identified within 660 feet of the NGT Project area; therefore, no impact on bald eagles is anticipated. However, we recommend that prior to construction, NEXUS should conduct additional bald eagle nest surveys to determine if any new eagle nests are present within 660 feet of the construction workspace.

A total of 91 state-listed species may occur in the Projects area. Seventy-seven (77) species are listed at the state level only; 11 species are also listed as federally protected, while 3 are listed as federally protected, but are not present in the Projects area. The applicants have proposed measures to reduce habitat and species impacts, and continue to consult with resource agencies to identify and develop additional conservation and mitigation measures to further minimize impacts on state-listed species. State permitting agencies have further opportunity during their permit review and authorization processes to require additional conservation and mitigation measures that would further protect and conserve sensitive species and their habitats according to each agencies' mission and conservation goals.

Although a number of other candidate, state-listed, or special concern species were identified as potentially present in the Projects area, none were detected during surveys and we do not expect any adverse effects given the applicants' proposed measures and our recommendations. Based on implementation of these measures and our recommendations, we conclude that impacts on special-status species would be adequately avoided or minimized.

Land Use, Recreation, and Visual Resources

Construction of the Projects would affect a total of 5,223.7 acres of land. About 85.6 percent of this acreage would be utilized for the pipeline facilities, including the construction right-of-way (59.1 percent) and additional temporary workspace (26.5 percent). The remaining acreage affected during construction would be associated with contractor yards (4.5 percent), staging areas (0.9 percent), new and modified aboveground facilities (7.7 percent), and access roads (1.3 percent). During operation, the new permanent pipeline right-of-way, aboveground facilities, and permanent access roads would affect 1,707.4 acres of land.

The land retained as new permanent right-of-way would generally be allowed to revert to its former use, except for forest/woodland and tree crops. Certain activities, such as the construction of permanent structures or the planting of trees, would be prohibited within the permanent right-of-way. To facilitate pipeline inspection, operation, and maintenance, the entire permanent right-of-way in upland areas would be maintained in an herbaceous vegetated state. This maintained right-of-way would be mowed no more than once every 3 years, but a 10-foot-wide strip centered over the pipeline might be mowed more frequently to facilitate corrosion and other operational surveys.

The NGT Project's proposed construction work area is within 50 feet of 178 structures including 15 residences and/or their associated structures. The TEAL Project is not within 50 feet of any structure. NEXUS has developed site-specific residential construction plans for the residential structures within 50 feet of the construction work area. We reviewed these plans and find them acceptable; however, we are encouraging the owners of each of these residences to provide us comments on the plan specific for their property (see appendix E-5). Also, to further minimize effects on residences, we recommend that for all residences located within 10 feet of the construction work area, NEXUS provide evidence of landowner concurrence with the *Site-specific Residential Construction Plans*. NEXUS has also developed an *Issue Resolution Plan* that identifies how stakeholders can contact pipeline company representatives with questions, concerns, and complaints prior to, during, and after construction. We have reviewed this plan and find it acceptable.

Sixty-two (62) planned or ongoing residential and commercial/industrial development projects have been identified within 0.25 mile of the proposed NGT Project facilities. We recommend that NEXUS continue discussions with landowners/developers and file updated correspondence with the Commission prior to the end of the draft EIS comment period for review and approval. No planned or ongoing residential or commercial/industrial development projects were identified within 0.25 mile of the proposed TEAL Project facilities.

Construction of the Projects would affect a total of 4,016.3 acres of agricultural land, and 1,331.8 acres would be retained during operation of the Project. Agricultural land in the construction rights-of-way would generally be taken out of production for one growing season and would be restored to previous use following construction (except fruit and tree crops). NEXUS would provide agricultural monitors that would be on site to monitor construction activities within agricultural lands.

NEXUS developed a *Drain Tile Mitigation Plan*, which provides a general overview of the types of drain tile systems potentially encountered during construction, and describes NEXUS' drain tile mitigation strategy during pre-construction, construction, and post-construction. If drain tiles are damaged during construction, temporary repairs would be conducted immediately and permanent repairs would be completed following construction. Repairs and restoration to these systems conducted by NEXUS would be monitored for three years, or until restoration is considered successful, to ensure the system functions properly. We reviewed this plan and find it acceptable.

The NGT Project crosses four certified organic farms and several specialty crop lands. The TEAL Project does not cross any certified organic farms or specialty crop lands. We recommend that NEXUS develop Organic Farm Protection Plans in coordination with organic farm landowners and applicable certifying agencies for each certified organic farm that would be crossed or be within 1.0 mile of the NGT Project that has the potential to experience direct and indirect effects as a result of construction or operation (e.g., pesticide drift, water migration, weeds). Operation of the NGT Project would affect 96.8 acres of specialty crops. NEXUS would compensate landowners for any project-related damages and lost production on organic farms and specialty crop lands.

The NGT Project crosses several parcels of land enrolled in the Current Agricultural Use Value program, the Ohio Forest Tax Law program, or are protected by conservation easements. The NGT Project also crosses a number of areas enrolled in a variety of Farm Service Agency enrolled land including Conservation Reserve Program (CRP) lands. On program lands where tree clearing is necessary, NEXUS would reimburse the landowner the fair market value for any loss of crop or timber for any area disturbed due to the construction of the pipeline. Also, NEXUS would work with landowners and local program officials to determine how the crossing of enrolled lands by the NGT Project affects the continued participation in the program by landowners. Because the information is pending, we recommend that Texas Eastern file with the Commission for review and approval prior the end of the draft EIS comment period a list by milepost of the CRP lands that would be crossed by the TEAL Project, identify construction and operation impacts (acres), and identify mitigation measures specific to each CRP parcel crossed.

The NGT Project would directly affect numerous trails, conservation and recreation areas, sports facilities, state parks and forests, nature and heritage areas, municipal parks, and federal- and state-designated recreation areas. The TEAL Project would not cross or be located within 0.25 mile of any public or private lands that support recreation or special interests. In general, effects of the NGT Project on recreational and special interest areas would be temporary and limited to the period of active construction, which typically lasts several days to several weeks in any one area. These effects would be minimized by implementing the measures in NEXUS' *E&SCP* and site-specific crossing plans, and working with the landowners of the recreational and special interest areas to avoid, minimize, or mitigate impacts on these areas. In addition, NEXUS would continue to consult with the owners and managing agencies of recreation and special interest areas regarding the need for specific construction mitigation measures. While NEXUS has provided site-specific crossing plans for some recreational and special interest areas, similar plans have yet to be provided for trails (land and waterway) where closure would be required during construction. We recommend that prior to the end of the draft EIS comment period NEXUS file with the Commission for review and approval site-specific crossing plans for trails (land and waterway) that would be closed during construction that show where a detour or portage would be placed, show where signage would be placed warning recreationalists of the detour or portage, and provide documentation that the plan was developed in coordination with the landowner or land-managing agency.

Portions of the NGT Project are subject to a federal Coastal Zone Consistency Review in Ohio; designated coastal zones in Michigan would not be affected. Because a consistency determination has not yet been received, we recommend that NEXUS file documentation with the Commission for review and approval prior to construction of concurrence from the ODNR that the NGT Project is consistent with the Coastal Zone Management Act.

The NGT Project would be within 0.25 mile of 112 sites listed as potential or known sources of contamination and hazardous wastes. There are no properties within 0.25 mile of the TEAL Project facilities that are listed as potential or known sources of contamination. In the event that construction activities encounter contaminated or hazardous wastes, NEXUS would implement its *Hazardous Waste Management Plan*, which includes measures that it would implement in the event contaminated media is encountered during construction. We have reviewed this plan and find it acceptable. The NGT Project would cross one site, the former Willow Run Powertrain Plant (also referred to as the Revitalizing Auto Communities Environmental Response [RACER] Trust site), for approximately 0.8 mile. The site is managed under the EPA's Resource Conservation Recovery Act and remediation is overseen by the MDEQ. To avoid impacting the site and encountering contaminated media, NEXUS is proposing to cross under the site using the HDD method.

Impacts on visual resources would be greatest where the pipeline routes parallel or cross roads and the pipeline rights-of-way may be seen by passing motorists, from residences where vegetation used for visual screening or for ornamental value is removed, and where the pipelines are routed through forested areas. The visual effects of construction in forested areas would be permanent on the maintained right-of-way where the regrowth of trees would not be allowed, and would be long term in the temporary workspaces. After construction, all disturbed areas, including forested areas, would be restored in compliance with NEXUS' and Texas Eastern's *E&SCPs*; federal, state, and local permits; landowner agreements; and easement requirements. Generally this would include seeding the restored areas with grasses and other herbaceous vegetation, after which trees would be allowed to regenerate within the temporary workspaces.

Visual effects also would occur at rivers, trails, railroads, roads, and historic properties that are valued for their scenic quality. These include the Maumee River, North Country National Scenic Trail, Cuyahoga Valley Scenic Railroad, America's Byway, Lincoln Highway Historic Byway, Maumee Valley Scenic Byway, and the Abbott-Page house. Visual impacts on these areas would be minimized by co-location with an existing corridor or use of HDD or bore construction method.

NEXUS has designed aboveground facilities to preserve existing tree buffers within purchased parcels to the extent practicable. To further mitigate visual impacts, NEXUS would install perimeter fences, directionally controlled lighting, and slatted fencing at its compressor station sites. Several residents expressed concern about the visual impacts of the Hanoverton, Wadsworth, and Waterville Compressor Stations. Therefore, we recommend that NEXUS develop visual screening plans for these stations and that the plans be filed with the Commission for review and approval prior to the end of the draft EIS comment period.

Cultural Resources

The applicants identified 178 archaeological sites within the study areas. Of the sites, the applicants recommended 9 as potentially eligible, 165 as not eligible, and 4 were not assessed. The Ohio State Historic Preservation Officer (SHPO) provided comments on the Ohio portion of the NGT Project. The Ohio SHPO requested the eligibility of 12 sites be re-assessed and that 2 additional sites are potentially eligible for the National Register of Historic Place (NRHP) and should be avoided or Phase II site evaluation would be necessary. The Ohio SHPO has not provided comments on the TEAL Project. The Michigan SHPO has not provided comments on the eligibility of the identified resources.

The applicants identified 210 historic architectural properties within the study areas. Of the properties, 3 are NRHP-listed districts, and 5 have been determined eligible. Of the remaining properties, the applicants recommended 34 as eligible or potentially eligible, 167 as not eligible, and 1 was not assessed. The Ohio SHPO provided comments on the Ohio portion of the NGT Project. The Ohio SHPO recommended 13 additional resources for further investigation in order to determine their potential NRHP eligibility. The Ohio SHPO has not provided comments on the TEAL Project. The Michigan SHPO has not provided comments on the eligibility of the identified resources.

Both we and NEXUS consulted with 42 federally recognized Native American tribes, as well as several other non-governmental organizations, local historical societies, historic preservation and heritage organizations, conservation districts, and other potential interested parties to provide them an opportunity to comment on the proposed Projects. TEAL consulted with 8 of the 42 federally recognized Native American tribes that we also contacted. Michigan’s Washtenaw County Office of Community and Economic Development requested information on three historic properties within proximity to the NGT Project. NEXUS confirmed all three properties would not be affected. Several tribes requested additional consultation or information, and the Delaware Nation, Miami Tribe of Oklahoma, and Peoria Tribe of Indians of Oklahoma requested notification if unanticipated discoveries are encountered during construction. The Chippewa-Cree Indians of the Rocky Boy’s Reservation responded with a request to be consulted on the NGT Project due to the potential to affect properties of traditional and cultural significance. We will continue to consult with the tribes.

The applicants have planned the Projects to avoid impacting resources eligible for listing on the National Register of Historic Places (NRHP). If NRHP-eligible resources are identified that cannot be avoided, the applicants would prepare treatment plans. Implementation of a treatment plan would only occur after certification of the Projects and after FERC provides written notification to proceed. Compliance with Section 106 of the National Historic Preservation Act (NHPA) has not been completed for the Projects. To ensure that our responsibilities under Section 106 of the NHPA are met, we recommend that applicants not begin construction until any additional required surveys are completed, survey reports and treatment plans (if necessary) have been reviewed by the appropriate parties, and we provide written notification to proceed. The studies and impact avoidance, minimization, and measures proposed by NEXUS and Texas Eastern, and our recommendation, would ensure that any adverse effects on cultural resources would be appropriately mitigated.

Air Quality and Noise

Air quality impacts associated with construction of the Projects would include emissions from fossil-fueled construction equipment and fugitive dust. NEXUS and Texas Eastern would implement their respective *Fugitive Dust Control Plans* to limit impacts associated with particulates. We have reviewed this plan and find it acceptable. In nonattainment and maintenance areas, estimated construction emission would not exceed general conformity applicability thresholds.

Operation of the Projects would result in air emissions from stationary equipment (e.g., turbines, emergency generators, and heaters at compressor and M&R stations), including emissions of nitrogen oxides, particulate matter, sulfur dioxides, volatile organic compounds, greenhouse gases (including fugitive methane), and hazardous air pollutants. NEXUS and Texas Eastern submitted air quality applications to the MDEQ and OEPA in accordance with federal and state requirements. Emissions from the new aboveground facilities and modifications to existing facilities, including the proposed meter and regulator stations, would not have a significant impact on local or regional air quality.

Based on the analysis in the EIS and compliance with federal and state air quality regulations, we conclude that operational emissions would not have a significant impact on local or regional air quality.

Noise would be generated during construction of the pipeline and aboveground facilities, but would be spread over the length of the pipeline route and would not be concentrated at any one location for an extended period of time, except at proposed HDD sites and aboveground facility construction sites. Because mitigated noise levels attributable to the proposed HDDs are anticipated to be below the FERC 55 A-weighted decibles (dBA) day-night sound level (L_{dn}) sound criterion at all noise sensitive areas (NSA) within a 0.5-mile radius of the HDD entry and exit points, overnight construction, if necessary, is not expected to create significant impacts on surrounding NSAs. NEXUS indicated that landowners within 0.5 mile would be notified in advance of planned nighttime HDD construction activities. However, we recommend that NEXUS file the results of noise measurements for each HDD entry and exit site at the start of drilling operations. If the noise measurements exceed 55 dBA or results in a noise increase greater than 10 decibels over ambient levels, NEXUS should implement additional mitigation measures.

The Projects would likely require blasting in some areas of the proposed route to dislodge bedrock, resulting in potential noise and vibration impacts. NEXUS' and Texas Eastern's *Blasting Plans* include mitigation measures related to blasting activity. Blasting would be conducted in accordance with applicable agency regulations, including advance public notification and mitigation measures as necessary.

To ensure that the noise levels during operation of the compressor stations and meter and regulator stations do not exceed the FERC 55 dBA L_{dn} sound criterion, we recommend that NEXUS and Texas Eastern file noise surveys at full load conditions and install additional noise controls if the levels are exceeded.

We received comments regarding the potential for low frequency vibrations from compressor stations to cause or exacerbate health issues. FERC regulations state that a new compressor station or modification of an existing station shall not result in a perceptible increase in vibration at any NSA. This would apply to compressor stations for both the NGT and TEAL Projects. FERC staff would investigate noise and vibration complaints and, to the extent that a violation is documented, each company would be required to address the issue.

We received comments about potential impacts on residents due to low frequency sounds waves generated by high pressure natural gas flowing through a pipeline. This type of noise is typically associated with reciprocating engines. The proposed compressor units at all compressor stations are turbines, and this issue would not occur.

Based on the analyses conducted, the proposed mitigation measures, and our recommendations, we concluded that construction and operation of the Projects would not result in significant noise impacts on residents and the surrounding environment.

Safety and Reliability

We received several comments about the safety of homes, schools, hospitals, etc., within the potential impact radius for the NGT Project. The potential impact radius for the NGT Project would be 1,100 feet. For the NGT Project compressor stations, the potential impact radius would be 943 feet.

The pipeline and aboveground facilities associated with the Projects would be designed, constructed, operated, and maintained to meet the U.S. Department of Transportation (DOT) Minimum Federal Safety Standards in 49 Code of Federal Regulations (CFR) 192 and other applicable federal and state regulations. At compressor stations, NEXUS and Texas Eastern would implement measures such as enclosing each compressors station within a chain-linked fence and installing video cameras and an alarm system for security, ventilating compressor buildings to prevent accumulating gas in an enclosed area; equipping the stations with automatic shutdown systems when unsafe conditions are detected; and installing relief valves to prevent over-pressurizing the pipeline. Based on NEXUS' and Texas Eastern's compliance with federal design and safety standards as well as their implementation of safety measures, we conclude that constructing and operating the pipeline facilities would not significantly impact public safety.

NEXUS would develop a Public Awareness Program for its system, which would provide outreach measures to the affected public, emergency responders, and public officials. NEXUS would also mail informational brochures to landowners, businesses, potential excavators, and public officials along the pipeline system each year to inform them of the presence of the pipeline and instruct them on how to recognize and react to unusual activity in the area. Texas Eastern already has a similar program in place.

We received comments regarding the potential for accidents resulting from pipeline leaks, particularly leaks near electric power lines. Pipeline leaks typically occur at valve sites, fittings, etc., where the gas disperses into the atmosphere (e.g., the gas does not accumulate as it would in an enclosed space). As a result, the concentration of gas is not likely to result in impacts on power lines.

Cumulative Impacts

Three types of projects (past, present, and reasonably foreseeable projects) could potentially contribute to a cumulative impact when considered with the Projects. These projects include Marcellus Shale development (wells and gathering systems), FERC-jurisdictional natural gas pipelines, other natural gas facilities that are not under the Commission's jurisdiction, and other actions including electric transmission and generation projects, transportation projects, and residential and commercial developments.

A majority of the impacts associated with the proposed Projects in combination with other projects such as residential developments, wind farms, utility lines, and transportation projects, would be temporary and relatively minor overall, and we included recommendations in the EIS to further reduce the environmental impacts associated with the Projects. However, some long-term cumulative impacts would occur on wetland and forested vegetation and associated wildlife habitats. Also, some long-term cumulative benefits to the community would be realized from the increased tax revenues, jobs, wages, and purchases of goods and materials. Emissions associated with the Projects would contribute to cumulative air quality impacts. There is also the potential, however, that the Projects would contribute to a cumulative improvement in regional air quality if a portion of the natural gas associated with the Projects displaces the use of other more polluting fossil fuels.

We received comments regarding the NGT and TEAL Projects' impacts on climate change. We also received comments stating that our climate change analysis should include a lifecycle analysis of the NGT and TEAL Projects. The GHG emissions for construction and operation of the NGT and TEAL Projects are small (less that 0.1 percent each) when compared with the U.S. Greenhouse Gas Inventory of 6,873 million metric tons of carbon dioxide equivalent for 2014. The Commission staff's longstanding practice is to conduct an environmental review for each proposed project, or a number of proposed projects that are interdependent or otherwise interrelated or connected. NEPA does not, however, require us to engage in speculative lifecycle analyses or provide information that will not meaningfully inform the decision-making process.

We received comments regarding cumulative impacts on Ohio peatlands. NEXUS would implement its *Wetland Mitigation Plan*, which we recommend be filed with the Commission prior to construction. Other projects in proximity to the NGT Project would likely be required to implement similar mitigation measures to minimize wetland impacts. Based on NEXUS' mitigation measures and adherence to its project-specific *E&SCP*, we do not believe there would be a significant cumulative impact on peatlands in Ohio.

ALTERNATIVES

We evaluated the no-action alternative, system alternatives, major route alternatives, minor route variations, and alternative compressor station locations as alternatives to the proposed action. While the no-action alternative would eliminate the short- and long-term environmental impacts identified in the EIS, the stated objectives of the applicants' proposals would not be met.

Our analysis of system alternatives included an evaluation of whether existing or proposed natural gas pipeline systems could meet the Projects' objectives while offering an environmental advantage. We determined that six existing and three proposed systems potentially could be used in various combinations to transport natural gas to and from the markets served by the Projects; however, none of the existing pipelines have capacity available for transporting the required volumes of natural gas proposed by the applicants, nor do they service all the required receipt and delivery points. Consequently, there are no practicable existing or proposed system alternatives that are preferable to the proposed Projects.

During project planning, NEXUS incorporated many route alternatives and variations into its original route. In total, NEXUS adopted a total of 239 route changes totaling about 231 miles (91 percent of the pipeline route) for various reasons, including landowner requests, avoidance of sensitive resources, or engineering considerations. Texas Eastern did not incorporate route alternatives or variations because nearly all the pipeline is loop line.

We evaluated 12 major route alternatives to the proposed NEXUS pipeline route. We found that none of these would offer a major environmental advantage over the proposed route, and we eliminated them from further consideration. We did not evaluate major route alternatives to the TEAL pipeline route because nearly all the pipeline is loopline and we did not receive stakeholder comments on the loopline route.

We evaluated 17 minor route variations to the proposed NEXUS pipeline route. We determined that 15 of these minor route variations would not offer an environmental advantage over the proposed pipeline route and eliminated them from further consideration. We concluded that two of the minor route variation would have an environmental advantage and recommend that NEXUS incorporate the variations into its route. We did not evaluate minor route variations to the TEAL pipeline route because nearly all the pipeline is loopline and we did not receive stakeholder comments on the loopline route.

Numerous stakeholders commented that the pipeline should be routed in less populated areas further to the south to minimize the risk of a pipeline incident to the public. DOT safety standards are intended to ensure adequate protection of the public regardless of proximity to development and that pipelines must be designed, constructed, operated, and maintained in accordance with these safety standards.

The City of Green submitted an alternative route to the south of the proposed NEXUS pipeline route that would minimize the impacts of the pipeline on development in the vicinity of the city. We conclude that both the proposed route and City of Green Route Alternative are acceptable and recommended that NEXUS file a specific compressor station site for the City of Green Route Alternative. Landowners along the City of Green Route Alternative only recently have been added to the environmental review mailing list. Therefore, we encourage those landowners to provide us additional comments on the proposed route and City of Green Route Alternative during the draft EIS comment period.

NEXUS proposes to construct four new compressor stations, and Texas Eastern proposes to construct one new compressor station. We reviewed two or more alternative sites for each new compressor station and did not find a substantial environmental advantage over the proposed site in any of the cases; therefore, the alternative sites were eliminated from further consideration. We did, however, find both the proposed Hanoverton Compressor Station site and Alternative Site A to the Hanoverton Compressor Station acceptable and recommend that NEXUS file additional information on both sites.

We received comments suggesting that some of the compressor stations should be relocated to less populated area because of concerns about air and noise pollution; however, our analyses concluded that locating the compressor stations at the proposed sites would not have a significant impact on air quality or noise.

CONCLUSIONS

We determined that construction and operation of the Projects would result in some adverse environmental impacts, but impacts would be reduced to less-than-significant levels with the implementation of the applicants' proposed and our recommended mitigation measures. This determination is based on a review of the information provided by the applicants and further developed from data requests, field investigations, scoping, literature research, alternatives analysis, and contacts with federal, state, and local agencies as well as Indian tribes and individual members of the public.

Although many factors were considered in this determination, the principal reasons are:

- About 119.2 miles (46 percent) of the 261.4 miles of project pipeline facilities would be within or adjacent to existing rights-of-way, consisting of existing pipelines and/or electric transmission line rights-of-way.

- The applicants would minimize impacts on natural and cultural resources during construction and operation of the Projects by implementing, as required, their respective

E&SCPs, SPCC Plan, Blasting Plan, HDD Monitoring and Inadvertent Return Contingency Plan, Wetland Mitigation Plan, Invasive Species Management Plan, Migratory Bird Conservation Plan, Site-specific Residential Construction Plans Issue Resolution Plan, Drain Tile Mitigation Plan, Organic Farm Protection Plan, Hazardous Waste Management Plan, Fugitive Dust Control Plans, and Public Awareness Program.

- FERC staff would complete the process of complying with Section 7 of the ESA prior to construction.
- FERC staff would complete consultation under Section 106 of the NHPA and implementing regulations at 36 CFR 800 prior to construction.
- The applicants would comply with all applicable DOT safety standards for transportation of natural gas by pipeline.
- The applicants would comply with all applicable air and noise regulatory requirements during construction and operation of the Projects.
- An environmental inspection program would be implemented to ensure compliance with the mitigation measures that become conditions of FERC's authorization.

In addition, we recommend 47 project-specific mitigation measures that the applicants should implement to further reduce the environmental impacts that would otherwise result from construction and operation of the Projects. We are recommending that certain conditions be met prior to the end of the draft EIS comment period in order to allow for further assessment in the Final EIS. We conclude that these measures are necessary to reduce adverse impacts associated with the Projects and, in part, are basing our conclusions on implementation of these measures. Therefore, we recommend that these mitigation measures be attached as conditions to any authorization issued by the Commission. These recommended mitigation measures are presented in section 5.2 of the draft EIS.

1.0 INTRODUCTION

The Federal Energy Regulatory Commission (FERC or Commission) is responsible for authorizing the construction of interstate natural gas transmission pipeline facilities. As part of its decision-making process, the Commission is required by the National Environmental Policy Act (NEPA) and its implementing regulations to consider the environmental impacts resulting from the construction and operation of a proposed project. The Commission's environmental staff has prepared this draft Environmental Impact Statement (EIS) to assess the potential environmental impacts that could result from the construction and operation of the NEXUS Gas Transmission Project (NGT Project) proposed by NEXUS Gas Transmission, LLC (NEXUS) and the Texas Eastern Appalachian Lease Project (TEAL Project) proposed by Texas Eastern Transmission, LP (Texas Eastern). NEXUS is owned by affiliates of Spectra Energy Partners, LP and DTE Energy Company, while Texas Eastern is an indirect wholly owned subsidiary of Spectra Energy Partners, LP. Throughout this EIS, NEXUS and Texas Eastern are collectively referred to as the "applicants," and the NGT and TEAL Projects are collectively referred to as the "Projects."

On November 20, 2015, NEXUS filed an application with the FERC in Docket No. CP16-22-000 pursuant to Section 7(c) of the Natural Gas Act (NGA), and Parts 157 and 284 of the Commission's regulations. NEXUS is seeking a Certificate of Public Convenience and Necessity (Certificate) to construct, own, and operate a new natural gas pipeline utilizing third-party pipelines and greenfield pipeline construction to provide for the transportation of 1.5 million dekatherms per day (Dth/d) of shale gas from the Appalachian Basin to consuming markets in Northern Ohio and Southeastern Michigan as well as the Dawn Hub in Ontario, Canada. According to NEXUS, supply also would be able to reach the Chicago Hub in northern Illinois and other Midwestern markets through interconnections with other pipelines.

The NGT Project includes the construction of approximately 255.7 miles of new 36-inch-diameter natural gas transmission mainline pipeline running from Columbiana County, Ohio and connecting to DTE Gas Company (DTE Gas) in Ypsilanti Township, Michigan; as well as approximately 0.9 mile of new 36-inch-diameter interconnecting pipeline connecting to Tennessee Gas Pipeline Company near Hanover Township, Ohio. The NGT Project also includes the installation of 4 new gas turbine compressor stations, 6 new metering and regulating (M&R)[1] stations, 4 new pig[2] launchers and receiver facilities, and 13 new tee-taps.[3] A detailed description of the NGT Project is presented in section 2.0.

NEXUS is also seeking a Certificate to acquire capacity in lease from Texas Eastern in Pennsylvania, West Virginia, and Ohio; from DTE Gas in southeastern Michigan; and from Vector Pipeline, L.P. (Vector) in southeastern Michigan. Outside the United States, NEXUS would use existing capacity on the Vector system in western Ontario, Canada to access the Dawn Hub. This EIS is specific to the U.S. portion of the pipeline facilities. The use of facilities in Canada would require approval from the National Energy Board of Canada.

NEXUS is also asking for a blanket Certificate to construct, operate, acquire, and abandon certain facilities as described in Part 157, Subpart F and pursuant to Part 284, Subpart G of the Commission's

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[1] A metering and regulating station is an aboveground facility that contains the equipment necessary to measure the volume of gas flowing in a pipeline.

[2] A pig is an internal tool that can be used to clean and dry a pipeline and/or to inspect it for damage or corrosion. A pig launcher/receiver is an aboveground facility where pigs are inserted into or received from the pipeline.

[3] A tee-tap typically is an underground fitting installed on a pipeline to facilitate a potential future customer connection, which may or may not include aboveground components at that location at a later date.

regulations authorizing NEXUS to provide open-access firm and interruptible interstate natural gas transportation services on a self-implementing basis with pre-granted abandonment for such services.

NEXUS requests that FERC issue an order to grant authorizations by November 1, 2016.

On November 20, 2015, Texas Eastern filed an Abbreviated Application with the FERC in Docket No. CP16-23-000 pursuant to Section 7(b) and 7(c) of the NGA, and Parts 157 and 284 of the Commission's regulations for a Certificate to construct, own, and operate a natural gas pipeline and related facilities as well as approval to abandon by lease to NEXUS the capacity created by the TEAL Project facilities. The TEAL Project would involve the construction of 4.4 miles of 36-inch-diameter pipeline loop;[4] 0.3 miles of connecting pipeline to connect Texas Eastern's Line 73 with the NGT Project; an 18,000 horsepower (hp) Salineville Compressor Station in Franklin Township, Ohio; an additional 9,400 hp of compression at the existing Colerain Compressor Station in Belmont County, Ohio; piping and other modifications to permit bi-directional flow on Line 73; and various other related auxiliary facilities. A detailed description of the TEAL Project is presented in section 2.0.

In a related matter, on November 24, 2015, DTE Gas filed an application with FERC in Docket No. CP16-24-000 seeking approval of a lease of capacity on DTE Gas's system to NEXUS. The capacity lease would utilize existing capacity on DTE Gas' system as well as expansion capacity created by additional compression at existing DTE Gas compressor stations. Construction of the expansion capacity is subject to the jurisdiction of the Michigan Public Service Commission, not FERC, because DTE Gas is a state-regulated gas utility providing limited interstate transportation service pursuant to Title 18 Code of Federal Regulations (CFR) Section 284.224. Additional discussion of these non-jurisdictional facilities is included in section 1.4.

Also in a related matter, on March 11, 2015, Vector filed an application with FERC in Docket No. CP16-102-000 seeking approval of a lease of capacity on Vector's system to NEXUS. To accommodate the lease, Vector intends to modify the existing Milford Meter Station, located in Oakland County, Michigan. The modifications would include replacing an existing 30-inch ultrasonic meter and replacing it with two 20-inch ultrasonic, bi-directional meters, as well as adding various yard piping and valves. Vector also would construct approximately 0.6 mile of 30-inch-diameter pipeline to enable gas originating from the NGT Project to move to the suction side of Vector's existing Highland Compressor Station. The proposed modifications are to be conducted under Vector's blanket Certificate, which was issued by the Commission in Docket No. CP98-135-000 using the automatic authorization per 18 CFR 157.203(b). Vector would provide notice of the modifications after construction is complete and the facilities are placed in-service.

With regard to Vector's other facilities in Canada, any planned facilities are subject to the jurisdiction of Canadian regulators. There is no jurisdictional basis for the Commission to approve, mitigate, or reject any of the Canada facilities. Not only are these facilities non-jurisdictional to the FERC and other agencies of the United States federal government, they are extraterritorial and subject to the sovereign rule of another nation. There is simply no basis we[5] are aware of under FERC's organic legislation, the NGA, for evaluating these facilities. Neither NEPA nor the Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of NEPA define agencies' obligations to analyze the effects of actions as being limited by administrative boundaries (CEQ, 1997). Based on CEQ Guidance on NEPA Analyses for Transboundary Effects, it is noted that the entire body of NEPA law directs federal agencies

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[4] A loop is a segment of pipe that is installed adjacent to an existing pipeline and connected to it at both ends. A loop generally allows more gas to move through the system.

[5] "We," "us," and "our" refer to the environmental staff of the FERC's Office of Energy Projects.

to analyze the effects of proposed actions to the extent they are reasonably foreseeable consequences of the proposed action, regardless of where those impacts might occur. CEQ guidance suggests that agencies must include an analysis of reasonably foreseeable transboundary effects of proposed actions in their analysis of proposed actions in the United States. It does not suggest, however, that agencies must include an analysis of effects of proposed actions in another country on the United States. That would be the responsibility of the other country, which is Canada in this case.

1.1 PROJECT PURPOSE AND NEED

The Commission's purpose for reviewing the Projects is based on its obligations under the NGA. Because the applicants propose facilities for the transportation of natural gas in interstate commerce that are subject to the jurisdiction of the Commission, their applications must be considered by the Commission. In deciding whether to authorize major new natural gas transportation facilities, the Commission balances public benefits against potential adverse consequences. The Commission's goal is to give appropriate consideration in evaluating proposals for new facilities to the enhancement of competitive transportation alternatives, the possibility of overbuilding, subsidization by existing customers, the applicants' responsibility for unsubscribed capacity, and the avoidance of unnecessary disruptions to the environment and the exercise of eminent domain. While this EIS will briefly discuss NEXUS' and Texas Eastern's stated purposes, it will not determine whether the need for the Projects exists, as this will be determined separately by the Commission.

1.1.1 NGT Project

According to NEXUS, the purpose of the NGT Project would be to transport 1.5 Dth/d of Appalachian Basin shale gas, including Utica and Marcellus shale gas, to markets in northern Ohio, southeastern Michigan, and Dawn, Ontario. NEXUS indicates that the need for the NGT Project originates from an increase in demand for natural gas in the region for electric generation, home heating, and industrial use, coupled with a decrease of imports of natural gas by traditional supply sources, mainly from western Canada and the Gulf Coast. The NGT Project would meet this need by importing natural gas to the region from newly available sources, mainly in the Appalachian Basin.

According to NEXUS, the NGT Project design is based on the contractual commitments generated during open seasons held with customers, market connections, and other parties that expressed interest in obtaining natural gas. Open seasons were held October 15 to November 30, 2012; July 23 to August 21, 2014; and January 14 to February 12, 2015 to provide interested bidders an opportunity to obtain capacity in the NGT Project. The result of the open seasons was for NEXUS to propose construction of facilities to provide 1.5 million Dth/d of capacity to markets by November 1, 2017. Approximately 835,000 Dth/d of this capacity (56 percent) has been signed in precedent agreements[6] by NEXUS, as summarized in table 1.1.1-1. NEXUS is requesting an in-service date of November 1, 2017 to meet the firm transportation service requirements of the NGT Project shippers.

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[6] A precedent agreement is a binding contract under which one or both parties has the ability to terminate the agreement if certain conditions, such as receipt of regulatory approvals, are not met.

TABLE 1.1.1-1

Contracted Volumes for the NGT Project

Shipper	Volume (Dth/d)	Term (years)
Confidential Shipper A	200,000	15
Confidential Shipper B	150,000	15
Confidential Shipper C	150,000	15
Confidential Shipper D	110,000	15
Confidential Shipper E	75,000	15
Confidential Shipper F	75,000	15
Confidential Shipper G	75,000	15
Total	**835,000**	

Several comments were received during the scoping period questioning the market for natural gas and suggesting that a market does not exist at the receipt and delivery points proposed by NEXUS, and requesting that other receipt and delivery points be considered, particularly so the proposed pipeline could be moved to a different location. It is important to understand that FERC's mission is to employ competitive market forces to establish just, reasonable, and not unduly discriminatory or preferential service. The Commission's position is that marketplace competition benefits energy consumers by encouraging diverse resources, spurring innovation and deployment of new technologies, improving operating performance, and exerting downward pressure on costs (FERC, 2014). Therefore, the Commission does not direct development of the gas industry's infrastructure, neither on a broad regional basis nor a narrow localized basis. Instead, the Commission responds to the marketplace when an application is filed to provide new or modified service, and in each application the parameters of the project are determined by the applicant.

Because NEXUS has contractual commitments with customers, we disagree with the commenters who suggest that a market does not exist at the receipt and delivery points proposed by NEXUS. For the purposes of our analysis we recognize the difference between definitive receipt and delivery points based on binding precedent agreements and speculative receipt and delivery points based on the potential for future customers.

All receipt and delivery points, regardless of whether they are definitive or speculative, can have legitimate business purpose; however, granting a Certificate with the authority of eminent domain must be weighed differently for definitive elements of a project than speculative elements. For this reason, we consider the 6 definitive receipt and delivery points on the NGT Project to be essential to the Project's objective, whereas we do not consider the 13 tee-tap sites to be essential. This is an important distinction because we will not evaluate alternatives in section 3.0 of this EIS if they do not meet the Project's objectives. As such, all alternatives must meet the objective of serving the 6 definitive receipt and delivery points, but they do not need to serve the tee-tap sites.

1.1.2 TEAL Project

According to the Texas Eastern, the TEAL Project would be able to deliver 950,155 Dth/d of natural gas from Texas Eastern's system in the Appalachian Basin to NEXUS' proposed system in Columbiana County, Ohio. The need for the TEAL Project aligns closely to that of the NGT Project, in that it is necessary to provide natural gas required by the NGT Project.

1.2 PURPOSE AND SCOPE OF THIS EIS

Our principal purposes in preparing this EIS were to:

- identify and assess potential impacts on the natural and human environment that would result from constructing and operating the NGT and TEAL Projects;
- describe and evaluate reasonable alternatives to the NGT and TEAL Projects that would avoid or substantially reduce adverse effects of the Projects on the environment while still meeting the Projects' objectives;
- identify and recommend specific mitigation measures, as necessary, to avoid or further reduce/minimize environmental impacts; and
- encourage and facilitate involvement by the public and interested agencies in the environmental review process.

The environmental topics addressed in this EIS include geology; soils; groundwater and surface water; wetlands; vegetation; fish and wildlife; threatened, endangered, and other special-status species; land use and recreation; visual resources; socioeconomics, including environmental justice; cultural resources; air quality and noise; reliability and safety; and cumulative impacts. This EIS describes the affected environment as it currently exists based on available information, addresses the environmental consequences of the NGT and TEAL Projects, and compares the Projects' potential impacts to those of the alternatives. The EIS also presents our conclusions and recommended mitigation measures.

Our description of the affected environment is based on a combination of data sources, including desktop resources such as scientific literature and regulatory agency reports as well as field data collected by NEXUS and Texas Eastern. At the time the applications were filed with FERC, NEXUS had field surveyed about 90 percent of the total NGT Project route (about 230 linear miles) and Texas Eastern had field surveyed its entire route (about 5 linear miles). Completion of field surveys is primarily dependent upon acquisition of survey permission from landowners. If the necessary access cannot be obtained through coordination with landowners and the proposed Projects are certificated by FERC, the applicants may use the right of eminent domain granted to them under Section 7(h) of the NGA to obtain a right-of-way. Therefore, if the Projects are certificated by the Commission, then it is likely that a portion of the outstanding surveys for the Projects (and associated agency permitting) would have to be completed after issuance of the Certificate.

The U.S. Environmental Protection Agency (EPA) and U.S. Fish and Wildlife Service (FWS), are participating as cooperating agencies in the preparation of this EIS.[7] The roles of FERC and the cooperating agencies in the review process is described in the following sections.

1.2.1 Federal Energy Regulatory Commission

FERC is an independent federal regulatory agency responsible for evaluating applications for authorization to construct and operate interstate natural gas pipeline facilities. If the Commission determines that a project is required by the public convenience and necessity, a Certificate would be issued under Section 7(c) of the NGA and part 157 of the Commission's regulations. The Commission bases its decision not only on environmental impact, but also technical competence, financing, rates, market demand,

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[7] A cooperating agency has jurisdiction by law or special expertise with respect to environmental impacts involved with a proposed project and is involved in the NEPA analysis.

gas supply, long-term feasibility, and other issues concerning a proposed project. As such, FERC is the lead federal agency for the preparation of this EIS in compliance with the requirements of NEPA, the CEQ regulations for implementing the procedural provisions of NEPA (Title 40 CFR Parts 1500–1508), and FERC's regulations implementing NEPA (18 CFR 380).

This EIS presents our review of potential environmental impacts and reasonable recommendations to avoid or mitigate impacts. This EIS will be used as one element in the Commission's review of the Projects to determine whether a Certificate for each project would be issued. FERC will also consider non-environmental issues in its review of the NEXUS and Texas Eastern applications. A Certificate will be granted if the Commission finds that the evidence produced on financing, rates, market demand, gas supply, existing facilities and service, environmental impacts, long-term feasibility, and other issues demonstrates that the NGT and TEAL Projects are required by the public convenience and necessity. Environmental impact assessment and mitigation development are important factors in the overall public interest determination.

FERC may impose conditions on any Certificate granted for the NGT and TEAL Projects. These conditions could include requirements and mitigation measures identified in this EIS to minimize environmental impacts associated with the NGT and TEAL Projects (see section 5.0). We will recommend to the Commission that these requirements and mitigation measures (indicated with bold type in the text) be included as conditions to any approving Certificate issued for the NGT and TEAL Projects. Further, NEXUS and Texas Eastern would be required to implement the construction procedures and mitigation measures it has proposed in its filings with FERC, including those in appendices of this EIS, unless specifically modified by other Certificate conditions.

As applicable, this EIS is also intended to fulfill any cooperating federal agency's NEPA obligations in accordance with NEPA and CEQ regulations in 40 CFR 1501.6 (see section 1.2.2). Other regulatory agencies also may include terms and conditions or stipulations as part of their permits or approvals. While there would be jurisdictional differences between FERC's and other agencies' conditions, the environmental inspection program for the NGT and TEAL Projects would address all environmental or construction-related conditions, or other permit requirements placed on the NGT and TEAL Projects by all regulatory agencies.

We received comments during the scoping period recommending that the potential impacts associated with natural gas development activities, including production of natural gas from shale formations via fracking, be evaluated during our review.

1.2.2 U.S. Environmental Protection Agency Purpose and Role

The EPA is an independent federal agency responsible for protecting human health and safeguarding the natural environment. The EPA has delegated water quality certifications under Section 401 of the Clean Water Act (CWA) to the jurisdiction of individual state agencies, but the EPA may assume this authority if no state program exists, if the state program is not functioning adequately, or at the request of a state.

The EPA also oversees the issuance of a National Pollutant Discharge Elimination System (NPDES) permit by the state agency, under Section 402 of the CWA, for point-source discharge of water used for hydrostatic testing of pipelines into waterbodies. The EPA has the authority to review and veto the decisions on Section 404 permits. The EPA also has jurisdictional authority to control air pollution under the Clean Air Act (CAA) (Title 42 United States Code [USC] Chapter 85) by developing and enforcing rules and regulations for all entities that emit toxic substances into the air. Under this authority, the EPA has developed regulations for major sources of air pollution. The EPA has delegated the authority to implement these regulations to state and local agencies, who are also allowed to develop their own regulations for non-major sources. The EPA also establishes general conformity applicability thresholds, with which a federal agency can determine whether a specific action requires a general conformity assessment.

In addition to its permitting responsibilities, the EPA is required under Section 309 of the CAA to review and publicly comment on the environmental impacts of major federal actions including actions that are the subject of draft and final EISs, and is responsible for implementing certain procedural provisions of NEPA (e.g., publishing the Notices of Availability of the draft and final EISs in the Federal Register) to establish statutory timeframes for the environmental review process.

1.2.3 U.S. Fish and Wildlife Service Purpose and Role

The FWS is responsible for ensuring compliance with the Endangered Species Act (ESA). Section 7 of the ESA, as amended, states that any project authorized, funded, or conducted by any federal agencies should not "jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined…to be critical" (16 USC 1536[a][2]). The FWS also reviews project plans and provides comments regarding protection of fish and wildlife resources under the provisions of the Fish and Wildlife Coordination Act (16 USC 661 et seq.). The FWS is responsible for the implementation of the provisions of the Migratory Bird Treaty Act (MBTA) (16 USC 703) and the Bald and Golden Eagle Protection Act (BGEPA) (16 USC 688).

Section 7 of the ESA requires identification of and consultation on aspects of any federal action that may have effects on federally listed species, species proposed for federal listing, or their habitat. The ultimate responsibility for compliance with Section 7 remains with the lead federal agency (i.e., FERC for these Projects).

As the lead federal agency for the Projects, FERC consulted with the FWS pursuant to Section 7 of the ESA to determine whether federally listed endangered or threatened species or designated critical habitat are found in the vicinity of the Projects, and to evaluate the proposed action's potential effects on those species or critical habitats. FERC coordinated with the FWS regarding other federal trust wildlife resources, such as migratory birds. The FWS elected to cooperate in preparing this EIS because it has special expertise with respect to environmental impacts associated with the Projects.

1.3 PUBLIC REVIEW AND COMMENT

NEXUS filed a request on December 30, 2014 and Texas Eastern filed a request on January 16, 2015 to implement the Commission's pre-filing process for the NGT and TEAL Projects, respectively. FERC established the pre-filing process to encourage early involvement of interested stakeholders, facilitate interagency cooperation, and identify and resolve environmental issues before an application is filed with FERC and facility locations are formally proposed. On January 9, 2015, FERC granted NEXUS the pre-filing Docket No. PF15-10-000 for the NGT Project. On January 26, 2015, FERC granted Texas Eastern's pre-filing Docket No. PF15-11-000 for the TEAL Project.

Prior to and during the pre-filing process, NEXUS and Texas Eastern contacted federal, state, and local agencies to inform them about their respective Projects and discuss project-specific issues and concerns. Each applicant also developed a *Public and Agency Participation Plan* to facilitate stakeholder communications and make information available to the public and regulatory agencies. The *Public and Agency Participation Plans* established:

- a single point of contact within the NEXUS and Texas Eastern organizations for the public or agencies to call or e-mail with questions or concerns;
- a publicly accessible website with information about their Projects (including overview maps) and project status;
- regular newsletter mailings for affected landowners and other interested parties; and
- a schedule for public open house meetings in the vicinity of the NGT and TEAL Projects.

NEXUS initiated contact in August 2014 with potentially affected landowners prior to entering the FERC pre-filing process. These initial contacts were in the form of a letter describing the NGT Project and seeking permission to conduct environmental and cultural resource surveys on landowner property. Texas Eastern began notifying potential stakeholders, government officials, and other interested persons about the TEAL Project in January 2015.

NEXUS hosted nine informational meetings for stakeholders in October and November 2014. NEXUS hosted an additional 10 public open houses along the proposed route in February 2015. Eight of the NEXUS meetings were held in Ohio in the vicinity of the NGT Project in Columbiana, Erie, Fulton, Lorain, Lucas, Medina, Sandusky, and Stark Counties. Two were held in Michigan in Lenawee and Washtenaw Counties. Texas Eastern also held public open houses in February 2015 in Columbiana and Monroe Counties in Ohio. The purpose of the public open house meetings was to inform landowners, government officials, and the general public about the NGT and TEAL Projects and invite them to ask questions and express their concerns. FERC staff participated in the meetings and provided information regarding NEPA and the FERC's environmental review process.

On April 8 2015, the FERC issued, in the pre-filing docket, a *Notice of Intent to Prepare an Environmental Impact Statement for the Planned Nexus Gas Transmission Project and Texas Eastern Appalachian Lease Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meetings* (*NOI*). The *NOI* was published in the Federal Register on April 15, 2015[8] and mailed to 4,319 interested parties, including federal, state, and local agencies; elected officials; environmental and public interest groups; Native American tribes; potentially affected landowners; local libraries and newspapers; and other stakeholders who had indicated an interest in the NGT and TEAL Projects. The *NOI* briefly explained the pre-filing process, generally described the planned NGT and TEAL Projects, provided a preliminary list of issues identified by the FERC staff, requested written comments from the public, announced the time and location of six public scoping comment meetings, and asked other federal, state, and local agencies with jurisdiction and/or special expertise to cooperate with the FERC in the preparation of the EIS, as well as established May 22, 2015 as the closing date for receipt of comments.

We held six public scoping meetings to provide an opportunity for agencies, stakeholders, and the general public to learn more about the planned pipeline Projects and participate in the environmental analysis by commenting on the issues to be addressed in the draft EIS. Meetings were held in April and May 2015 in the following locations:

- Grafton, Ohio on April 28;

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[8] 80 Fed. Reg. 20219 (2015).

- Wadsworth, Ohio on April 29;
- Louisville, Ohio on April 30;
- Tecumseh, Michigan on May 5;
- Swanton, Ohio on May 6; and
- Fremont, Ohio on May 7.

Each meeting was documented by a court reporter and the transcripts were placed into the public record for the Projects.

On July 10, 2015, the Commission mailed to stakeholders a *Project Update for the Nexus Gas Transmission Project and Texas Eastern Appalachian Lease Project*. The purpose of the mailing was to provide stakeholders with an update on the status of environmental review, the major issues gathered during scoping, next steps in the review process, and how interested parties can stay informed.

On April 15, 2016, the Commission issued a letter to certain affected landowners briefly describing a number route modifications on the NGT Project, inviting newly affected landowners to participate in the environmental review process, and opening a special 30-day limited scoping period.

In addition, during the pre-filing process, we conducted conference calls on an approximately bi-weekly basis with representatives from NEXUS and Texas Eastern as well as interested agencies to discuss the pipeline Projects' progress and issues.

Written scoping comments, transcripts of the public scoping meetings, and any written comments received after the filing of the applications are part of the public record for the Projects and are available for viewing on the FERC internet website (http://www.ferc.gov).[9]

Table 1.3-1 lists the environmental issues that were identified during scoping and indicates the section of the EIS in which each issue is addressed. Including comments received at the public scoping meetings, nearly 2,000 written comment submissions and over 50 motions to intervene were filed with the FERC and placed in the public record for the Projects. Table 1.3-1 also lists issues that were identified after the formal scoping period closed, including the relevant environmental comments raised by individuals requesting to be interveners in the Commission's proceeding.[10] Additional issues we independently identified are also addressed in the EIS.

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[9] Using the "eLibrary" link, select "General Search" from the eLibrary menu and enter the docket number excluding the last three digits in the "Docket Number" field (i.e., PF15-10, PF15-11, CP16-22, or CP16-23). Be sure to select an appropriate date range.

[10] The FERC's *Notice of Application* for the Projects was issued in the Federal Register on March 9, 2015, which opened the 21-day period for intervention. A total of 80 groups and individuals for the NGT Project and 0 for the TEAL Project requested intervener status. Interveners are official parties to the proceeding and have the right to receive copies of case-related Commission documents and filings by other interveners.

TABLE 1.3-1

Environmental Issues and Concerns Raised During Public Scoping for the NGT and TEAL Projects

Issue/Concern	EIS Section Addressing Issue
GENERAL	
Project purpose and need	1.1
Availability of project-related information to the public	1.3
Exportation and production of natural gas and impacts associated with fracking	2.1, &1.4
Design and location of the pipeline, land requirements, construction techniques	2.1, 2.2 & 2.3
Future pipelines and other utilities	2.1.1.2 & 2.7
Timeframe and schedule for the proposed facilities	2.4
GEOLOGY	
Potential for earthquakes to compromise the integrity of the pipeline after construction	4.1.3.1
Potential for landslides to compromise the integrity of the pipeline after construction	4.1.3.4
Potential for surface subsidence from underground mine or karst feature collapse to compromise the integrity of the pipeline after construction	4.1.5.6
Impacts from blasting	4.1.5.1
Impacts on waterbodies from clearing and stormwater runoff, including potential for increased flooding and impacts on flood control structures	4.1.5.7
SOILS	
Potential for severe erosion	4.2.1.1 & 4.2.2
Impacts of soil compaction during construction and long-term effects on crop yields	4.2.1.4 & 4.2.2
Impacts on topsoil	4.2.2
Impacts of construction on soil drainage and drainage tiles	4.2.2 & 4.9
WATER RESOURCES	
Impacts on groundwater and hydrology from trenching, blasting, drilling, and dewatering	4.3.1.2
Impacts on groundwater from the pipeline coating, a pipeline rupture, or compressor station release	4.3.1.2
Impacts on drinking water wells and septic systems	4.3.1.2
Impacts on waterbodies from construction through the waterbodies	4.3.2.2
Impacts on water sources used for hydrostatic testing	4.3.1.1 & 4.3.2.3
Potential for existing contamination to be encountered and spread during construction	4.3.1.1
Spill prevention and response measures	4.3.1.2 & 4.3.2.2
WETLANDS	
Impacts on wetlands	4.4.2.2
Restoration of wetlands including topsoil segregation, vegetation restoration, and invasive species	4.4.2.2
Impacts to fen habitat	4.4.3.1
Wetland impacts to Singer Lake Bog, to Creek Bend Farm Park, and to the Schleman Nature Preserve	4.4.3.1
Impacts to Category III wetlands (including fen, peatland, bog, and forested habitats)	4.4.2.2
VEGETATION	
Impacts on vegetation, including the spread of undesirable vegetation and noxious weeds during and after construction	4.5.4
Impacts on old-growth trees and forests	4.5.2.1
Impacts on rare or sensitive plant habitats	4.5.1.1 & 4.6.3
Impacts on threatened and endangered plant species	4.5.1
WILDLIFE	
Impacts on wildlife from noise during construction and operation	4.6.2.1
Impacts on wildlife and wildlife habitat from forest fragmentation	4.6.4

TABLE 1.3-1 (cont’d)

Environmental Issues and Concerns Raised During Public Scoping for the NGT and TEAL Projects

Issue/Concern	EIS Section Addressing Issue
Impacts on rare or sensitive habitats	4.6.3
Impacts on migratory birds	4.6.6
Impacts on rare or sensitive wildlife habitats	4.6.2
SPECIAL-STATUS SPECIES	
Impacts on federally listed or proposed threatened or endangered species or their critical habitat	4.8.1
Impacts on state-listed species	4.8.2
Agency coordination on special-status species	4.8.1.3 & 4.8.2.1
LAND USE, RECREATION, AND VISUAL RESOURCES	
Impacts on densely populated areas (esp. schools, churches, ball fields, parks, day care centers, gun ranges)	4.9.3.1
Impacts on existing residences and structures	4.9.3.1
Impacts on planned future development	4.9.3.1
Impacts on agricultural lands, including drain tiles and crop damage	4.9.3.2
Impacts on specialty crop production (orchards) and organic farms	4.9.3.2
Impacts on lands enrolled in tax incentive programs, including for timber production and maple trees for syrup	4.9.3.3
Impacts on recreational and special interest areas, including wetland mitigation/preservation areas	4.9.4
Potential for existing contamination to be encountered at city parks and the RACER site	4.9.6
Eminent domain and compensation process	4.9.2
Compatibility with local and regional land use and zoning plans	4.9.3.1
Visual impacts of the pipeline right-of-way and aboveground facilities	4.9.7
SOCIOECONOMICS	
Impacts on traffic and roads	4.10.5 & 4.10.7
Impacts on public safety and emergency response services	4.10.5 & 4.10.7
Impacts on homes and property values, including ability to obtain and afford homeowner’s insurance	4.10.8
Impacts on businesses	4.10.6 & 4.10.9
Impacts on local economies, including agriculture and tourism	4.10.6
Impacts on minority and low-income populations	4.10.10
Potential tax revenue benefits to local communities	4.10.9
CULTURAL RESOURCES	
Impacts on culturally and historically significant properties	4.11.4
AIR QUALITY AND NOISE	
Impacts on air quality during construction and operation	4.12.1.3
Health impacts from fugitive dust generated during construction and operation	4.12.1.3
Noise impacts during construction and operation	4.12.2.1
Consistency with emissions limits and standards	4.12.1.3
Methane leaks/blowdowns and greenhouse gas emissions/climate change	4.12.1.3

TABLE 1.3-1 (cont'd)

Environmental Issues and Concerns Raised During Public Scoping for the NGT and TEAL Projects

Issue/Concern	EIS Section Addressing Issue
Emissions from all compressors stations analyzed as a single source	4.12.1.3
Pre- and post-construction testing and air quality monitoring	4.12.1.2
Low frequency vibrations	4.12.2.1
RELIABILITY AND SAFETY	
Emergency response plans and coordination with community public safety services	4.13.1
Safety and reliability of pipeline construction and operation/maintenance, particularly given the recent incident in western Pennsylvania	4.13.2
Potential for third-party damage to the pipeline	4.13.2
Who is responsible for damage caused by a pipeline accident	4.13.3
Potential impacts from locating near electrical transmission lines	4.13.3
Hazards associated with living, recreating, going to school, etc. near a natural gas pipeline and the potential for natural gas leaks, spills, and explosions	4.13.3
Impacts of blasting at local quarries on integrity of pipeline	4.13.3
Safety of high-pressure pipelines in or near population centers and/or near schools and child daycare and elderly facilities	4.13.1
ALTERNATIVES	
Co-locate with existing utilities	3.0
Creation of a pipeline safety corridor	3.0
Avoidance of populated areas and planned development, including the City of Green	3.0 & 3.3.3
No Action alternative	3.1
Alternative energy sources	3.1
Use of existing pipeline systems	3.2.1
Stakeholder proposed alternative routes	3.3, 3.4
Avoidance of sensitive resources, including Oak Openings	3.3, 3.4 & 3.5
Alternative compressor station sites	3.5
CUMULATIVE IMPACTS	
Analysis of cumulative impacts when combining the Projects with other actions in the region	4.14.8 & 4.14.9
Potential for the cleared pipeline right-of-way to contribute to increased erosion and loss of vegetation in the vicinity of the Projects	4.14.3 & 4.14.7
Potential for increased greenhouse gas emissions associated with the natural gas transported in the pipeline to contribute toward climate change	4.14.8
Induced natural gas development	4.14.3

Several of the issues identified both during and after the pre-filing process involved alternative pipeline routes requested to avoid localized resources such as water wells or wetlands, as well as larger resource areas such as aquifers, watersheds, and other environmentally sensitive areas (e.g., natural habitat management areas or designated scenic areas). These concerns were identified by property owners, stakeholders, FERC staff, and other agency staff. Many of these alternative routes that avoided sensitive resources were developed early in the process and voluntarily incorporated by NEXUS into its proposed route. Given this process, subsequent alternative route comparisons often were not necessary if the resource was avoided or the stakeholder's concerns were otherwise resolved; however, other alternative routes, both minor (as in a variation) and major (as in a route alternative), remained viable throughout the course of planning. Section 3.0 presents our analysis of the alternatives that we evaluated since the beginning of our review of in December 2014.

1.4 NON-JURISDICTIONAL FACILITIES

Under Section 7 of the NGA, FERC is required to consider, as part of its decision to authorize interstate natural gas facilities, all factors bearing on the public convenience and necessity. Occasionally, proposed projects have associated facilities that do not come under the jurisdiction of FERC. These "non-jurisdictional" facilities may be integral to the project objective (e.g., a new or expanded power plant that is not under the jurisdiction of FERC at the end of a pipeline) or they may be merely associated as minor, non-integral components of the jurisdictional facilities that would be constructed and operated with the proposed facilities (e.g., a meter station constructed by a customer of the pipeline to measure gas off-take).

Non-jurisdictional facilities associated with the NGT and TEAL Projects include the proposed construction and operation of new compressor units at two existing DTE Gas compressor facilities in Michigan as well as short connections to distribution lines to secure power to serve compressor stations, M&R stations, and mainline valves (MLV)[11] proposed for the NGT and TEAL Projects.

DTE Gas, in support of the NGT Project, proposes to modify existing facilities including the Willow Gate Station and the Willow Run Compressor Station located in Ypsilanti Township, Washtenaw County, Michigan; and the Milford Compressor Station located in Milford Township, Oakland County, Michigan. All modifications would be constructed entirely within property currently owned by DTE Gas. The Willow Gate Station would be modified with pipe additions of approximately 2,000 feet of 36-, 30-, 24-, 16-, and 12-inch-diameter pipe and necessary valves along with three new 10 million British thermal units per hour (MMBtu/hr) water bath line heaters. The Willow Run Compressor Station would be modified with compressor building and miscellaneous station/unit piping to provide an additional 17,700 hp of new gas compression that would discharge to the Willow Gate Station with an addition of approximately 2,500 feet of 30-inch-diameter pipe. Modifications to the Milford Compressor station would include an additional 45,000 hp of new gas compression that includes an associated compressor building and miscellaneous station/unit piping, and would be sent through an additional 2,000 feet of 36-inch suction/discharge header pipe to an existing DTE Gas transmission pipeline valve nest.

All three facilities are scheduled to be available for the NGT Project on November 1, 2017. The Willow Gate Station is being scheduled in two phases with the first phase in the summer of 2016 and the second in the summer of 2017. Both the Willow Run and Milford Compressor Stations are scheduled to begin construction in the fall of 2016.

The only non-jurisdictional facility associated with the TEAL Project would be the electrical power needed for the Salineville Compressor Station, which would require a connection to the local electrical distribution grid. Texas Eastern has sited the compressor station near existing roads with existing electrical lines to minimize the length of connections to the electrical distribution lines. These facilities, and others, are addressed in our cumulative impacts analysis in section 4.14 of this EIS.

We received numerous comments requesting that we consider oil and gas production facilities in the Projects area as related facilities. Our authority under the NGA and the NEPA review requirements relate only to natural gas facilities that are involved in interstate commerce. The permitting of oil and gas production facilities is under the jurisdiction of various state and federal agencies where those facilities are located. Thus, the facilities associated with the production of natural gas are not under FERC jurisdiction and are not analyzed in this EIS. Commenters recommended that the impacts associated with producing

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[11] A mainline valve is an aboveground facility that is capable of controlling the flow of gas in a pipeline.

natural gas be included in our environmental review of the Projects. The development of the Appalachian Basin natural gas, which is regulated by the states, continues to drive the need for takeaway interstate pipeline capacity to allow the gas to reach markets; therefore, companies are planning and building interstate transmission facilities in response to this gas supply. In addition, many production facilities have already been permitted and/or constructed in the region, creating a network through which natural gas may flow along various pathways to local users or interstate pipeline systems. That is not to say that the environmental impact of individual production facilities is not assessed. The permitting of oil and gas production facilities is under the jurisdiction of other agencies, such as the USACE or state agencies. Although we do not examine the impacts of natural gas production facilities to the same extent as the Projects' facilities in this EIS, we have identified existing and proposed production facilities in proximity to the Projects and have considered them within the context of cumulative impacts in section 4.13 of this EIS.

1.5 PERMITS, APPROVALS, AND REGULATORY REQUIREMENTS

FERC and other federal agencies that must make a decision on whether the NGT and TEAL Projects are required to comply with federal statutes, including the CAA, CWA, ESA, MBTA, BGEPA, Coastal Zone Management Act (CZMA), and the National Historic Preservation Act (NHPA). Each of these statutes has been taken into account in the preparation of this EIS.

A list of major environmental permits, approvals, and consultations for the NGT and TEAL Projects is provided in table 1.5-1. NEXUS and Texas Eastern would be responsible for obtaining all permits and approvals required to construct and operate the Projects, regardless of whether or not they appear in this table. FERC encourages cooperation between NEXUS and Texas Eastern and state and local authorities; however, state and local agencies, through the application of state and local laws, may not prohibit or unreasonably delay the construction or operation of facilities approved by FERC. Any state or local permits issued with respect to jurisdictional facilities must be consistent with the conditions of any authorization issued by FERC.[12]

TABLE 1.5-1

Major Environmental Permits, Licenses, Approvals, and Consultations for the NGT and TEAL Projects

	NGT Project		TEAL Project	
Agency/Permit or Approval	Submittal	Receipt	Submittal	Receipt
FEDERAL				
FERC				
Certificate under section 7(c) of the NGA	20-Nov-15	*(Nov-16)*	20-Nov-15	*(Nov-16)*
U.S. Army Corps of Engineers				
Permits under section 404 of the CWA and section 10 of the Rivers and Harbors Act	18-Dec-15	*(Sep/Oct-16)*	*(TBD)*	*(Sep/Oct-16)*
FWS				
Consultation under section 7 of the ESA and coordination under the MBTA	20-Nov-15	*(Sep/Oct-16)*	20-Nov-15	*(Sep/Oct-16)*
U.S. National Park Service				
Wild and Scenic Rivers Act Section 7(a) Determination	20-Nov-15	*(Sep/Oct-16)*	20-Nov-15	*(Sep/Oct-16)*
EPA, Region 3				
Oversight of federal and state delegated permits	20-Nov-15	*(Sep/Oct-16)*	20-Nov-15	*(Sep/Oct-16)*

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[12] For example, see Schneidewind v. ANR Pipeline Co., 485 U.S. 293 (1988); National Fuel Gas Supply v. Public Service Commission, 894 F.2d 571 (2n Cir. 1990); and Iroquois Gas Transmission System, L.P., et al., 52 FERC 61,091 (1990) and 59 FERC 61,094 (1992).

TABLE 1.5-1 (cont'd)

Major Environmental Permits, Licenses, Approvals, and Consultations for the NGT and TEAL Projects

Agency/Permit or Approval	NGT Project		TEAL Project	
	Submittal	Receipt	Submittal	Receipt
Advisory Council on Historic Properties				
Consultation under section 106 of the NHPA	20-Nov-15	*(Sep/Oct-16)*	20-Nov-15	*(Sep/Oct-16)*
OHIO				
Ohio Environmental Protection Agency				
Section 401 Water Quality Certification	17-Dec-15	*(Aug/Sep-16)*	*(TBD)*	*(Aug/Sep-16)*
CAA, Air Permit-to-Install-and-Operate	14-Jul-15	*(Nov-16)*	*(TBD)*	*(Nov-16)*
NPDES hydrostatic test water discharge permit	*(Dec-16)*	*(Jan-17)*	*(2016)*	*(Jan-17)*
Ohio Department of Natural Resources				
Consultation on threatened and endangered species	20-Nov-15	*(Sep/Oct-16)*	20-Nov-15	*(Sep/Oct-16)*
Water withdrawal facility registration	*(Dec-16)*	*(Jan-17)*	N/A	N/A
Coastal management zone determination	22-Dec-15	*(Aug/Sep-16)*	N/A	N/A
Ohio Historic Preservation Office				
Section 106 NHPA consultation	20-Nov-15	*(Sep/Oct-16)*	20-Nov-15	*(Sep/Oct-16)*
MICHIGAN				
Michigan Department of Natural Resources				
State-listed species consultation	20-Nov-15	*(Aug/Sep-16)*	N/A	N/A
Michigan Department of Environmental Quality				
Joint permit for impacts on wetlands, inland lakes, streams and floodplains;	18-Dec-15	*(Aug/Sep-16)*	N/A	N/A
NPDES hydrostatic test water discharge permit	18-Dec-15	*(Aug/Sep-16)*	N/A	N/A
NPDES permit for storm water discharge from construction activities	18-Dec-15	*(Aug/Sep-16)*	N/A	N/A
Water withdrawal authorization	18-Dec-15	*(Aug/Sep-16)*	N/A	N/A
Michigan Office of Historic Preservation				
Section 106 NHPA Consultation	20-Nov-15	*(Sep/Oct-16)*	N/A	N/A
Michigan Natural Resources Inventory				
State-listed species consultation	20-Nov-15	*(Aug/Sep-16)*	N/A	N/A
Lenawee County				
Soil Erosion and Sediment Control Permit	*(TBD)*	*(TBD)*	N/A	N/A
Monroe County				
Soil Erosion and Sediment Control Permit	*(TBD)*	*(TBD)*	N/A	N/A
Washtenaw County				
Soil Erosion and Sediment Control Permit	*(TBD)*	*(TBD)*	N/A	N/A
Wayne County				
Soil Erosion and Sediment Control Permit	*(TBD)*	*(TBD)*	N/A	N/A

TBD = To be determined.

Note: Future/anticipated dates are identified in *italic* font and parentheses.

2.0 DESCRIPTION OF PROPOSED ACTION

2.1 PROPOSED FACILITIES

The proposed Projects evaluated in this EIS include the NGT Project and TEAL Project. The NGT Project would involve construction and operation of new pipeline, four new compressor stations, six new M&R stations, and associated aboveground facilities as described in the following sections. The TEAL Project would involve construction of loop pipeline, connecting pipeline, one new compressor station, and associated aboveground facilities, as well as modifications at one existing compressor station, as described in the following sections. Overview maps depicting the locations of these facilities are provided in figures 2.1-1 and 2.1-2. Detailed maps showing the pipeline routes and aboveground facilities are included in appendix B. The non-jurisdictional facilities associated with the Projects are addressed in section 1.4.

2.1.1 NGT Project

2.1.1.1 Pipeline Facilities

The proposed NGT Project pipeline facilities would include two main components:

- the NGT mainline, which consists of about 255 miles of new 36-inch-diameter mainline pipeline, including about 208 miles of new pipeline in Columbiana, Stark, Summit, Wayne, Medina, Lorain, Huron, Erie, Sandusky, Wood, Lucas, Henry, and Fulton Counties, Ohio; and about 47 miles of new pipeline in Lenawee, Monroe, Washtenaw, and Wayne Counties, Michigan; and

- the Tennessee Gas Pipeline Company, LLC (TGP) interconnecting pipeline, which consists of about 0.9 mile of new 36-inch-diameter interconnecting pipeline between the NGT mainline and TGP in Columbiana County, Ohio.

The pipeline facilities would be constructed of steel and installed underground for their entire length, except for small segments of aboveground piping at aboveground facilities. A summary of NGT Project pipeline facilities is provided in table 2.1.1-1.

Figure 2.1.1-1
NEXUS Gas Transmission Project
Overview Map

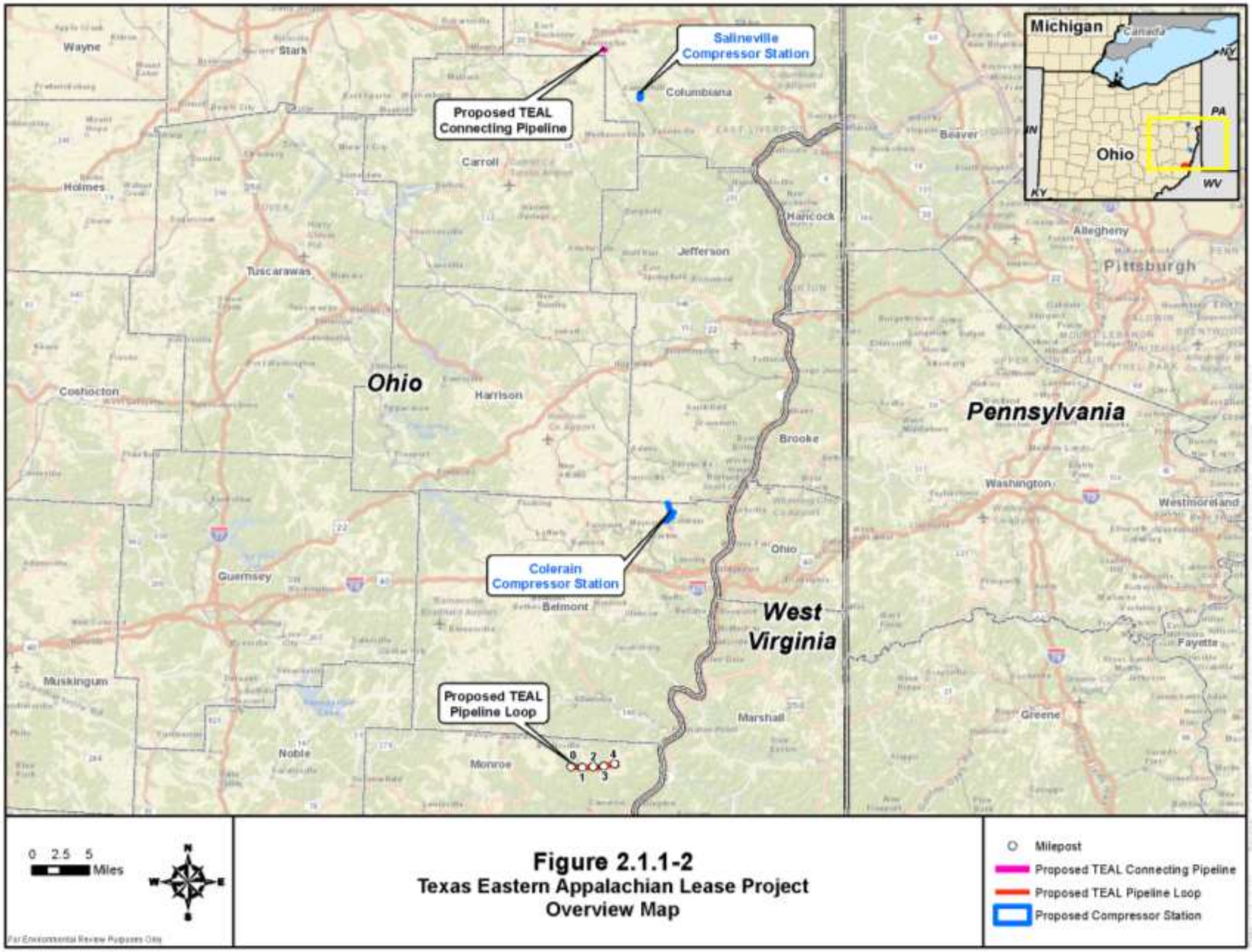

Figure 2.1.1-2
Texas Eastern Appalachian Lease Project
Overview Map

TABLE 2.1.1-1

NGT Project Pipeline Facilities

State/County	Component	Pipe Diameter (inches)	Milepost Range [a]	Length (miles) [b]
OHIO				
Columbiana	TGP Interconnecting Pipeline	36	0.0 - 0.9 TGP	0.9
	NGT Mainline	36	0 - 12.5	12.6
Stark	NGT Mainline	36	12.5 - 34.2	21.7
Summit	NGT Mainline	36	34.2 - 50.4	16.3
Wayne	NGT Mainline	36	50.4 - 56.6	6.2
	NGT Mainline	36	57.2 - 57.7	0.6
Medina	NGT Mainline	36	56.6 - 57.2	0.6
	NGT Mainline	36	57.7 - 80.5	22.9
Lorain	NGT Mainline	36	80.5 - 101.3	21.0
Huron	NGT Mainline	36	101.3 - 104.7	3.4
Erie	NGT Mainline	36	104.7 - 131.5	26.7
Sandusky	NGT Mainline	36	131.5 - 163.7	32.4
Wood	NGT Mainline	36	163.7 - 181.4	17.7
Lucas	NGT Mainline	36	181.4 - 189.3	7.9
Henry	NGT Mainline	36	189.3 - 190.2	0.9
Fulton	NGT Mainline	36	190.2 - 208.3	18.0
			Ohio Total	**208.9**
MICHIGAN				
Lenawee	NGT Mainline	36	208.3 - 230.4	22.1
Monroe	NGT Mainline	36	230.4 - 236.9	6.5
Washtenaw	NGT Mainline	36	236.9 – 255.0	18.2
			Michigan Total	**46.8**
			NGT Project Total	**256.6**

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a Mileposts followed by a “TGP” indicate the facility is on the TGP Interconnecting Pipeline. Mileposts without a “TGP” indicate the facility is on the NGT mainline.

b Lengths listed may not correspond exactly to the milepost range due to route variations that have altered the pipeline length.

2.1.1.2 Aboveground Facilities

The proposed NGT Project would include construction of new aboveground facilities, including 4 compressor stations, 6 M&R stations, 17 MLVs, 4 pig launchers, 4 pig receivers, and 5 communication towers. A summary of NGT Project aboveground facilities is provided in table 2.1.1-2.

TABLE 2.1.1-2

NGT Project Aboveground Facilities

Facility Name	County, State	Milepost [a]	Description [b]
COMPRESSOR STATIONS			
CS 1 – Hanoverton	Columbiana, OH	1.4	Construct compressor station and communication tower.
CS 2 – Wadsworth	Medina, OH	63.5	Construct compressor station, pig launcher, pig receiver, and communication tower.
CS 3 – Clyde	Sandusky, OH	134.0	Construct compressor station and communication tower.
CS 4 – Waterville	Lucas, OH	183.5	Construct compressor station, pig launcher, pig receiver, and communication tower.
METERING AND REGULATING STATIONS			
MR01 – TGP	Columbiana, OH	0.0 TGP	Construct M&R station and pig launcher at beginning of TGP interconnecting pipeline.

TABLE 2.1.1-2 (cont'd)

NGT Project Aboveground Facilities

Facility Name	County, State	Milepost [a]	Description [b]
MR03 – Texas Eastern	Columbiana, OH	0.9 TGP	Construct M&R station and pig receiver at end of TGP interconnecting pipeline.
MR02 – Kensington	Columbiana, OH	0.0	Construct M&R station and pig launcher at beginning of NGT mainline.
MR05 – Dominion East Ohio	Erie, OH	128.8	Construct M&R station delivery point with Dominion East Ohio Gas.
MR06 – Columbia Gas Ohio	Sandusky, OH	159.3	Construct M&R station delivery point with Columbia Gas Ohio
MR04 – Willow Run	Washtenaw, MI	255.0	Construct M&R station and pig receiver at end of NGT Mainline.
MAINLINE VALVES			
MLV 1	Stark , OH	16.7	Construct new MLV.
MLV 2	Stark, OH	32.6	Construct new MLV.
MLV 3	Summit, OH	40.2	Construct new MLV.
MLV 4	Wayne, OH	50.4	Construct new MLV.
MLV 5	Medina, OH	58.0	Construct new MLV.
MLV 6	Medina, OH	71.9	Construct new MLV.
MLV 7	Lorain, OH	89.3	Construct new MLV.
MLV 8	Lorain, OH	96.7	Construct new MLV.
MLV 9	Erie, OH	116.3	Construct new MLV.
MLV 10	Erie, OH	124.8	Construct new MLV.
MLV 11	Sandusky, OH	151.8	Construct new MLV.
MLV 12	Wood, OH	167.8	Construct new MLV.
MLV 13	Lucas, OH	189.2	Construct new MLV.
MLV 14	Lenawee, MI	208.9	Construct new MLV.
MLV 15	Lenawee, MI	228.2	Construct new MLV and communication tower.
MLV 16	Washtenaw, MI	247.4	Construct new MLV.

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[a] Mileposts followed by a "TGP" indicate the facility is on the TGP Interconnecting Pipeline. Mileposts without a "TGP" indicate the facility is on the NGT mainline.

[b] Pig launchers, pig receivers, and communication towers would be co-located with other facilities.

CS = Compressor station

MR = M&R station

Compressor Stations

NEXUS would construct four new compressor stations for the NGT Project. Compressor stations utilize engines to maintain pressure within the pipeline in order to deliver the contracted volumes of natural gas to specific points at specific pressures. Compressors are housed in acoustically insulated buildings that are designed to attenuate noise and allow for operation and maintenance activities. Auxiliary equipment typically includes a turbine exhaust system with exhaust stack, turbine air intake system, gas piping, and a unit blowdown silencer for the compressor unit. Compressor stations also include administrative, maintenance, storage, and communications buildings, and can include metering, pig launching, and pig receiving facilities, as discussed in the following sections. Stations consist of a developed, fenced area within a larger parcel of land that remains undeveloped. The location of the compressor station and amount of compression needed are determined primarily by hydraulic modeling. The general construction procedures for the compressor stations are discussed in section 2.3.3. Regulatory requirements and impacts on air quality and noise associated with compressor stations are discussed in section 4.12.

The Hanoverton Compressor Station (CS1) would be located in Columbiana County, Ohio and consist of two natural gas turbine-driven compressor packages totaling 52,000 hp. The facility would be located on 27.7 acres within a 119.6-acre parcel of agriculture and open lands that NEXUS would acquire.

The Wadsworth Compressor Station (CS2) would be located in Medina County, Ohio and consist of a single natural gas turbine-driven compressor package totaling 26,000 hp. The facility would be located on 22.0 acres within a 76.5-acre parcel of agricultural, open, and residential lands that NEXUS would acquire.

The Clyde Compressor Station (CS3) would be located in Sandusky County, Ohio and consist of a single natural gas turbine-driven compressor package totaling 26,000 hp. The facility would be located on 37.2 acres within a 50.4-acre parcel of agricultural, open, industrial/commercial that NEXUS would acquire.

The Waterville Compressor Station (CS4) would be located in Lucas County, Ohio and consist of a single natural gas turbine-driven compressor package totaling 26,000 hp. The facility would be located on 33.0 acres within a 48.8-acre parcel of agricultural, open, and industrial/commercial lands that NEXUS would acquire.

Metering and Regulating Stations

NEXUS would construct six new M&R stations. M&R stations measure the volume of gas added to or removed from a pipeline system. Most M&R stations consist of a small, fenced, graveled area with small building(s) that enclose the measurement equipment.

TGP M&R Receipt Station (MR01) is proposed at the beginning of the TGP Interconnecting Pipeline and would tie-in with TGP's mainline in Columbiana County, Ohio.[1] The facility would be located on 3.6 acres within a 35.1-acre parcel of agricultural, open, and industrial/commercial land that NEXUS would acquire.

Texas Eastern M&R Receipt Station (MR03) is proposed at the end of the TGP interconnecting pipeline in Columbiana County, Ohio. The MR03 facilities would be located on 5.2 acres of land within a 117.2-acre parcel of agricultural, forested, and industrial/commercial land that NEXUS would acquire.

The Kensington M&R Receipt Station (MR02) is proposed at the beginning of the NGT mainline and would be immediately adjacent to MR03 in Columbiana County, Ohio. The MR02 facilities would be co-located on the same 5.2 acres of land within the same 117.2-acre parcel that NEXUS would acquire for MR03.

The Dominion East Ohio M&R Delivery Station (MR05) is proposed at the delivery point with Dominion East Ohio Gas in Erie County, Ohio. The facility would be located on 1.8 acres of land within a 20.2-acre parcel of agricultural land that NEXUS would acquire.

The Columbia Gas Ohio Delivery Station (MR06) is proposed at the delivery point with Columbia Gas Ohio in Sandusky County, Ohio. The facility would be located on 1.0 acre of land within a 76.9-acre parcel of agricultural land that NEXUS would acquire.

The Willow Run M&R Delivery Station (MR04) is proposed at the terminus of the NGT mainline and would tie-in with DTE facilities in Washtenaw County, Michigan. The facility would be located on 0.7 acre of land within a 3.7-acre parcel of open and industrial/commercial that NEXUS would acquire.

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[1] In this EIS, we generally present information in milepost order. This may be confusing for M&R stations because the M&R station numbers assigned by NEXUS and Texas Eastern do not represent the milepost order in which they occur on the Projects.

Mainline Valves

The NGT Project would include construction and operation of 17 remote-controlled MLVs. MLVs consist of a system of aboveground and underground piping and valves that control the flow of gas within the pipeline. MLVs are monitored at a gas control center and can be closed remotely with an electronic command to stop the flow of gas if necessary. MLVs would be installed within other aboveground facilities or in areas already disturbed by pipeline construction and would be primarily located within the permanent operational right-of-way.

Pig Launcher and Receivers

The NGT Project would include construction and operation of four pig launchers and four pig receivers. Launchers and receivers are facilities where internal pipeline cleaning and inspection tools, referred to as "pigs," can be inserted or retrieved from the pipeline. Pig launchers and receivers consist of aboveground piping within the pipeline right-of-way or other aboveground facility boundaries. Pig launchers and receivers would be installed at the Wadsworth and Waterville compressor stations. Launcher facilities also would be installed at MR01 and at MR02, and receiver facilities would be installed at MR03 and MR04.

Communications Towers

The NGT Project would include construction and operation of five communications towers. Communications towers support licensed very high frequency mobile radio transmission equipment for voice communications. One tower would be installed at each of the compressor stations, and one tower would be installed at MLV 16. All of the towers would be 190 feet tall, except the tower at the Wadsworth Compressor Station, which would be 140 feet tall.

Tee-Taps

The NGT Project would include construction of 13 tee-taps along the proposed pipeline, as listed in table 2.1.1-3. Tee-taps typically are underground fittings installed on a pipeline to facilitate potential future connections, which may or may not include aboveground components at that location at a later date. Installing tee-taps during initial construction eliminates the need to make connections to an operational pipeline while natural gas is flowing (also known as a hot tap) at a later time. The tee-tap locations on the NGT Project represent locations where NEXUS is presently negotiating gas delivery contracts with potential customers. These locations do not necessarily represent the locations where gas will eventually be delivered because negotiations may not be successful and result in a gas delivery contract.

TABLE 2.1.1-3

NGT Project Tee-taps

Facility Name	County, State	Milepost	Comments
Dominion East Ohio (DEO) TPL 15 Tap	Columbiana, OH	3.2	
DEO TPL 13 Tap	Wayne, OH	52.4	
Brickyard & Rittman Industrial Tap	Medina, OH	56.7	
Columbia Gas Ohio S Medina Tap	Medina, OH	65.8	
Columbia Gas Ohio N Medina Tap	Medina, OH	75.0	
NRG Avon Lake Tap	Lorain, OH	88.0	
Erie County Industrial Park Tap	Erie, OH	120.3	
MR05 DEO Delivery	Erie, OH	128.8	Co-located with MR05.
Columbia Gas Ohio 1 Tap	Sandusky, OH	159.3	Co-located with MR06.
GDF Suez Troy Energy Tap	Wood, OH	166.3	
Oregon Clean Energy Tap	Wood, OH	170.4	
Waterville Tap	Lucas, OH	182.1	
Ohio Gas Tap	Fulton, OH	199.3	

2.1.2 TEAL Project

2.1.2.1 Pipeline Facilities

The TEAL Project pipeline facilities would include two main components:

- the TEAL pipeline loop, which comprises about 4.4 miles of new 36-inch-diameter loop pipeline on Texas Eastern's Line 15 in Monroe County, Ohio; and

- the TEAL connecting pipeline, which comprises about 0.3 mile of new 30-inch-diameter interconnecting pipeline from Texas Eastern's Line 73 to the NGT Project pipeline near MR02 in Columbiana County, Ohio.

As with the NGT Project, the pipeline facilities would be constructed of steel and installed underground for their entire length, except for small segments of aboveground piping at aboveground facilities.

2.1.2.2 Aboveground Facilities

The TEAL Project would include one new compressor station, one new communication tower, two new pig launchers/receivers,[2] one temporary pig launcher/receiver, modifications at an existing compressor station, and modifications at other existing aboveground facility sites. A summary of TEAL Project aboveground facilities is provided in table 2.1.2-1.

TABLE 2.1.2-1

TEAL Project Aboveground Facilities

Facility Name	County, State	Description
NEW FACILITIES		
Salineville Compressor Station	Columbiana, OH	Construct new compressor station and communication tower.
Pig Launcher/Receiver	Columbiana, OH	Install new pig launcher/receiver at beginning of TEAL connecting pipeline.
Pig Launcher/Receiver	Columbiana, OH	Install new pig launcher/receiver at end of TEAL connecting pipeline.
Pig Launcher/Receiver	Monroe, OH	Install temporary pig launcher/receiver at beginning of TEAL pipeline loop.
MODIFICATIONS AT EXISTING FACILITIES		
Colerain Compressor Station Site	Belmont, OH	Install new compressor unit and modify piping for bi-directional flow.
Line 30 Launcher/Receiver Site	Monroe, OH	Remove existing pig launcher/receiver at end of TEAL pipeline loop.
Line 73 Launcher/Receiver Site	Monroe, OH	Modify piping and install filter separator for bi-directional flow.
Line 73 Regulator Site	Monroe, OH	Modify piping and install filter separator for bi-directional flow.

Compressor Stations

Texas Eastern would construct and operate one new compressor station. The Salineville Compressor Station would be located in Columbiana County, Ohio and consist of natural gas turbine-driven compressor

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[2] A "pig launcher/receiver," as distinguished from either a "pig launcher" or "pig receiver," indicates that the facility is capable of both launching and receiving pigs.

packages totaling 18,800 hp. The facility would be located on 11.5 acres within a 48.8-acre parcel of agricultural and open lands that Texas Eastern would acquire.

Texas Eastern would modify its existing Colerain Compressor Station in Belmont County, Ohio by installing a new natural gas turbine-driven compressor package providing an additional 9,400 hp of compression. Texas Eastern also would conduct piping modifications at the compressor station to accommodate bi-directional flow. All work would occur within the existing compressor station site or adjacent areas previously disturbed by construction of the station.

Pig Launcher/Receivers

Texas Eastern would construct and operate two new pig launcher/receivers and one temporary pig launcher/receiver, and would remove one existing launcher/receiver. New pig launcher/receiver facilities would be installed at the beginning and end of the TEAL connecting pipeline. A temporary pig launcher/ receiver facility would be installed at the beginning of the TEAL pipeline loop and an existing pig launcher/ receiver would be removed from the end of the TEAL pipeline loop. Also, Texas Eastern would conduct piping modifications and install filter separators at one additional existing launcher/receiver site and at one existing regulator site.

Communications Towers

Texas Eastern would construct and operate one new communication tower. The tower would be installed at the Salineville Compressor Station site and would be 300 feet tall.

2.2 LAND REQUIREMENTS

Table 2.2-1 summarizes the land use requirements for the pipelines and associated facilities, including compressor and M&R stations, additional temporary workspace (ATWS), pipe/contractor yards, staging areas, and access roads that are described in sections 2.2.1 through 2.2.4. A more detailed description of the land use requirements for the Projects is presented in section 4.9.1. If the Projects are approved, the applicants' construction and operational work areas would be limited to those described in the final EIS and any subsequent Commission authorizations as described in section 2.5.3.

TABLE 2.2-1

Summary of Land Requirements Associated with the Projects

Project Component	Construction Area (acres)	Operation Area (acres)
NGT PROJECT		
Pipeline Right-of-Way	3,007.2	1,559.8
Additional Temporary Workspace	1,358.1	0.0
Aboveground Facilities	293.8	132.2
Access Roads	68.9	4.0
Pipe/Contractor Yards & Staging Areas	282.8	0.0
NGT Project Total	**5,010.8**	**1,696.0**
TEAL PROJECT		
Pipeline Right-of-Way	53.3	26.7
Additional Temporary Workspace	34.3	0.0
Aboveground Facilities	113.6	16.2
Access Roads	4.9	1.0
Pipe/Contractor Yards & Staging Areas	0.0	0.0
TEAL Project Total	**213.0**	**45.9**
Grand Total	**5,223.7**	**1,741.9**

Note: The totals shown in this table may not equal the sum of addends due to rounding.

2.2.1 NGT Project

2.2.1.1 Pipeline Facilities

Construction of the NGT Project would disturb 5,010.8 acres of land, including pipeline facilities, ATWS, aboveground facilities, pipe/contractor yards, staging areas, and access roads. Permanent operation of the NGT Project would require 1,559.8 acres for the permanent right-of-way, 132.2 acres for aboveground facilities, and 4.0 acres for permanent access roads. The remaining 3,314.8 acres of land disturbed during construction would be restored and allowed to revert to its pre-construction use.

Co-location with Existing Rights-of-Way

The Commission's policy encourages the use, enlargement, or extension of existing rights-of-way over developing new rights-of-way in order to reduce potential impacts on sensitive resources. In general, the co-location of new pipeline along existing rights-of-way or other linear corridors that have been previously cleared or used (e.g., pipelines, power lines, roads, or railroads) may be environmentally preferable to the development of new rights-of-way. Construction-related impacts and cumulative impacts can normally be reduced by use of previously cleared or disturbed rights-of-way; however, in congested or environmentally sensitive areas, it may be advantageous to deviate from an existing right-of-way. Additionally, co-location may be infeasible in some areas due to a lack of or unsuitably oriented existing corridors, engineering and design considerations, or constructability or permitting issues.

Approximately 45 percent of NGT's pipeline rights-of-way would be co-located or adjacent to existing pipeline, roadway, railway, and/or utility rights-of-way. A summary of areas where the NGT Project would be adjacent to existing rights-of-way is presented in appendix C-1. In these areas, the pipeline would not be installed within an existing right-of-way, but may utilize the existing utility right-of-way for temporary construction workspace.

Right-of-Way Configurations

NEXUS proposes to use a 100-foot-wide construction right-of-way. In certain sensitive areas, such as wetlands and residential lands, NEXUS proposes to reduce its construction right-of-way width to 75 feet. In areas where full construction right-of-way topsoil stripping would be conducted[3] and at steep side-slopes, NEXUS proposes to increase its construction right-of-way width to 125 to 145 feet. Following construction, NEXUS would retain a 50-foot-wide permanent right-of-way to operate the pipeline facilities. Appendix D depicts the typical right-of-way configurations for NEXUS' pipeline construction.

Additional Temporary Workspace

In addition to the various construction right-of-way configurations described above, NEXUS has requested 1,358.1 acres of ATWS in several locations due to the presence of wetlands, waterbodies, roads, railroads, and utilities, and for other site-specific, construction-related reasons. Appendix C-2 identifies where NEXUS has requested ATWS as well as justification for the use of each.

ATWS beyond those currently identified could be required during construction. Prior to construction, NEXUS would be required to file a complete and updated list of all extra work areas

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[3] We note that full construction right-of-way topsoil stripping would be conducted in agricultural land and where the proposed pipeline is co-located with existing pipeline and powerline easements in accordance with the typical right-of-way configurations included in appendix D.

(including pipe/contractor yards and staging areas) for review and approval (see Post-Approval Variance Process in section 2.5.3).

Aboveground Facilities

The proposed aboveground facilities for the NGT Project include 4 new compressor stations, 6 new M&R stations, 17 MLVs, 4 pig launcher, 4 pig receivers, and 5 communication towers (see table 2.2.1-1).

Construction of the compressor and M&R stations would require 292.7 acres of land, 131.5 acres of which would be used permanently during operation (see table 2.2.1-1). MLVs would be located entirely within the construction and permanent right-of-way for the pipeline and therefore would not encumber any additional acreage. Pig launchers, pig receivers, and communication towers would be co-located with other aboveground facilities and also would not encumber any additional acreage.

TABLE 2.2.1-1

NGT Project Aboveground Facility Land Requirements

State/Facility [a]	Milepost [b]	Construction Area (acres)	Operation Area (acres)
OHIO			
New Compressor Stations			
CS 1 – Hanoverton	1.4	93.3	27.7
CS 2 – Wadsworth	63.5	64.0	22.0
CS 3 – Clyde	134.0	59.6	37.2
CS 4 – Waterville	183.5	37.3	33.0
Metering and Regulating Stations			
MR01 – TGP	0.0 TGP	10.3	3.6
MR02 – Kensington & MR03 – Texas Eastern [c]	0.9 TGP / 0.0	10.3	5.2
MR05 – Dominion East Ohio	128.8	10.1	1.8
MR06 – Columbia Gas Ohio	159.3	7.8	1.0
	Ohio Total [d]	**292.7**	**131.5**
MICHIGAN			
Meter and Regulating Stations			
MR04 – Willow Run	255.0	1.0	0.7
	NGT Project Total [d]	**293.7**	**132.2**

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[a] MLVs, pig launchers, pig receivers, and communication towners are not included in this table. MLVs would be located entirely within the construction and permanent rights-of-way for the pipeline and therefore would not encumber any additional acreage. Pig launchers, pig receivers, and communication towers would be co-located with other aboveground facilities and also would not encumber any additional acreage.

[b] Mileposts followed by a "TGP" indicate the facility is on the TGP Interconnecting Pipeline. Mileposts without a "TGP" indicate the facility is on the NGT mainline.

[c] The MR02 and MR03 facilities would be co-located on the same 5.2 acres of land within a 10.3-acre parcel

[d] The totals shown in this table may not equal the sum of addends due to rounding

Pipe/Contractor Yards and Staging Areas

To support construction activities, NEXUS proposes to use eight pipe/contractor yards (also termed "wareyards" by NEXUS) on a temporary basis. The pipe/contractor yards would be used for equipment, pipe sections, and construction material and supply storage, as well as for temporary field offices, parking, and pipe preparation and pre-assembly. The use of these sites would temporarily affect about 282.8 acres of land (see appendix C-3). These yards are depicted on the maps in appendix B-1.

Access Roads

NEXUS would use existing public and private roads to gain access to the Project area. Many of the existing roads are presently in a condition that can accommodate construction traffic without modification or improvement. Some roads, however, are dirt or gravel roads that currently are not suitable for construction traffic. Where necessary, NEXUS would build new roads or improve existing roads through grading, widening, realigning, graveling, paving, and installing culverts. Access roads would temporarily impact 0.1 acre of wetland habitat. No permanent wetland impacts due to access roads would occur. NEXUS is proposing to build 73 new roads and modify 68 existing roads; of these, 22 new roads and 4 modified roads would be maintained on a permanent basis as access roads to aboveground facilities. Appendix C-4 identifies access road and road improvements proposed for the NGT Project.

2.2.2 TEAL Project

2.2.2.1 Pipeline Facilities

Construction of the TEAL Project would disturb 213.0 acres of land, which includes pipeline facilities, ATWS, aboveground facilities, pipe/contractor yards, and access roads. Permanent operation of the TEAL Project would require 26.7 acres for permanent right-of-way, 16.2 acres for aboveground facilities, and 1.0 acre for permanent access roads. The remaining 167.1 acres of land disturbed during construction would be restored and allowed to revert to its pre-construction use.

Co-location with Existing Rights-of-Way

Approximately 94 percent of NGT’s pipeline rights-of-way would be co-located with Texas Eastern’s existing pipeline. Specifically, the entire 4.4-mile-long TEAL pipeline loop in Monroe County, Ohio would be co-located with Texas Eastern’s Line 15. Conversely, the 0.3-mile-long TEAL connecting pipeline in Columbiana County, Ohio would not be co-located with existing right-of-way.

Right-of-Way Configurations

Texas Eastern proposes to use a 100-foot-wide construction right-of-way. In wetlands, Texas Eastern proposes to reduce its construction right-of-way width to 75 feet. Following construction, Texas Eastern would retain a 50-foot-wide permanent right-of-way to operate the pipeline facilities. The permanent right-of-way would overlap onto the existing Line 15 permanent right-of-way where co-located. Appendix D depicts the typical right-of-way configurations for Texas Eastern’s pipeline construction.

Additional Temporary Workspace

In addition to the various construction right-of-way configurations described above, Texas Eastern has requested 39.5 acres of ATWS in several locations due to the presence of wetlands, waterbodies, roads, railroads, and utilities, and for other site-specific, construction-related reasons. Appendix C-5 identifies where Texas Eastern has requested ATWS as well as justification for the use of each.

ATWS beyond those currently identified could be required during construction. Prior to construction, Texas Eastern would be required to file a complete and updated list of all extra work areas (including pipe/contractor yards) for review and approval (see Post-Approval Variance Process in section 2.5.3).

Aboveground Facilities

The proposed aboveground facilities for the TEAL Project include one new compressor station, one new communication tower, two new pig launchers/receivers, one temporary pig launcher/receiver, modifications at an existing compressor station, and modifications at other existing aboveground facility sites (see table 2.2.2-1).

Construction of the new compressor station and modification of the existing compressor station, pig launcher/receiver, and regulator would require 113.6 acres of land, 16.2 acres of which would be used permanently during operation (see table 2.2.2-1). Installation of the new pig launcher/receivers and removal of existing pig launcher/receivers would be located entirely within the construction and permanent rights-of-way for the pipelines and therefore would not encumber any additional acreage. The new communication tower would be co-located with the new compressor station and also would not encumber any additional acreage.

TABLE 2.2.2-1

TEAL Project Aboveground Facility Land Requirements

Facility Name	County, State	Construction Area (acres)	Operation Area (acres)
NEW FACILITIES			
New Salineville Compressor Station	Columbiana, OH	41.0	11.5
New Pig Launcher/Receiver	Columbiana, OH	0.0	0.0
New Pig Launcher/Receiver	Columbiana, OH	0.0	0.0
New Pig Launcher/Receiver (temporary)	Monroe, OH	0.0	0.0
	New Facilities Total	**41.0**	**11.5**
MODIFICATIONS AT EXISTING FACILITIES			
Modify Colerain Compressor Station	Belmont, OH	62.1	0.0
Remove Line 30 Launcher/Receiver	Monroe, OH	0.0	0.0
Modify Line 73 Launcher/Receiver Site	Monroe, OH	1.1	0.0
Modify Line 73 Regulator Site	Monroe, OH	9.4	4.7
	Modifications at Existing Facilities Total	**72.6**	**4.7**
	TEAL Project Total	**113.6**	**16.2**

Pipe/Contractor Yards and Staging Areas

Texas Eastern is not proposing to use pipe/contractor yards and would stage construction within its existing and proposed facility sites.

Access Roads

Texas Eastern is proposing to modify six existing roads. Of the six roads, two would be maintained on a permanent basis as access roads to aboveground facilities. No road improvements would be conducted in wetlands. Appendix C-4 identifies access road and road improvements proposed on the TEAL Project.

2.3 CONSTRUCTION PROCEDURES

The NGT and TEAL Projects would be designed, constructed, tested, and operated in accordance with all applicable requirements included in the U.S. Department of Transportation's (DOT) Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards regulations in 49 CFR 192,[4] and

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[4] Pipe design regulations for steel pipe are contained in CFR subpart C, Part 192. Section 192.105 contains a design formula for the pipeline's design pressure. Sections 192.107 through 192.115 contain the components of the design formula,

other applicable federal and state regulations, including U.S. Department of Labor Occupational Safety and Health Administration requirements. These regulations are intended to ensure adequate protection for the public. Among other design standards, Part 192 specifies pipeline material and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

To reduce construction impacts, NEXUS and Texas Eastern would implement their respective *Erosion and Sediment Control Plans* (*E&SCP*). These plans are based on our *Upland Erosion Control, Revegetation, and Maintenance Plan* (*FERC Plan* or *Plan*) and *Wetland and Waterbody Construction and Mitigation Procedures* (*FERC Procedures* or *Procedures*).[5] The intent of NEXUS' and Texas Eastern's *E&SCPs* are to identify baseline mitigation measures and construction techniques that incorporate guidelines recommended by various resource agencies (such as proper disposal of construction materials and debris), as well as other guidelines and plans tailored to project-specific issues. The *E&SCPs* contain numerous measures designed to prevent or minimize potential impacts on resources. As indicated in table 2.3-1, the applicants' *E&SCPs* include some alternative measures that differ from the FERC's standard *Plan* and *Procedures*, such as the construction sequencing for minimizing duration of open trench and methods for disposing excess woody debris from clearing activities. The applicants' *E&SCPs* also include deviations from our standard *Plan* and *Procedures* not listed in table 2.3-1, but they are more protective than our requirements and we have found them to be acceptable.

Consistent with the FERC's standard *Plan* and *Procedures*' sections V.B.2.b and VI.B.1.a, NEXUS and Texas Eastern provided site-specific justification for each additional temporary workspace within 50 feet from the edge of a wetland or waterbody (unless the adjacent upland consists of cultivated or rotated cropland or other disturbed land, in which case no justification is required). We found most of the site-specific justifications provided by NEXUS to be acceptable. NEXUS moved additional temporary workspaces outside of the 50-foot setback where we did not find the justification to be acceptable. We have not found the site-specific justification provided by Texas Eastern to be acceptable and are requesting additional information from the applicant. Additional detail is provided in appendix H-6 and discussed in sections 4.3.2.2 and 4.4.3.

TABLE 2.3-1

Summary of Proposed Modifications to the FERC's Plan and Procedures

Applicable FERC Plan/Procedures Section	Resource Issue	Description	FERC Recommendation	EIS Section Discussed
Plan, at Section III.A.3	Construction Sequencing	Proposal to trench prior to stringing, which increases the time a trench is open. NEXUS proposes to minimize open trench by managing crew spacing.	Acceptable.	2.2.1
Procedures, at Section IV.F.4.e	Wood Chipping	Proposal discusses hauling wood chips off site but does not specify that the location be FERC approved.	Acceptable.	4.4.4

In addition to their baseline *E&SCPs*, NEXUS and Texas Eastern prepared several other plans or developed and described other measures identified in table 2.3-2 that would be implemented to further

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including yield strength, wall thickness, design factor, longitudinal joint factor, and temperature derating factor, which are adjusted according to the project design conditions, such as pipe manufacturing specifications, steel specifications, class location, and operating conditions. Pipeline operating regulations are contained in subpart L, Part 192.

[5] FERC's *Plan* and *Procedures* are a set of construction and mitigation measures that were developed in collaboration with other federal and state agencies and the natural gas pipeline industry to minimize the potential environmental impacts of the construction of pipeline projects in general. The FERC *Plan* and *Procedures* can both be viewed on the FERC website at: https://www.ferc.gov/industries/gas/enviro/guidelines.asp

reduce potential environmental impacts. The *E&SCPs* and additional plans and procedures are collectively referred to in this EIS as NEXUS' and Texas Eastern's construction and restoration plans.

TABLE 2.3-2

Construction, Restoration, and Mitigation Plans Associated with the NGT and TEAL Projects

General Plan Name	NGT Project-specific Plan Name	TEAL Project-specific Plan Name
E&SCP	*E&SCP* (Resource Report [RR] 1, appendix 1B1; Accession No. 20151120-5299)	*E&SCP* (RR 1, appendix 1B1; Accession No. 20151120-5254)
Spill Plan	*Spill Prevention Control and Countermeasure (SPCC Plan)* (RR 1, appendix 1B2; Accession No. 20151120-5299)	*SPCC Plan* (RR1, appendix 1B2; Accession No. 20151120-5254)
Blasting Plan	Appendix E-1	Appendix E-2
Drain Tile Mitigation Plan	Appendix E-3	N/A
Dust Control Plan/Procedure	*Fugitive Dust Control Plan* (RR 1, appendix 1B5; Accession No. 20151120-5299)	*Fugitive Dust Plan*; (RR1, appendix 1B4; Accession No. 20151120-5254
Winter Construction Plan	*Winter Construction Plan* (RR 1, appendix 1B6; Accession No. 20151120-5299)	*Winter Construction Plan* (RR 1, appendix 1B5; Accession No. 20151120-5254)
Invasive Species Management Plan	*Invasive Plant Species Management Plan (IPSMP)* (RR1, appendix 1B7; Accession No. 20151120-5299)	*IPSMP* (RR1, appendix 1B6; Accession No. 20151120-5254))
HDD Design Reports and HDD Monitoring and Inadvertent Return Contingency Plan	Appendix E-4	N/A
Unanticipated Discovery Plan	*Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains* (RR4, appendix 4.C; Accession No. 20151120-5299)	*Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains* (RR4, appendix 4C; Accession No. 20151120-5254)
Residential Construction Plan	Appendix E-5	N/A
Landowner Complaint Resolution Procedure	*Issue Resolution Plan for the NEXUS Project* (RR8, appendix 8D; Accession No. 20151120-5299)	*Issue Resolution Plan for the TEAL Project* (RR 8, appendix 8A; Accession No. 20151120-5254)
Migratory Bird Conservation Plan	Appendix E-6 [pending receipt]	Appendix E-6 [pending receipt]

N/A = Not applicable

2.3.1 General Pipeline Construction Procedures

Constructing the pipelines would generally be completed using sequential pipeline construction techniques, which include survey and staking; clearing and grading; trenching; pipe stringing, bending, and welding and coating; lowering-in and backfilling; hydrostatic testing; commissioning; and cleanup and restoration (see figure 2.3.1-1). These construction techniques would generally proceed in an assembly line fashion and construction crews would move down the construction right-of-way as work progresses. Construction at any single point along the pipelines, from surveying and staking to cleanup and restoration, could last from approximately 8 to 16 weeks.

2.3.1.1 Survey and Staking

The first step of construction involves survey crews staking the limits of the construction right-of-way, the centerline of the proposed trench, ATWSs, and other approved work areas. NEXUS and Texas Eastern would mark approved access roads using temporary signs or flagging as well as the limits of approved disturbance on any access roads requiring widening. NEXUS and Texas Eastern would mark other environmentally sensitive areas (e.g., waterbodies, cultural resources, sensitive species), where appropriate. NEXUS and Texas Eastern would contact the One Call system for each state to locate, identify, and flag existing underground utilities to prevent accidental damage during pipeline construction.

2.3.1.2 Clearing and Grading

Clearing and grading would remove trees, shrubs, brush, roots, and large rocks from the construction work area and would level the right-of-way surface to allow operation of construction equipment. Vegetation would generally be cut or scraped flush with the surface of the ground, leaving rootstock in place where possible. Brush and other materials cleared from the construction corridor would be burned, chipped, or mulched within the construction right-of-way, or hauled to an appropriate disposal location. Burning would be conducted in accordance with applicable state and local regulations and project plans.

Grading would be conducted where necessary to provide a reasonably level work surface. Extensive grading may be required in uneven terrain and where the right-of-way traverses steep slopes and side slopes. NEXUS and Texas Eastern have indicated that they would separate topsoil from subsoil in agricultural and residential areas. They would segregate at least the top 12 inches of topsoil where 12 or more inches of topsoil is present. In areas with less than 12 inches of topsoil, NEXUS and Texas Eastern would segregate the entire topsoil layer. During backfilling, subsoil would be returned to the trench first. Topsoil would follow such that spoil would be returned to its original horizon.

Temporary erosion controls would be installed along the construction right-of-way immediately after initial disturbance of the soil and would be maintained throughout construction. Temporary erosion control measures would remain in place until permanent erosion controls are installed or restoration is completed. NEXUS and Texas Eastern have committed to employing Environmental Inspectors (EI) during construction to help determine the need for erosion controls and ensure that they are properly installed and maintained. Additional discussion of EI responsibilities is provided in section 2.5.2.

2.3.1.3 Trenching

Soil and bedrock would be removed to create a trench into which the pipeline would be placed. A rotary trenching machine, track-mounted excavator, or similar equipment would be used to dig the pipeline trench. When rock is encountered, tractor-mounted mechanical rippers or rock trenchers would be used to fracture the rock prior to excavation. Blasting would be required in areas where mechanical equipment cannot break up or loosen the bedrock. Excavated materials would be stockpiled along the right-of-way on the side of the trench away from the construction traffic.

The trench would be excavated to a depth that would provide sufficient cover over the pipeline in accordance with DOT standards in 49 CFR 192.327. Typically, the trench would range from 6 to 8 feet deep, depending on the substrate and resource being crossed. Excavations could be deeper in certain locations, such as at road and stream crossings. Generally, the pipeline would be installed with a minimum of 3 feet of cover, except where consolidated rock prevents this depth of cover from being achieved. Additional cover would be provided at road and waterbody crossings. Additional cover (above DOT standards) could also be negotiated at a landowner’s request to accommodate land use practices. Additional depth of cover generally requires a wider construction right-of-way to store the additional spoil.

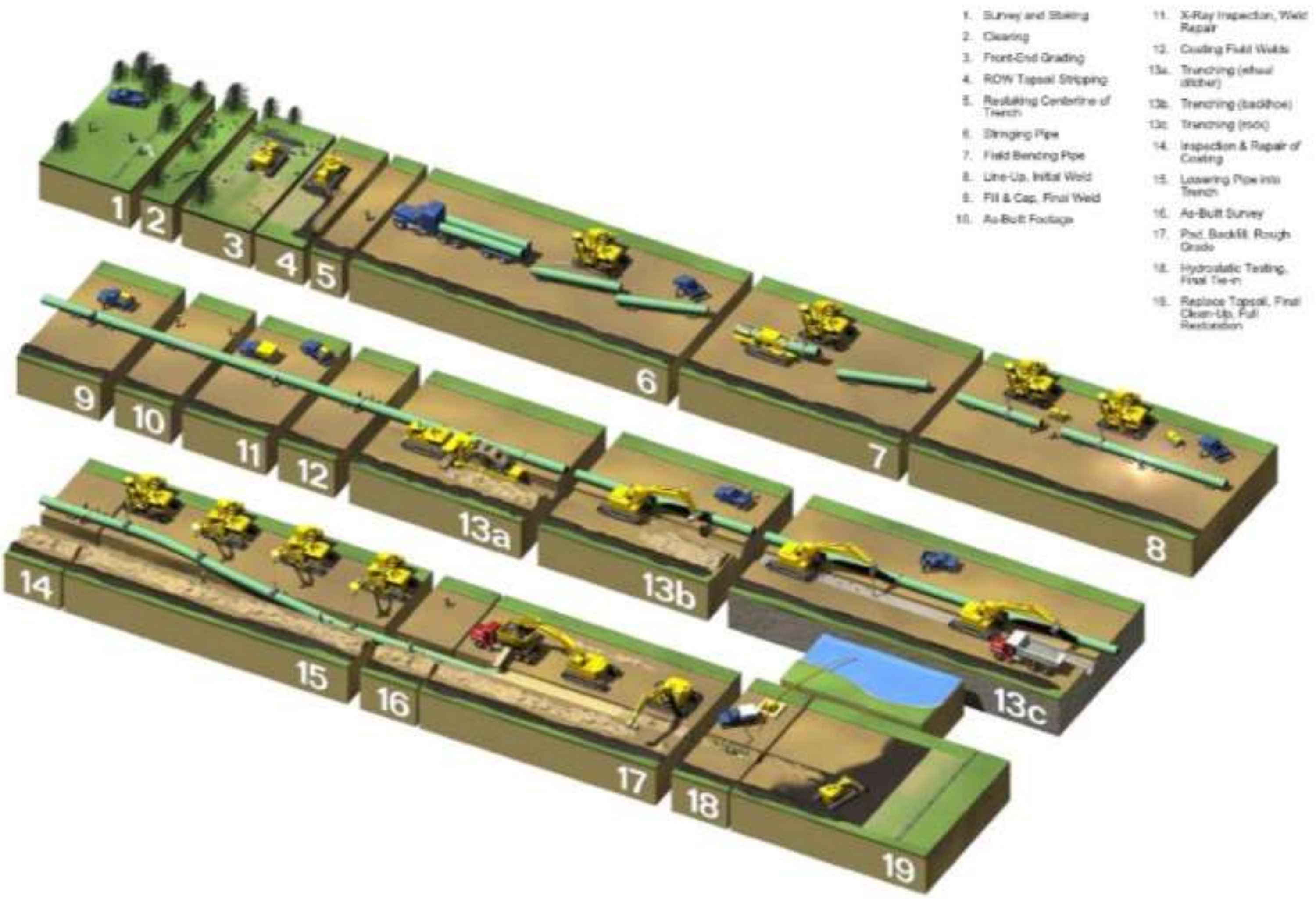

Figure 2.3.1-1

NGT and TEAL Pipeline Projects

Construction Sequence Overview

NEXUS and Texas Eastern would each implement their project-specific *Blasting Plan* in accordance with industry accepted standards, applicable regulations, and permit requirements (see appendices E-1 and E-2). NEXUS and Texas Eastern would adhere to strict safety precautions during blasting and would exercise care to prevent damage to nearby structures, utilities, wells, springs, and other important resources. Blasting would only be conducted during daylight hours and would not begin until landowners and tenants have been provided sufficient advanced notice to protect property or livestock. Blasting mats or padding would be used where necessary to prevent fly rock from scattering. All blasting activities would be performed in compliance with federal, state, and local codes, ordinances, and permits; the manufacturers' prescribed safety procedures; and industry practices. Impacts of blasting on various resources and details about the measures to mitigate the impacts of blasting on these resources are discussed in sections 4.1, 4.3, and 4.5.

2.3.1.4 Pipe Stringing, Bending, Welding, and Coating

After trenching, sections of pipe typically between 40 and 80 feet long (also referred to as "joints") would be transported to the right-of-way by truck and strung beside the trench in a continuous line. The pipe would be delivered to the job site with a protective coating of fusion-bonded epoxy or other approved coating that would inhibit corrosion by preventing moisture from coming into direct contact with the steel.

Individual sections of pipe would be bent to conform to the contours of the ground after the joints of pipe sections are strung alongside the trench. Workers would use a track-mounted, hydraulic pipe-bending machine to bend the pipe. Where multiple or complex bends are required, bending would be conducted at the pipe fabrication factory, and the pipe would be shipped to the Projects area pre-bent.

After the pipe joints are bent, they would be aligned, welded together into a long segment, and placed on temporary supports at the edge of the trench. NEXUS and Texas Eastern would use welders who are qualified according to applicable standards in 49 CFR 192 Subpart E, American Petroleum Standard 1104, and other requirements.

Once the welds are made, a coating crew would coat the area around the weld before the pipeline is lowered into the trench. Prior to application, the coating crew would thoroughly clean the bare pipe with a power wire brush or sandblast machine to remove dirt, mill scale, and debris. The crew would then apply the coating and allow the coating to dry. The pipeline would be inspected electronically (also referred to as "jeeped" because of the sound of the alarm on the testing equipment) for faults or voids in the coating and would be visually inspected for scratches and other defects. NEXUS and Texas Eastern would repair damage to the coating before the pipeline is lowered into the trench.

2.3.1.5 Lowering-In and Backfilling

The trench would be inspected to be sure it is free of rocks and other debris that could damage the pipe or protective coating before the pipe would be lowered into the trench. Trench dewatering may be necessary to inspect the bottom of the trench in areas where water has accumulated. Trench water discharges would be directed to well-vegetated areas and away from waterbodies to minimize the potential for runoff and sedimentation. The pipeline would then be lowered into the trench by a series of side-boom tractors (tracked vehicles with hoists on one side and counterweights on the other), which would carefully lift the pipeline and place it on the bottom of the trench.

Trench breakers (stacked sand bags or polyurethane foam) would then be installed in the trench on slopes at specified intervals to prevent subsurface water movement along the pipeline. The trench would then be backfilled using the excavated material. At locations where topsoil had been separated from subsoil during the clearing process, subsoil would be returned to the trench first, followed by topsoil. A crown of soil about the width of the trench and up to 1 foot high may be left over the trench in non-agricultural areas to compensate for settling. Appropriately spaced breaks may be left in the crown to prevent interference with stormwater runoff.

In rocky areas or where the trench contains bedrock, padding material such as sand, approved foam, or other protective materials would be placed in the bottom of the trench to protect the pipeline. Once the pipe is sufficiently covered with suitable material, the excavated rocky soil would be used for backfill within the original rocky soil horizon. Topsoil would not be used for padding.

We received comments during the scoping period expressing concern that coal ash would be used to fill the trench following pipe installation. In accordance with the respective project *E&SCPs*, backfilling material would consist of the earth removed from the trench or with other fill material hauled to the site when the existing trench spoil is not adequate for backfill. Neither NEXUS nor Texas Eastern have stated that they would use coal ash during construction.

2.3.1.6 Hydrostatic Testing

NEXUS and Texas Eastern would hydrostatically test the pipeline after backfilling to ensure the system is capable of withstanding the operating pressure for which it was designed. Hydrostatic testing typically involves filling the pipeline with water to a designated test pressure and maintaining that pressure for approximately 8 hours. Actual test pressures and durations would be consistent with the requirements of 49 CFR 192. Any leaks would be repaired and the section of pipe retested until the required specifications are met.

Water for hydrostatic testing would be obtained from surface waterbodies and municipal water sources. Following satisfactory completion of hydrostatic testing, the test water would be discharged in vegetated upland areas through a dewatering structure designed to slow the flow of water. If discharging directly to receiving waters, NEXUS and Texas Eastern would use diffusers (energy diverters) to minimize the potential for stream scour. All testing activities would be conducted within the parameter of the applicable water withdrawal and discharge permits. Section 4.3.2.3 provides more information on hydrostatic testing.

2.3.1.7 Cleanup and Restoration

Within 20 days of backfilling the trench (10 days in residential areas) all work areas would be graded and restored to preconstruction contours and natural drainage patterns as closely as possible. If seasonal or other weather conditions prevent compliance with these timeframes, temporary erosion controls would be maintained until conditions allow completion of final cleanup. Topsoil and subsoil would be tested for compaction at regular intervals in agricultural and residential areas disturbed by construction activities. Severely compacted agricultural areas would be plowed and appropriate soil compaction mitigation would be performed in residential areas. Cut and scraped vegetation would be spread back across the right-of-way. Some large shrubs and trees cut during clearing may be spread back across the right-of-way to impede vehicular traffic and other unauthorized access, or hauled away for disposal in accordance with applicable laws. Surplus construction material and debris would be removed from the right-of-way unless the landowner or land-managing agency approves otherwise. Excess rock and stone would be removed from at least the top 12 inches of soils in agricultural and residential areas and, at the landowner's request, in other areas, such that the size, density, and distribution of rock on the construction right-of-way would be similar to adjacent non-right-of-way areas. Landowners may be able to negotiate certain specific construction requirements and restoration measures directly with NEXUS and Texas Eastern.

NEXUS and Texas Eastern would conduct restoration activities in accordance with landowner agreements, permit requirements, and written recommendations on seeding mixes, rates, and dates obtained from the local conservation authority or other duly authorized agency and in accordance with NEXUS and Texas Eastern construction and restoration plans. The right-of-way would be seeded within 6 working days following final grading, weather and soil conditions permitting. Alternative seed mixes specifically requested by the landowner or required by agencies may be used. Any soil disturbance that occurs outside the permanent seeding season or any bare soil left unstabilized by vegetation would be mulched in accordance with NEXUS and Texas Eastern construction and restoration plans. Additional discussion of restoration activities is provided in section 4.2.2.

Markers showing the location of the pipeline would be installed at fence and road crossings to identify the owner of the pipeline and convey emergency information in accordance with applicable governmental regulations, including DOT safety requirements. Special markers providing information and guidance for aerial patrol pilots would also be installed.

NEXUS and Texas Eastern would install cathodic protection equipment along the pipeline to prevent the corrosion of metal surfaces over time. Cathodic protection equipment could consist of underground cased deep well or conventional ground beds, linear anode cable systems, aboveground junction boxes, and rectifiers. According to the applicants, construction and operation of cathodic protection beds would occur within the construction rights-of-way and permanent easements.

Landowners would be compensated for damages in accordance with individual landowner agreements. Following construction, temporary access roads would be restored to their preconstruction condition unless the landowner or land-managing agency requests that the improvements be left in place.

2.3.1.8 Commissioning

Test manifolds would be removed and final pipeline tie-ins would be completed after hydrostatic testing. The pipeline then would be cleaned and dried using mechanical tools (pigs) that are moved through the pipeline with pressurized dry air. Pigs also would be used to internally inspect the pipeline to detect any abnormalities or damage. Any problems or concerns would be addressed as appropriate. Pipeline commissioning would then commence. Commissioning involves verifying that equipment has been properly installed and is working, verifying that controls and communications systems are functioning, and confirming that the pipeline is ready for service. In the final step, the pipeline would be prepared for service by purging the pipeline of air and loading it with natural gas. NEXUS and Texas Eastern would not be authorized to place the pipeline facilities into service until they have received written permission from the Director of the FERC's Office of Energy Projects (OEP).

2.3.2 Special Pipeline Construction Procedures

Special construction techniques are required when a pipeline is installed across waterbodies, wetlands, roads, major utilities, steep slopes, residences, agricultural lands, and other sensitive environmental resources. In general, ATWS adjacent to the construction right-of-way would be used at most of these areas for staging construction, stockpiling spoil, storing materials, maneuvering equipment, and fabricating pipe.

2.3.2.1 Waterbody Crossings

Waterbody crossings would be completed in accordance with the measures described in NEXUS' and Texas Eastern's construction plans as summarized below and in accordance with federal, state, and local permits. The waterbodies that would be crossed, and NEXUS' and Texas Eastern's proposed crossing methods for each are discussed in sections 2.3 and 4.3.2.

ATWS necessary for waterbody crossings would be located a minimum of 50 feet from the waterbody edge, except where adjacent upland consists of actively cultivated or rotated cropland or other disturbed land. The 50-foot setback would be maintained unless site-specific approval for a reduced setback is granted by the FERC and other jurisdictional agencies (see section 4.3.2.2).

To prevent sedimentation caused by equipment traffic crossing through waterbodies, NEXUS and Texas Eastern would install temporary equipment bridges. Bridges may include clean rock fill over culverts, equipment pads, wooden mats, free-spanning bridges, and other types of spans. Equipment bridges would be maintained throughout construction. Each bridge would be designed to accommodate normal to high streamflow (from storm events) and would be maintained to prevent soil from entering the waterbody and to prevent restriction of flow during the period of time the bridge is in use.

Sediment barriers would be installed immediately after initial disturbance of the waterbody or adjacent upland. Sediment barriers would be properly maintained throughout construction and reinstalled as necessary until replaced by permanent erosion controls or restoration of adjacent upland areas is complete and revegetation has stabilized the disturbed areas.

For waterbodies without flow at the time of construction, NEXUS and Texas Eastern would utilize the general construction methods described in section 2.3.1. After backfilling, the streambanks would be re-established to approximate preconstruction contours and stabilized, and erosion and sediment control measures would be installed across the construction right-of-way to reduce streambank and upland erosion and sediment transport into the waterbody.

Flume Construction Method

The flume method is a standard dry waterbody crossing method that involves diverting the flow of water across the in-stream construction work area through one or more flume pipes placed in the waterbody. The first step in the flume crossing method would involve placing a sufficient number of adequately sized flume pipes in the waterbody to accommodate the highest anticipated flow during construction. After placing the pipe in the waterbody, sand bags or equivalent dam diversion structures would be placed in the waterbody upstream and downstream of the trench area. These devices would serve to dam the stream and divert the water flow through the flume pipes, thereby isolating the water flow from the construction area between the dams. Flume pipes would be left in place during pipeline installation until final cleanup of the streambed is complete.

Dam and Pump Construction Method

The dam and pump method is another dry crossing method similar to the flume crossing method except that pumps and hoses would be used instead of flumes to move water across the in-stream construction work area. The technique involves damming of the waterbody with sandbags and/or clean gravel with a plastic liner upstream and downstream of the trench area. Pumps would be set up at the upstream dam with the discharge line routed through the construction area to discharge water immediately downstream of the downstream dam. An energy dissipation device would be used to prevent scouring of the streambed at the discharge location. Water flow would be maintained through all but a short reach of the waterbody at the actual crossing. The pipeline would be installed and backfilled. After backfilling, the dams would be removed and the banks restored and stabilized.

Wet Open-cut Construction Method

The wet open-cut construction method involves trench excavation, pipeline installation, and backfilling in a waterbody without controlling or diverting streamflow (i.e., the stream would flow through the work area throughout the construction period). With the wet open-cut method, the trench would be excavated across the flowing stream using trackhoes or draglines working within the waterbody, on equipment bridges, and/or from the streambanks. Once trench excavation across the entire waterbody is complete, a pre-fabricated section of pipe would be lowered into the trench. The trench would then be backfilled with the previously excavated material, and the pipe section tied-in to the pipeline. Following pipe installation and backfilling, the streambanks would be re-established to approximate preconstruction contours and stabilized. Erosion and sediment control measures would be installed across the right-of-way to reduce streambank and upland erosion and sediment transport into the waterbody.

Conventional Bore Method

The conventional bore method is a trenchless crossing method that involves excavating large bell holes on each side of a waterbody that are deep enough for the bore equipment to auger a hole horizontally from one bell hole to the other a minimum of 5 feet below the bed of a waterbody. Once the bore hole has been created, the pipeline would be pushed or pulled through the hole. Due to the depth of the bell holes and proximity to water resources, this method may require use of sheet pile to maintain the integrity of the bell holes, and use of well point dewatering systems to avoid flooding of the bell holes.

Horizontal Directional Drill Construction Method

A horizontal directional drill (HDD) is a trenchless crossing method that involves drilling a hole under the waterbody (or other sensitive feature) and installing a pre-fabricated pipe segment through the hole. NEXUS proposes to use the HDD method at 18 locations; the TEAL Project would not include HDD crossings (see table 2.3.2-1).

The first step in an HDD is to drill a small diameter pilot hole from one side of the crossing to the other using a drill rig. As the pilot hole progresses, segments of drill pipe are inserted into the hole to extend the length of the drill. The drill bit is steered and monitored throughout the process until the desired pilot hole had been completed. The pilot hole is then enlarged using several passes of successively larger reaming tools. Once reamed to a sufficient size, a pre-fabricated segment of pipe is attached to the drill string on the exit side of the hole and pulled back through the drill hole toward the drill rig. Depending on the substrate, drilling and pull back can last anywhere from a few days to a few weeks.

The HDD method utilizes a slurry referred to as drilling mud, which is composed of water and bentonite, a naturally occurring clay mineral that can absorb up to 10 times its weight in water. Bentonite-based drilling mud is a non-toxic, non-hazardous material that is also used to construct potable water wells throughout the United States. The drilling mud is pumped under pressure through the inside of the drill pipe, and flows back (returns) to the drill entry point along the outside of the drill pipe. The purpose of the drilling mud is to lubricate the drill bit and convey the drill cuttings back to the drill entry point where the mud is reconditioned and re-used in a closed, circulating process. It also forms a cake on the rock surface of the borehole, which helps to keep the drill hole open and maintain circulation of the drilling mud system. Because the drilling mud is pressurized, it can seep into the surrounding matrix, resulting in an inadvertent release of fluid if the drill path encounters fractures or fissures that offer a path of least resistance, or near the drill entry and exit points where the drill path has the least amount of ground cover.

The potential for an inadvertent release is typically greatest during drilling of the initial pilot hole, and decreases once the pilot hole has been completed. The volume of mud lost would be dependent on a number of factors, including the size of the fault, the permeability of the geologic material, the viscosity of the drilling mud, and the pressure of the drilling system. A drop in drilling pressure would indicate that an inadvertent release may be occurring and if the mud moves laterally, the release may not be evident from the ground surface. For a release to be evident there must be a fault or pathway extending vertically to the surface.

TABLE 2.3.2-1

NGT Project Horizontal Direction Drill Crossings

State/Facility	Feature Crossed	Pipeline Diameter (inches)	Entry Milepost	Exit Milepost	Length (miles)
OHIO					
Mainline	Wetland	36	7.9	8.4	0.6
	Nimisila Reservoir	36	41.0	41.3	0.3
	Tuscarawas River	36	47.8	48.4	0.6
	Wetland	36	71.1	71.4	0.3
	East Branch Black River	36	86.9	86.5	0.3
	West Branch Black River	36	92.5	92.2	0.3
	Vermilion River	36	104.1	104.7	0.6
	Interstate 80	36	110.3	110.1	0.3
	Huron River	36	116.8	117.3	0.5
	Sandusky River	36	146.3	145.8	0.5
	Portage River	36	162.6	162.4	0.3
	Findlay Road	36	180.1	179.8	0.3
	Maumee River	36	181.2	181.9	0.8
				Ohio Total	**5.7**
MICHIGAN					
Mainline	River Raisin	36	215.0	215.3	0.3
	Saline River	36	237.4	237.7	0.3
	Hydro Park	36	250.7	251.1	0.4
	Interstate 94	36	251.5	251.8	0.3
	Highway 12/RACER Property	36	254.4	254.1	0.3
				Michigan Total	**1.6**
				NGT Project Total	**7.3**

In the event of a drilling mud release, pits or containment structures could be constructed to contain drilling mud released to the surface of the ground, and a pump may be required to transfer the drilling mud from the pit or the structure to a containment vessel. A release underground would be more difficult to contain and would be addressed by thickening the drilling mud, stopping drilling all together, or continuing to drill past the fault or blockage to re-establish the bore hole as the path of least resistance. In the event of lost drilling mud, NEXUS may introduce additives into the drilling mud to stop or reduce the amount of drilling mud loss. These additives could include walnut shells, paper, other biodegradable solids, or approved polymers that would increase the viscosity and gel strength of the drilling mud. The corrective actions and clean up measures that NEXUS would implement in the event of an inadvertent release of drilling mud, are outlined in NEXUS' *HDD Design Report and HDD Monitoring and Inadvertent Return Contingency Plan* and further discussed in section 4.3.2.2.

It is possible for HDD operations to fail, primarily due to encountering unexpected geologic conditions during drilling or the pipe becoming lodged in the hole during pullback operations. NEXUS would be required to seek approval from the Commission and other applicable agencies prior to abandoning any HDD crossing in favor of a new location, or using another construction method should a second attempt fail. If any of the HDD crossings are found to be infeasible, NEXUS would be required to submit specific proposed alternate construction methods for review and approval by the Commission and other applicable agencies.

2.3.2.2 Wetland Crossings

Wetland crossings would be completed in accordance with federal and state permits and follow the measures described in NEXUS' and Texas Eastern's construction plans. The wetlands that would be crossed are discussed further in section 4.4.1.

NEXUS and Texas Eastern would typically use a 75-foot-wide construction right-of-way through wetlands unless site-specific approval for an increased right-of-way width is granted by the FERC and other jurisdictional agencies (see section 4.4.2). ATWS may be required on both sides of wetlands to stage construction equipment, fabricate the pipeline, and store materials. ATWS for wetland crossings would be located in upland areas a minimum of 50 feet from the wetland edge unless site-specific approval for a reduced setback is granted by the FERC and other jurisdictional agencies (see section 4.4.2).

Clearing of vegetation in wetlands would be limited to trees and shrubs, which would be cut flush with the surface of the ground and removed from the wetland. Stump removal, grading, topsoil segregation, and excavation would be limited to the area immediately over the trenchline. A limited amount of stump removal and grading may be conducted in other areas to ensure a safe working environment.

During clearing, sediment barriers, such as silt fence and staked straw bales, would be installed and maintained adjacent to wetlands and within temporary extra workspaces as necessary to minimize the potential for sediment runoff. Sediment barriers would be installed across the full width of the construction right-of-way at the base of slopes adjacent to wetland boundaries. Silt fence or straw bales installed across the working side of the right-of-way would be removed during the day when vehicle traffic is present and would be replaced each night. Sediment barriers would also be installed within wetlands along the edge of the right-of-way, where necessary, to minimize the potential for sediment to run off the construction right-of-way and into wetland areas outside the construction work area. If trench dewatering is necessary in wetlands, the trench water would be discharged in stable, vegetated, upland areas and/or filtered through a filter bag or siltation barrier. No heavily silt-laden water would be allowed to flow into a wetland.

Construction equipment working in wetlands would be limited to that essential for right-of-way clearing, excavating the trench, fabricating and installing the pipeline, backfilling the trench, and restoring the right-of-way. The method of pipeline construction used in wetlands would depend largely on the stability of the soils at the time of construction. In areas of saturated soils or standing water, low-ground-weight construction equipment and/or timber riprap, pre-fabricated equipment mats, or terra mats would be used to reduce rutting and the mixing of topsoil and subsoil. In unsaturated wetlands, the top 12 inches of topsoil from the trenchline would be stripped and stored separately from the subsoil. Topsoil segregation generally would not be possible in saturated soils.

Where wetland soils are saturated and/or inundated, the pipeline may be installed using the push-pull technique. The push-pull technique would involve stringing and welding the pipeline outside of the wetland and excavating the trench through the wetland using a backhoe supported by equipment mats. The water that seeps into the trench would be used as the vehicle to "float" the pipeline into place together with a winch and flotation devices that would be attached to the pipe. After the pipeline is floated into place, the floats would be removed and the pipeline would sink into place. Pipe installed in saturated wetlands is typically coated with concrete or equipped with set-on weights to provide negative buoyancy. After the pipeline sinks to the bottom of the trench, a trackhoe working on equipment mats would backfill the trench and complete cleanup.

Prior to backfilling, trench breakers would be installed where necessary to prevent the subsurface drainage of water from wetlands. Where topsoil has been segregated from subsoil, the subsoil would be backfilled first followed by the topsoil. Equipment mats, terra mats, and timber riprap would be removed from wetlands following backfilling.

Where wetlands are located at the base of slopes, permanent interceptor dikes and trench plugs would be installed in upland areas adjacent to the wetland boundary. Temporary sediment barriers would be installed where necessary until revegetation of adjacent upland areas is successful. Once revegetation is successful, sediment barriers would be removed from the right-of-way and disposed of properly.

2.3.2.3 Road and Railroad Crossings

Construction across roads would be conducted in accordance with the requirements of road and railroad crossing permits obtained by NEXUS and Texas Eastern and applicable laws and regulations. Generally, paved roads, unpaved roads where traffic cannot be detoured, and railroads would be crossed by boring beneath the road or railroad without disturbing the road or rail bed or disrupting traffic. Boring would involve excavating a pit on each side of the road or railroad, placing the boring equipment in the pit, and then boring a hole under the road or railroad that is at least equal to the diameter of the pipe. Once the hole is bored, a pre-fabricated section of pipe would be pushed through the borehole. At particularly long crossings, pipe sections may be welded onto the pipe string just before being pushed through. Borings would typically occur during normal construction work hours. However, if necessary as required by field conditions, borings could be conducted 24 hours per day, 7 days per week until completed. Each bore crossing typically would require between 2 and 10 days to complete from start to finish.

In addition to the conventional bore method, NEXUS has identified the cased crossing and hammer technique for road crossings. The cased crossing would be similar to a bored crossing; however, a section of steel casing pipe that is several inches in diameter greater than the pipeline width would be bored into place. The pipeline would then be pulled through the casing pipe. With the hammer technique, a casing pipe is driven under the roadway with a horizontal air operated reciprocating hammer. The material inside the casing pipe is then removed and the pipeline is pulled through the casing. Following installation, the casing pipe may be left in place or removed.

Most gravel and dirt roads would be crossed by the open-cut method, which would require temporary closure of the road and the establishment of detours. Roads would be closed only where allowed by permit or landowner/land-managing agency consent. Most open-cut road crossings require only 1 or 2 days to complete, although resurfacing could require several weeks to allow for soil settlement and compaction. In residential areas, landowners would be provided continued access to their properties throughout construction.

NEXUS and Texas Eastern would construct all road and railroad crossings in accordance with DOT safety standards and would coordinate traffic control measures with the appropriate state and local agencies. Where heavy equipment is known to use a road crossed by the pipeline, special safety measures, such as thicker-walled pipe or additional cover over the pipe, would be required.

2.3.2.4 Steep Slopes

Segments of the NGT and TEAL Projects pipeline facilities would cross areas with slopes greater than 5 percent. In these areas, NEXUS and Texas Eastern would install and maintain specific temporary and permanent controls to minimize erosion and sedimentation, which can increase due to clearing, grading, and trenching on steep slopes. During construction, temporary slope and trench breakers consisting of compacted earth, sandbags, or other materials would be placed to reduce runoff velocity and divert water off of the construction right-of-way. Temporary trench plugs consisting of compacted earth or similar low-permeability material would be installed at the entry and exit points of wetlands and waterbodies to minimize channeling along the ditch and maintain subsurface hydrology patterns. Additional types of temporary erosion control such as super silt fence, erosion control matting, and hydro-mulching may be used. Upon installation of the pipeline, permanent trench breakers and plugs consisting of sandbags, gravel, foam, cement, or cement-filled sacks would be installed over and around the pipeline and permanent slope breakers generally consisting of compacted earth and rock would be installed across the right-of-way during grade restoration. Surface contours and topsoil would be returned to preconstruction conditions and revegetation of the right-of-way would commence. NEXUS and Texas Eastern would monitor the right-of-way during operation and take measures as necessary to ensure the effectiveness of erosion control and revegetation.

NEXUS and Texas Eastern may also implement the two-tone construction method in areas of steep side slopes. During grading, the upslope side of the right-of-way would be cut and the material placed on the downslope side to create a safe, level work area. This method could require additional ATWS to accommodate the downslope spoil. After installation of the pipeline, the spoil would be returned to the upslope cut and the overall grade restored. Any springs or seeps found in the upslope cut would be carried downslope through polyvinyl chloride (PVC) pipe and/or gravel French drains during restoration.

2.3.2.5 Agricultural Areas

Agricultural areas crossed by the NGT and TEAL Projects are identified in section 4.9. As discussed in their respective *E&SCPs*, NEXUS and Texas Eastern would conserve topsoil in all actively cultivated and rotated croplands, pastures, and hayfields. NEXUS and Texas Eastern would also segregate topsoil at the specific request of the landowner or land management agency. The topsoil would be stored in separate windrows on the construction right-of-way. The depth of the trench would vary with the stability of the soil, but in all cases it would be sufficiently deep to allow for at least 3 feet of cover over the pipe.

We received several comments during the scoping period expressing concern about agricultural drain tiles being damaged during construction and interrupting flow to agricultural fields. In areas where irrigation or drainage systems would be crossed, NEXUS and Texas Eastern would identify crossing locations during civil surveys and prior to construction. In the event irrigation and drainage systems are damaged as a result of construction, they would be permanently repaired during backfill and cleanup. Section 4.2.2 provides additional discussion of drain tiles and NEXUS' and Texas Eastern's proposed mitigation measures, including implementation of NEXUS' *Drain Tile Mitigation Plan*.

We received comments during the scoping period expressing concern about organic farm crossings and the Projects' potential to affect landowners' continued production of organic crops. Section 4.9.3.2 identifies the locations of where known organic farms would be crossed and NEXUS' and Texas Eastern's proposed mitigation measures at these locations.

2.3.2.6 Major Utilities

The pipelines would be constructed across or parallel to numerous utility lines. Prior to construction, NEXUS' and Texas Eastern's construction contractors would call the One Call systems in each state to identify and flag buried utilities before ground-disturbing activities. Where the pipeline is installed near a buried utility, NEXUS and Texas Eastern would install the pipeline with at least 12 inches of clearance from any other underground structure not associated with the pipeline, as required by 49 CFR 192.325. Section 4.9.1.1 discusses the major utilities that would be crossed by the NGT and TEAL Projects.

2.3.2.7 Residential Construction

Construction through or near residential areas would be done in a manner to ensure that all construction activities minimize adverse impacts on residences and that cleanup is prompt and thorough. Access to homes would be maintained, except for the brief periods essential for laying the new pipeline.

NEXUS and Texas Eastern would implement measures to minimize construction-related impacts on all residences and other structures located within 50 feet of the construction right-of-way, including:

- install safety fence at the edge of the construction right-of-way for a distance of 100 feet on either side of the residence or business establishment;
- fence the boundary of the construction work area to ensure that construction equipment and materials, including the spoil pile, remain within the construction work area;
- attempt to leave mature trees and landscaping intact within the construction work area unless the trees and landscaping interfere with the installation techniques or present unsafe working conditions;
- ensure piping is welded and installed as quickly as reasonably possible to minimize the amount of time a neighborhood is affected by construction;
- backfill the trench as soon as possible after the pipe is laid or temporarily place steel plates over the trench;
- complete final cleanup, grading, and installation of permanent erosion control devices within 10 days after backfilling the trench, weather permitting; and
- restore private property such as fences, gates, driveways, and roads disturbed by pipeline construction to original or better condition upon completion of construction activities.

In addition, NEXUS and Texas Eastern have provided site-specific *Residential Construction Plans* to inform affected landowners of proposed measures to minimize disruption and to maintain access to the residences located within 50 feet of the construction work area. These plans are described in section 4.9.3.1 and included in appendix E-5.

2.3.2.8 Karst Sensitive Areas

The NGT Project would cross areas of karst geology in Ohio and Michigan between MPs 124.3 and 190.2 and MPs 224.5 and 247.7. Sections 4.1 and 4.3 detail the project-specific construction and restoration methods that would be implemented to address karst features encountered during trenching.

2.3.2.9 Winter Construction

NEXUS and Texas Eastern have proposed to place their Projects into service by November 2017, and would seek approval to begin construction by November 2016 as soon as all necessary federal, state, and local approvals can be obtained. Based on the schedule provided, construction during the winter of 2016/2017 would be required. Therefore, NEXUS and Texas Eastern have each developed a project-specific *Winter Construction Plan* to address specialized methods and procedures that would be used to protect resources during the winter season (see table 2.3-2 for accession numbers relating to both documents). The key elements of the *Winter Construction Plans* include:

- winter construction procedures (e.g., snow handling and removal, access road construction and maintenance, soil handling under saturated or frozen conditions, topsoil stripping);
- stabilization and monitoring procedures if ground conditions would delay restoration until the following spring (e.g., mulching and erosion controls, inspection and reporting, stormwater control during spring thaw conditions); and
- final restoration procedures (e.g., subsidence and compaction repair, topsoil replacement, seeding).

We have reviewed the *Winter Construction Plans* and have found them acceptable.

2.3.3 Aboveground Facility Construction

Construction activities at the proposed compressor station sites would include access road construction; site clearing; grading; installing concrete foundations; erecting metal buildings; and installing compressors, metering facilities, and appurtenances. Initial work at the compressor stations would focus on preparing foundations for the buildings and equipment. Building foundations and pipe trenches would be excavated with standard construction earthmoving equipment. Following foundation work, station equipment and buildings would be brought to the site and installed, using any necessary trailers or cranes for delivery and installation. Following installation of the buildings and primary facilities, associated equipment, piping, and electrical systems would be installed. Necessary equipment testing and start-up activities would occur on a concurrent basis.

Construction of the other proposed aboveground facilities, including the M&R stations, MLVs, and pig launchers/receivers, would involve site clearing and grading as needed to establish appropriate contours for the facilities. Following installation of the equipment, the sites would be graveled, as necessary, and fenced. MLVs would be installed at intervals specified by the DOT or as needed for customer deliveries.

2.4 CONSTRUCTION SCHEDULE AND WORKFORCE

NEXUS and Texas Eastern would seek approval to begin construction as soon as possible after receiving all necessary federal authorizations and have proposed an in-service date of November 2017 for the proposed facilities, except that the increased compression proposed by Texas Eastern would be placed in-service in October 2018. Construction of mainline pipeline and compressor stations is scheduled to begin in the first quarter of 2017, followed by M&R stations and launcher and receiver stations. Restoration efforts would commence following construction and continue until all workspaces are compliant with the FERC *Plan* and *Procedures*.

NEXUS and Texas Eastern would seek to begin construction of their Projects dependent upon:

- whether the Commission decides to authorize a Certificate;
- subsequent acquisition of additional survey access and easement agreements;
- completion of field surveys and submittal of permit applications;
- receipt of all necessary federal, state, and local authorizations;

- other Projects-specific requirements such as waterbody, migratory bird, and rare bat construction window restrictions (see sections 4.3.3, 4.6, and 4.7);

- satisfaction of all pre-construction conditions of any Certificate issued for the Projects; and

- the FERC's separate post-Certificate authorization that construction may begin.

Section 4.10.3 details the estimated construction workforce for each phase of the NGT and TEAL Projects. The total construction workforce of over 2,700 workers would occur during construction in 2017 for both projects and in both states affected by the NGT and TEAL Projects. In 2018, a total construction workforce of 120 workers would be required for the TEAL Project. The total construction workforce would vary on any given day depending on the phase of construction. As the pipeline spread moves along, construction at any single point would last approximately 8 to 16 weeks; however, the duration of construction may be longer at aboveground facility sites and at hydrostatic test tie-in locations. Construction crews would typically work 10 hours per day, 6 days per week. Work would be conducted during daylight hours, except where the pipe would be installed using the HDD and bore methods, which require around-the-clock operations and typically last a few days to a few weeks.

2.5 ENVIRONMENTAL INSPECTION, COMPLIANCE MONITORING, AND POST-APPROVAL VARIANCES

2.5.1 Coordination and Training

NEXUS and Texas Eastern would incorporate into their construction drawings and specifications the mitigation measures identified in their permit applications, as well as additional requirements of federal, state, and local agencies. NEXUS and Texas Eastern would also provide copies of applicable environmental permits and construction drawings and specifications to their construction contractors.

Each of the applicants would develop environmental training programs tailored to their respective proposed Project and the requirements for each. The programs would be designed to ensure that:

- qualified environmental training personnel provide thorough and focused training sessions regarding the environmental requirements applicable to the trainees' activities;

- all individuals receive environmental training before they begin work on any construction workspaces;

- adequate training records are kept; and

- refresher training is provided as needed to maintain high awareness of environmental requirements.

The applicants would also conduct training for construction personnel regarding proper field implementation of NEXUS' and Texas Eastern's construction and restoration plans and other Projects-specific plans and mitigation measures.

2.5.2 Environmental Inspection

NEXUS and Texas Eastern have each proposed to employ EIs on their Projects to ensure that construction complies with the procedures and mitigation measures identified in their respective applications, the FERC Certificates, other environmental permits and approvals, and environmental requirements in landowner easement agreements. A minimum of one EI would be assigned to each construction spread, which equates to four EIs on the NGT Project and two EIs on the TEAL Project. EIs would have peer status with all other activity inspectors. EIs would have the authority to stop activities that violate the environmental conditions of the FERC Certificate, other permits, or landowner requirements, and to order the appropriate corrective action. At a minimum, the EI would be responsible for:

- ensuring compliance with the measures set forth in NEXUS' and Texas Eastern's *E&SCPs* and all other environmental permits and approvals, as well as environmental requirements in landowner agreements;
- identifying, documenting, and overseeing corrective actions as necessary to bring an activity back into compliance;
- verifying that the limits of authorized construction work areas and locations of access roads are properly marked before clearing;
- verifying the locations of signs and highly visible flagging to mark the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area;
- identifying erosion/sediment control and stabilization needs in all areas;
- locating dewatering structures and slope breakers to ensure that they would not direct water into sensitive areas, such as known cultural resource sites or sensitive species habitat;
- verifying that trench dewatering activities do not result in deposition of sand, silt, and/or sediment near the point of discharge in a wetland or waterbody. If such deposition is occurring, the EI would stop the dewatering activity and take corrective action to prevent a reoccurrence;
- advising the Chief Construction Inspector when conditions (such as wet or frozen weather) make it advisable to restrict construction activities to avoid excessive rutting;
- approving imported soils and verifying that the soil is certified free of noxious weeds and soil pests, unless otherwise specified by the landowner;
- determining the need for and ensuring that erosion controls are properly installed, as necessary, to prevent sediment flow into wetlands, waterbodies, and sensitive areas, and onto roads;
- inspecting and ensuring the maintenance of temporary erosion control measures at least daily in areas of active construction or equipment operation, on a weekly basis in areas with no construction or equipment operation; and within 24 hours of each 0.5 inch or greater of rainfall;
- ensuring restoration of contours and topsoil;
- ensuring the repair of all ineffective temporary erosion control measures as soon as possible but not longer than 24 hours after identification;

- ensuring that subsoil and topsoil are tested in agricultural and residential areas to measure compaction and determine the need for corrective action;

- keeping records of compliance with conditions of all environmental permits and approvals during active construction and restoration; and

- identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase.

2.5.3 Post-Approval Variance Process

The pipeline alignment and work areas identified in this EIS should be sufficient for construction and operation (including maintenance) of the Projects and ancillary facilities. However, minor route realignments and other workspace refinements often continue past the Projects' planning phase and into the construction phase. As a result, the Projects' locations and areas of disturbance described in this EIS may require refinement after the Projects are approved (assuming they are approved). These changes frequently involve minor route realignments, shifting or adding new ATWS, or adding additional access roads. We have developed a procedure for assessing impacts on those areas that have not been evaluated in this EIS and for approving or denying their use.

In general, biological and cultural resource surveys were conducted using a survey corridor larger than that necessary to construct the pipeline. If NEXUS or Texas Eastern shifts any ATWS or requires unanticipated workspace subsequent to any regulatory approval, these areas would typically be within the previously surveyed area. Such requests would be reviewed using a post-approval variance process.

NEXUS and Texas Eastern would prepare its request for route realignments or ATWS locations, including a copy of the survey results, and forward it to the FERC (and other federal land-managing agencies as applicable) in the form of a "variance request" in compliance with environmental recommendation number 5 in section 5.2 of this EIS. Any variance activity by the applicants and subsequent FERC action would be available on the FERC's e-library webpage under the docket number for the respective Project (CP16-22 or CP16-23).

Typically, no further resource agency consultation would be required if the requested change is within previously surveyed areas as long as no sensitive species or features were present. The procedures used for assessing impacts on work areas outside the survey corridor and for approving their use are similar to those described previously, except that additional surveys, analyses, and resource agency consultations would be performed to ensure that impacts on biological, cultural, and other sensitive resources are avoided or minimized to the maximum extent practicable. After the applicants complete any additional surveys, landowner consultation, analyses, and/or resource agency consultations, the new work area(s) and supporting documentation (including a statement of landowner approval) would be submitted to FERC in the form of a formal variance request, which would be evaluated in the manner described previously for approval or denial.

2.5.4 Compliance Monitoring

NEXUS filed information with the Commission on June 12, 2015 indicating it would like to implement a third-party compliance monitoring program on the NGT Project. The overall objective of a third-party compliance monitoring program is threefold: to assess environmental compliance during construction in order to achieve a higher level of environmental compliance throughout a project; to assist FERC staff in screening and processing variance requests during construction; and to create and maintain a database of daily reports documenting compliance and instances of noncompliance.

In addition to the EIs, FERC third-party monitors typically would conduct periodic field inspections during construction and restoration. The monitors would report on the effectiveness of the environmental inspection program and help ensure compliance with the terms and conditions of the FERC Certificate. Third-party compliance monitors would report to FERC; would have authority to approve simple variance requests (see section 2.5.3); and would have the authority to stop any activity that violates an environmental condition of the FERC Certificate. FERC environmental staff would also visit the site periodically during construction and restoration. The FERC monitor would be present on the ground throughout construction. Other federal, state, and local agencies also may monitor the Projects to the extent determined necessary by the agency.

Texas Eastern is not proposing to implement a third-party compliance monitoring program; therefore, Texas Eastern would not gain the benefits of expedited processing of variance requests during construction.

Other regulatory agencies also may include terms and conditions or stipulations as part of their permits or approvals. While there would be jurisdictional differences between the FERC's and other agencies' conditions, the environmental inspection program for the Projects would address all environmental or construction-related conditions or other permit requirements placed on the Projects by all regulatory agencies.

2.5.5 Post-construction Monitoring

NEXUS and Texas Eastern would conduct follow-up inspections and monitor disturbed areas after the first and second growing seasons at a minimum, including until revegetation thresholds are met and temporary erosion control devices are removed. NEXUS and Texas Eastern would submit quarterly monitoring reports for at least 2 years following construction. Restoration is deemed complete when the density and cover of non-nuisance vegetation are similar in density and cover to adjacent, undisturbed areas.

We would monitor the rights-of-way following construction for issues such as vegetation cover, invasive species, soil settling, soil compaction, excessively rocky soils, and drainage problems. We would also continue oversight of the NGT and TEAL Projects area after construction by reviewing NEXUS' and Texas Eastern's monitoring reports and conducting compliance inspections. We would require NEXUS and Texas Eastern to continue revegetation efforts until we determine that restoration is successful.

We recognize that during and after construction, issues or complaints may develop that were not addressed during the environmental proceedings at the Commission, and it is important that landowners have an avenue to contact NEXUS and Texas Eastern representatives. Should the NGT and TEAL Projects be approved, we are interested in ensuring that landowner issues and complaints received during and after construction are resolved in a timely and efficient manner. Resolution of landowner issues and complaints are discussed further in section 4.9.

2.6 OPERATION AND MAINTENANCE

The NGT and TEAL Projects' pipelines and aboveground facilities would be operated and maintained in accordance with DOT regulations in 49 CFR 192, the Commission's guidance in 18 CFR 380.15, and NEXUS and Texas Eastern construction and restoration plans.

2.6.1 Pipeline Surveys and Inspections

As required by 49 CFR 192.615, NEXUS and Texas Eastern would establish an operation and maintenance plan as well as an emergency plan for each Project that includes procedures to minimize the hazards in a natural gas pipeline emergency. As a part of pipeline operations and maintenance, NEXUS and Texas Eastern would conduct regular patrols of the pipeline rights-of-way. The patrol program would be conducted in accordance with DOT requirements and include aerial and ground patrols of the pipeline facilities to survey surface conditions on and adjacent to the pipeline right-of-way for evidence of leaks, unauthorized excavation activities, erosion and wash-out areas, areas of sparse vegetation, damage to permanent erosion control devices, exposed pipe, missing markers and signs, new residential developments, and other conditions that might affect the safety or operation of the pipeline. The cathodic protection system would also be inspected to ensure that it is functioning properly. In addition, pigs are sent through the pipeline to check for corrosion and irregularities in the pipe in accordance with DOT requirements. All MLVs along the NGT Project would be installed with equipment such that they may be remotely operated from a control center. All MLVs along the NGT Project would be equipped with line break control that would automatically close the MLV in the event of a major leak or break. NEXUS and Texas Eastern would be required to keep detailed records of all inspections and supplements to the corrosion protection system as necessary to meet the requirements of 49 CFR 192.

NEXUS and Texas Eastern would also maintain a liaison with the appropriate fire, police, and public officials as part of each of their emergency operating procedures. Communications with these parties would include the potential hazards associated with NEXUS' and Texas Eastern's facilities located in their service area and prevention measures undertaken, the types of emergencies that may occur on or near the new pipeline facilities, the purpose of pipeline markers and the information contained on them, pipeline location information, recognition of and response to pipeline emergencies, and procedures to contact NEXUS and Texas Eastern for more information.

In addition, NEXUS and Texas Eastern would install a supervisory control and data acquisition system on each pipeline system that would continuously monitor gas pressure, temperature, and volume at specific locations along the pipeline. These systems would be continuously monitored from each NEXUS' and Texas Eastern's gas control center. The systems would provide continuous information to the control center operators and has threshold and alarm values set to warn operators if critical parameters are exceeded.

2.6.2 Right-of-way Maintenance

In addition to the survey, inspection, and repair activities described previously, operation of the pipelines would include right-of-way maintenance. The rights-of-way would be allowed to revegetate after restoration; however, larger shrubs and brush may be periodically removed near the pipeline. The frequency of the vegetation maintenance would depend upon the vegetation growth rate. NEXUS and Texas Eastern have indicated that they would not need to maintain vegetation (i.e., mow) within the 50-foot-wide permanent right-of-way in most land uses types. However, in accordance with NEXUS' and Texas Eastern's construction and restoration plans, routine vegetation maintenance clearing of the permanent right-of-way is allowed but would not be done more frequently than every 3 years. To facilitate periodic corrosion and leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be maintained annually in an herbaceous state. In no case would routine vegetation maintenance clearing occur between April 15 and August 1 of any year. Vegetation management is discussed further in section 4.5.2.

Pipeline facilities would be clearly marked at line-of-sight intervals and at crossings of roads, railroads, and other key points. The markers would clearly indicate the presence of the pipeline and provide a telephone number and address where a company representative may be reached in the event of an emergency or prior to any excavation in the area of the pipeline by a third party. NEXUS and Texas Eastern would participate in the national and state One Call systems in the states in which they operate.

3.0 NGT AND TEAL PROJECTS ALTERNATIVES

In accordance with NEPA, FERC policy, and CWA 404(b)(1) guidelines, we identified and evaluated alternatives to the proposed Projects to determine whether the alternatives would be reasonable and environmentally preferable to the proposed action while still meeting project objectives. These alternatives included the No Action Alternative, system alternatives, major route alternatives, minor route variations, and aboveground facility site alternatives. The analysis of alternatives is based on information provided by NEXUS and Texas Eastern, as well as input from cooperating agencies, public scoping, site visits, and our own assessments. We compared each of the alternatives to the Projects using the following three criteria:

- Does the alternative have the ability to meet the Projects' objectives?
- Is the alternative technically and economically feasible and practical?
- Does the alternative offer a substantial environmental advantage over the proposed Projects?

The stated objectives of the Projects, described in greater detail in section 1.1, are to provide for the transportation of 1.5 million Dth/d of Appalachian Basin shale gas to consuming markets in northern Ohio and southeastern Michigan, and to the Dawn Hub in Ontario, Canada. Therefore, a preferable alternative must be able to meet this objective. A preferable alternative also would need to provide the services within a reasonably similar timeframe. It is important to recognize that not all conceivable alternatives have the ability to meet the objective and an alternative that does not meet the Projects' objectives cannot be considered a reasonable alternative and is not considered in our evaluation.

Many alternatives are technically and economically feasible. Technically practical alternatives, with exceptions, would generally require the use of common construction methods. An alternative that would require the use of a new, unique, or experimental construction method may not be technically practical because the required technology is not available or is unproven. Economically practical alternatives would result in an action that generally maintains the price competitive nature of the proposed action. Generally, we do not consider the cost of an alternative as a critical factor unless the sum total cost to construct and operate the alternative would render the project economically impractical.

Determining if an alternative provides a significant environmental advantage requires a comparison of the impacts on each resource as well as an analysis of impacts on resources that are not common to the alternatives being considered. The determination must then balance the overall impacts and all other relevant considerations. In comparing the impact between resources (factors), we also considered the degree of impact anticipated on each resource. Ultimately, an alternative that results in equal or only minor advantages in terms of environmental impact would not compel us to shift the impacts from the current set of landowners affected by the proposed Projects to a new set of landowners.

To ensure a consistent environmental comparison and to normalize the comparison factors, we generally use desktop sources of information when evaluating alternatives against the proposed route (e.g., publicly available data, Geographic Information Systems (GIS) data, aerial imagery) and assume the same right-of-way widths and general workspace requirements. As described previously, our environmental analysis and this evaluation consider quantitative data (e.g., acreage, mileage, or numbers of residences) and use common comparative factors such as total length, amount of co-location, and land requirements. The total length of an alternative as well as the length of greenfield construction provides a baseline for which to evaluate, at a high level, the anticipated impacts from construction and operation. A longer a route or a route with more greenfield construction suggests a greater amount and intensity of impacts. We also often evaluate the total mileage of steep slopes and sidehill construction because such areas generally require substantially more workspace and suggest greater impacts.

Our evaluation also considers impacts on both natural and human environments. Impacts on the natural environment include wetlands, waterbodies, aquifers, forested lands, karst geology, and other common environmental resources. Impacts on the human environment include proximity to residences and crossings of designated forests or parks. In recognition of the competing interests and the different nature of impacts resulting from an alternative that sometimes exists (i.e., impacts on the natural environment versus impacts on the human environment), we also considered other factors that are relevant to a particular alternative or discount or eliminate factors that are not relevant or may have less weight or significance.

We received thousands of comments during scoping expressing concern about the Projects, many of which requested that we evaluate alternatives to the Projects, the proposed pipeline routes, and the aboveground facility locations. In response to many of these comments, we required NEXUS and Texas Eastern to provide additional environmental information, requested they assess the feasibility of alternatives as proposed by the commenters, conducted site visits and field investigations, met with affected landowners and local representatives and officials, consulted with federal and state regulatory agencies, and sought additional public input. These efforts, along with NEXUS' and Texas Eastern's continued assessments of their respective projects, resulted in numerous changes to the proposed actions. During the course of the pre-filing processes and the issuance of this draft EIS, over 239 route alternatives and variations were adopted (see sections 3.3 and 3.4).

Some of the comments we received during scoping suggested that the FERC should establish an energy corridor through Ohio and Michigan where the NGT Project as well as other pipelines could be safely and efficiently routed. It is important to understand that the Commission does not direct development of the gas industry's infrastructure, neither on a broad regional basis through the establishment of energy corridors, nor on a more local scale in the design of specific projects. Instead, the Commission responds when an application is filed with the FERC and in each application the parameters of the project are determined by the applicant. Typically, a project presented to the FERC represents one way to get certain gas supplies to certain markets, and, in some cases, may be the only option. This does not mean that we cannot recommend a modification to a project or different routing option and, as required by NEPA, the Commission evaluates a full range of practical and feasible alternatives to applicant proposals. However, part of our review is to make sure any recommended modifications or alternatives would meet the applicant's objectives. Ultimately, the Commission (not FERC staff) determines whether a project's objectives are in the public interest.

We also received comments stating that the pipeline and compressor stations should be routed away from population centers and relocated to more rural, less populated areas due to the potential for a pipeline accident. Each of the alternatives evaluated in this section includes a comparison of resources affected by the proposed action and the alterative. Within these tables, we have included the number of residential-type structures (including detached dwellings, garages, sheds, and other buildings often associated with a residence) within 150 feet of the pipeline centerline. However, this information is included to characterize the potential construction-related impacts on residential land use. As discussed in section 4.13, the transportation of natural gas by pipeline involves some incremental risk to the public due to the potential for an accident; the DOT is the federal agency responsible for administering the national regulatory program to ensure the safe transportation of natural gas. DOT safety standards are intended to ensure adequate protection for the public and account for population density in the vicinity of the pipeline and aboveground facilities. The safety standards specify more rigorous safety requirements for populated areas and areas where a gas pipeline accident could do considerable harm to people and their property (e.g., near multiple residences, schools, churches, retirement homes, airports). The pipelines and aboveground facilities associated with the NGT and TEAL Projects must be designed, constructed, operated, and maintained in accordance with these safety standards.

Factors that must be considered in pipeline routing are specified in 18 CFR 380.15; however, proximity to people is not specified in these regulations. Because public safety is addressed by compliance with DOT safety standards, it is not a primary consideration for siting alternatives. The pipeline facilities would be built according to the class location and high-consequence area safety as defined in 49 CFR 192 (see section 4.13.1). Proximity to people is not a factor with respect to public safety because the pipeline must meet DOT safety standards.

With regard to co-location in particular, we frequently evaluate alternatives that minimize the creation of new rights-of-way (i.e., greenfield[1] routes) by routing pipelines within or adjacent to existing rights-of-way. Installation of new pipeline along an existing, cleared right-of-way (such as another pipeline, electric transmission line, road, or railroad) may be environmentally preferable to construction along a new right-of-way, and construction effects and cumulative impacts can normally be reduced by use of a previously cleared right-of-way. Likewise, long-term or permanent environmental impacts may be reduced by avoiding the creation of new right-of-way through previously undisturbed areas.

Finally, we received comments during scoping suggesting that the receipt and delivery points identified by NEXUS are baseless, and that other receipt and delivery points could or should be considered. We recognize the difference between definitive receipt and delivery points based on binding precedent agreements and speculative receipt and delivery points based on the potential for future customers. As identified earlier, we consider the six definitive receipt and delivery points on the NGT Project to be essential to the Project's objective, whereas we do not consider the 13 potential future receipt and delivery points to be essential. This is an important distinction because for this EIS we have decided to not evaluate alternatives they do not meet the Projects' objectives; however, we will evaluate other alternatives that do. As such, all alternatives must meet the objective of serving the 6 definitive receipt and delivery points, but they may not need to serve the 13 speculative sites.

3.1 NO ACTION ALTERNATIVE

The Commission has two possible courses of action in processing applications under Section 7 of the NGA: 1) deny the requested authorizations (i.e., the No Action Alternative), or 2) grant the Certificate with or without conditions. If the Commission denies the NEXUS and Texas Eastern applications, the environmental impacts identified in this EIS would not occur nor would the Projects' objectives be met. Although a Commission decision to deny the proposed action would avoid the immediate environmental impacts addressed in this EIS, other natural gas companies could construct projects in substitute for the natural gas supplies offered by the NGT and TEAL Projects. Such alternative projects could require the construction of additional and/or new pipeline facilities in the same or other locations to transport the gas volumes proposed by the Projects. These projects would result in their own set of specific environmental impacts that could be less than, equal to, or greater than those described for the current proposal.

If the applicants' proposed facilities are not constructed, the Projects' shippers would presumably need to obtain an equivalent supply of natural gas from new or existing pipeline systems. In response, the applicants or another natural gas transmission company would likely develop a new project or projects to provide the volume of natural gas contracted through the Projects' binding precedent agreements with the shippers. As more fully evaluated in the following sections, construction of new pipelines or other natural gas infrastructure would result in environmental impacts equal to or greater than those of the Projects, and

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[1] A greenfield pipeline crosses land previously untouched by linear infrastructure (e.g., pipelines, electric power lines, roads, railroads) rather than using existing rights-of-way.

therefore would not be preferable to the proposed Projects. For these reasons, we are not recommending the no-action alternative.

The Commission received comments suggesting that other types of energy, such as electricity generated from renewable sources, could eliminate the need for the Projects and that the use of these energy sources as well as gains realized from increased energy efficiency and conservation should be considered as alternatives to the Projects. The generation of electricity from renewable energy sources is a reasonable alternative for a review of generating facilities powered by fossil fuels. The siting, construction, and operation of generating facilities are regulated by the states. Authorizations related to how markets would meet demands for electricity are not part of the applications before the Commission and their consideration is outside the scope of this draft EIS. Therefore, because the purpose of the Projects is to transport natural gas, and the generation of electricity from renewable energy resources or the gains realized from increased energy efficiency and conservation are not transportation alternatives, they are not considered or evaluated further in this analysis.

3.2 SYSTEM ALTERNATIVES

System alternatives are alternatives to a proposed action that would make use of existing, modified, or other proposed natural gas transmission systems to meet the stated objectives of the proposed Projects. A system alternative would make it unnecessary to construct all or part of the proposed Projects, although some modifications or additions to another pipeline system may be required, or another entirely new system may need to be constructed. Such modifications or additions would result in environmental impacts that could be less than, similar to, or greater than the impacts associated with construction of the proposed Projects. The purpose of identifying and evaluating system alternatives is to determine whether the environmental impacts associated with the construction and operation of the proposed Projects would be avoided or reduced by using existing, modified, or other proposed pipeline systems.

A viable system alternative to the Projects would have to provide the pipeline capacity necessary to transport an additional 1.5 million Dth/d of natural gas at the contracted volumes from the production areas of the Appalachian Basin to the delivery points required by the precedent agreements signed by the Projects' shippers.

We identified and evaluated several other interstate natural gas pipeline system alternatives, as described in the following sections and corresponding figures.

Although we are evaluating system alternatives, we recognize that NEXUS and Texas Eastern are already making use of their existing systems as a means of meeting the project objectives. In addition to constructing new facilities, the Projects involve contracting existing and expanded capacity on pipeline systems in Pennsylvania, West Virginia, Ohio, and Michigan.

3.2.1 Existing Pipeline Systems

Six existing pipeline systems presently operate in the vicinity of the Projects that could potentially transport natural gas from the Appalachian Basin to markets in northern Ohio and southeastern Michigan, and to the Dawn Hub in Ontario, Canada (see figure 3.2.1-1). These six systems include:

- ANR Pipeline Co. (ANR), which consists of about 9,400 miles of pipeline between Texas and Michigan;
- Columbia Gas Transmission (Columbia), which consists of about 12,700 miles of pipeline between Kentucky and New York;

- Dominion Transmission (Dominion), which consists of about 7,800 mile of pipeline between Ohio and New York;

- Panhandle Eastern Pipe Line (Panhandle Eastern), which consists of about 6,000 miles of pipeline between the Texas and Michigan;

- Rockies Express Pipeline (REX), which consists of about 1,700 miles of pipeline between Colorado and Ohio; and

- Texas Eastern, which consists of about 9,100 miles of pipeline between Texas and New Jersey.

Conceivably, these six systems could be used in various combinations to transport natural gas to and from the markets served by the Projects; however, the main constraint limiting the viability of these systems is that none of these existing pipelines have capacity available for transporting the required volumes of natural gas needed by the Projects and subsequently would also require expansion of facilities. Furthermore, these existing systems do not service all the proposed receipt and delivery points; therefore, additional pipeline lateral facilities from the mainline pipelines to the receipt and delivery points would be needed. For these reasons, use of these systems is not technically feasible without substantial modifications and the construction of new natural gas transmission infrastructure, including new mainline, pipeline loop, lateral pipeline, and compression. Under the best scenario, we estimate that about 300 miles of new pipeline or pipeline loop would be required to achieve the Projects' objectives, which is substantially more than the proposed Projects. Further, these systems may not be economically viable due to higher capital cost, rate stacking, and fuel retention. These systems, therefore, are not reasonable alternatives to the Projects and we eliminated them from further consideration.

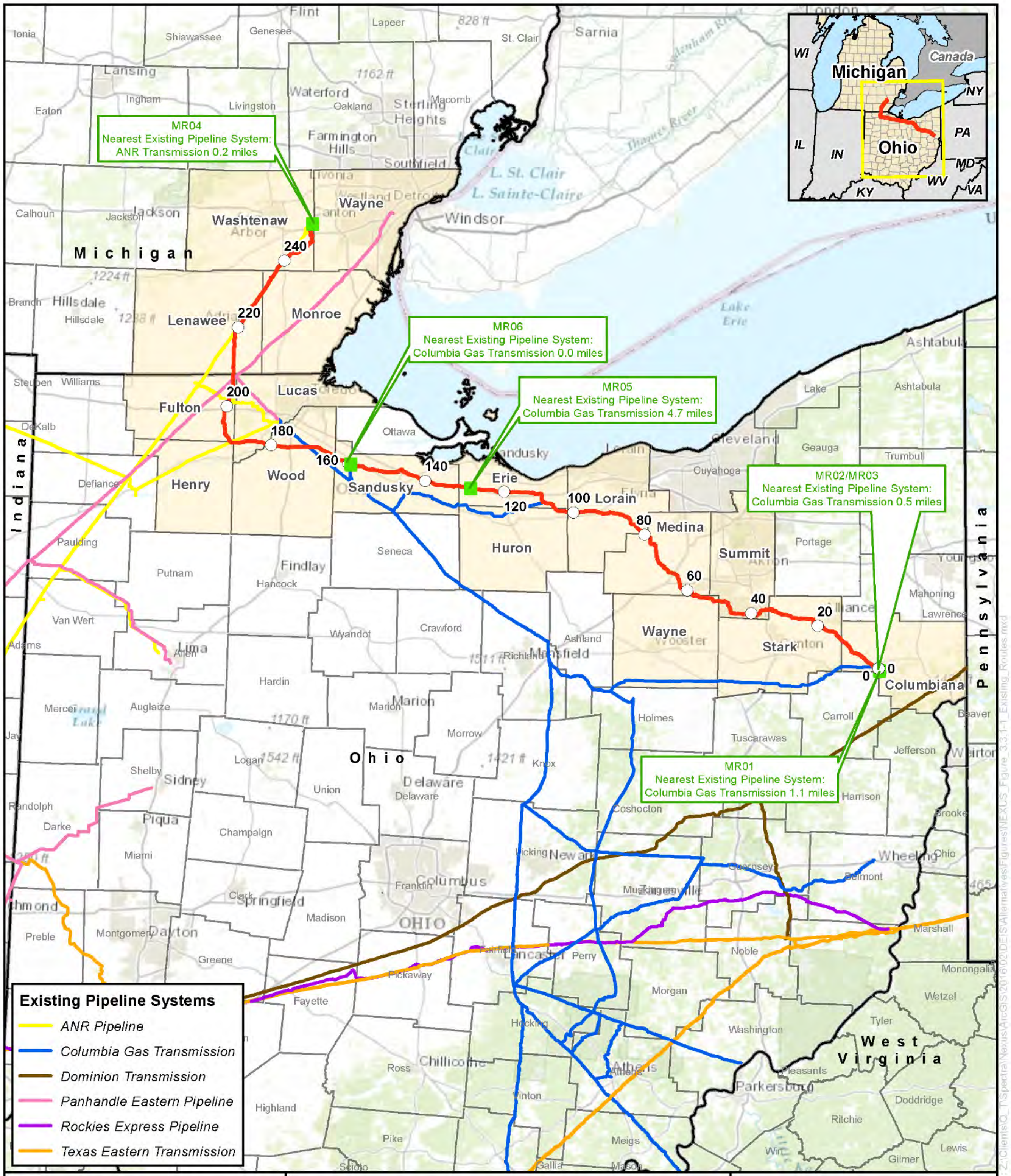
3.2.2 Proposed Pipeline Systems

Two different proposed and one planned pipeline systems are presently being planned in the vicinity of the Projects that could be used to transport natural gas from the Appalachian Basin to markets in northern Ohio and southeastern Michigan, and to the Dawn Hub in Ontario, Canada. These three systems include:

- Rover Pipeline Project (FERC Docket No. CP15-93-000);

- Leach XPress Project (FERC Docket No. CP15-514-000); and

- ANR East Pipeline Project (ANR East) (not yet entered pre-filling with FERC)



0 15 30 Miles

1 inch = 30 miles

For Environmental Review Purposes Only

Figure 3.2.1-1
Existing Pipeline Systems
NGT and TEAL Projects

○ Milepost
🟥 Proposed NEXUS Pipeline
🟩 Fixed Receipt/Delivery Points
☐ County Boundary
☐ State Boundary

Rover Pipeline, LLC (Rover) is proposing to construct a new natural gas system that would consist of about 511 miles of new 24-, 30-, 36-, and 42-inch-diameter pipeline, 10 new compressor stations, and other related facilities in West Virginia, Pennsylvania, Ohio, and Michigan (figure 3.2.2-1). Rover proposed to place its new system in service on or before June 2017; however, we note that this date is not likely feasible as its review is still pending at the FERC. Rover has executed precedent agreements with shippers representing 3.2 million Dth/d of the 3.4 million Dth/d total capacity of the new system.

Columbia is proposing its Leach Xpress Project to construct new natural gas transportation facilities that would consist of approximately 160 miles of 30- and 36-inch-diameter pipeline, three new compressor stations, one existing compressor station upgrade, and other related facilities in West Virginia and Ohio (see figure 3.2.2-2). Columbia is proposing to place its new facilities in service on or before November 2017, pending any delays. Columbia has executed precedent agreements with shippers representing 1.4 million Dth/d of the 1.5 million Dth/d total capacity of the new pipeline system.

TransCanada is planning to construct ANR East to transport natural gas from Utica and Marcellus shale producers to the Gulf Coast and other Midwestern markets and would consist of 320 miles of large diameter pipeline (figure 3.2.2-3). TransCanada initially planned an in service date for the project in late 2017. However, we note that this date is not likely feasible as the project is still being developed and has not yet entered the pre-filling process with the FERC.

Conceivably, these proposed or planned pipelines could be used to transport natural gas to and from the markets served by the Projects. However, the main constraints limiting the viability of these pipelines is the same as those limiting the viability of existing system pipelines: they already are almost fully subscribed and do not serve the required definitive receipt and delivery points. For these reasons, use of the other proposed or planned pipelines is not technically feasible without significant modifications to their design and the construction of new additional infrastructure and new additional pipeline to serve NEXUS' and Texas Eastern's customers. We also note that the ANR East Project would not be in-service within a timeframe reasonably similar to the Projects. The proposed and planned pipelines, therefore, are not a reasonable alternative to the Projects. Because we received several comments during scoping suggesting that the NGT Project could be realigned to follow the Rover pipeline route, we have included a more detailed discussion of this alternative in section 3.3.1.

3.3 MAJOR ROUTE ALTERNATIVES

We considered other routes for the Projects to determine if the route alternatives would avoid or reduce impacts on environmentally sensitive resources. Route alternatives are typically only recommended if the alternative confers a substantial environmental advantage over the proposed route. Otherwise, such an alternative merely represents a shift in impacts from one area or resource to another. We note that all major route alternatives evaluated in this EIS are along the NGT mainline. We found no reason of our own nor any compelling reason based on stakeholder comments to evaluate major route alternatives for 0.9 mile of TGP interconnecting pipeline, the 4.4 miles of TEAL pipeline loop, or 0.3 mile of TEAL connecting pipeline.

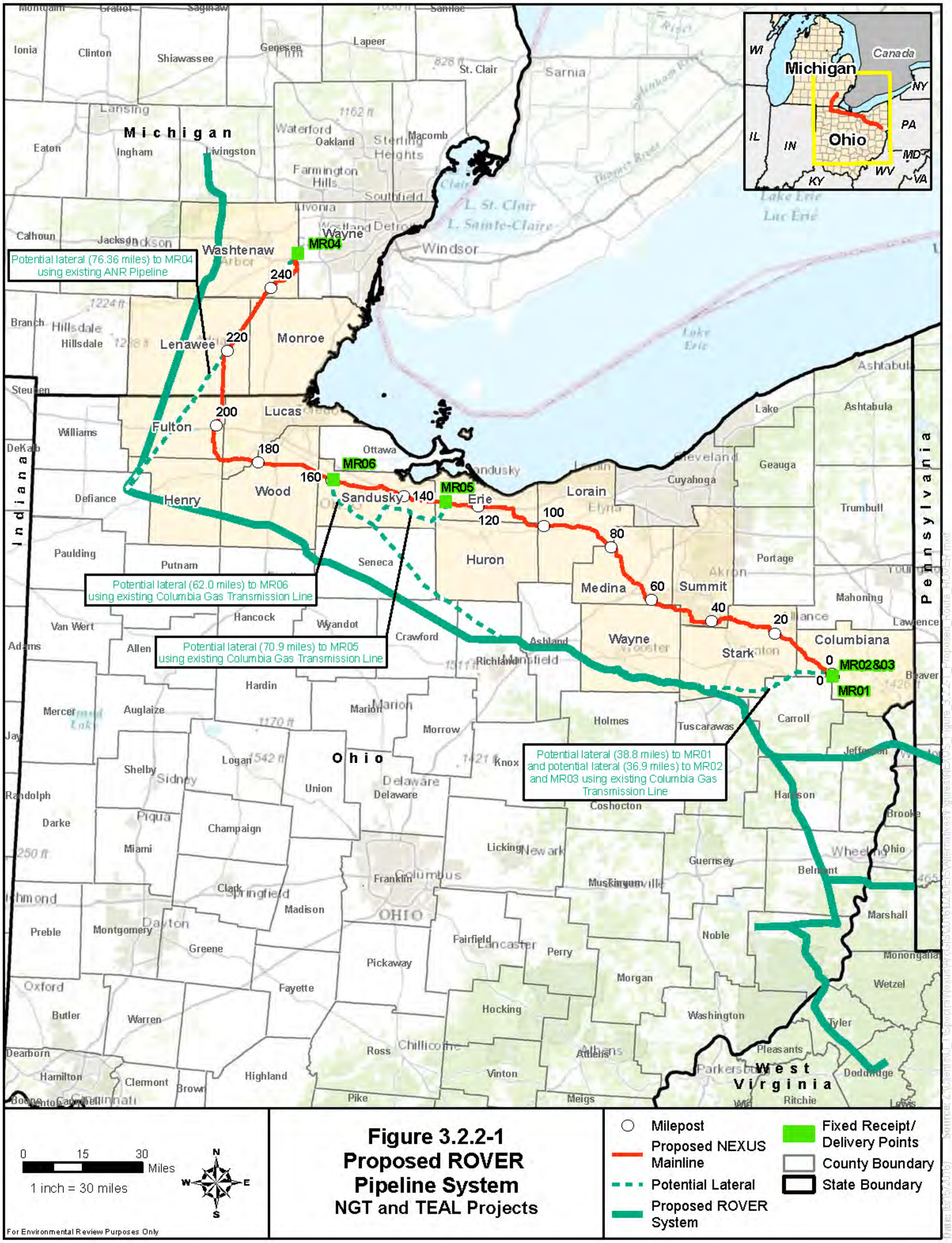


Figure 3.2.2-1
Proposed ROVER
Pipeline System
NGT and TEAL Projects

Figure 3.2.2-2
Proposed Leech Xpress Pipeline System
NGT and TEAL Projects

Potential lateral (250.3 miles) to MR04 using existing Columbia Gas Transmission Line and the ANR Pipeline

Potential lateral (153.5 miles) to MR06 using existing Columbia Gas Transmission Line

Potential lateral (162.3 miles) to MR05 using existing Columbia Gas Transmission Line

Potential lateral (144.2 miles) to MR01 and potential lateral (142.1 miles) to MR02 and MR03 using existing Columbia Gas Transmission Line

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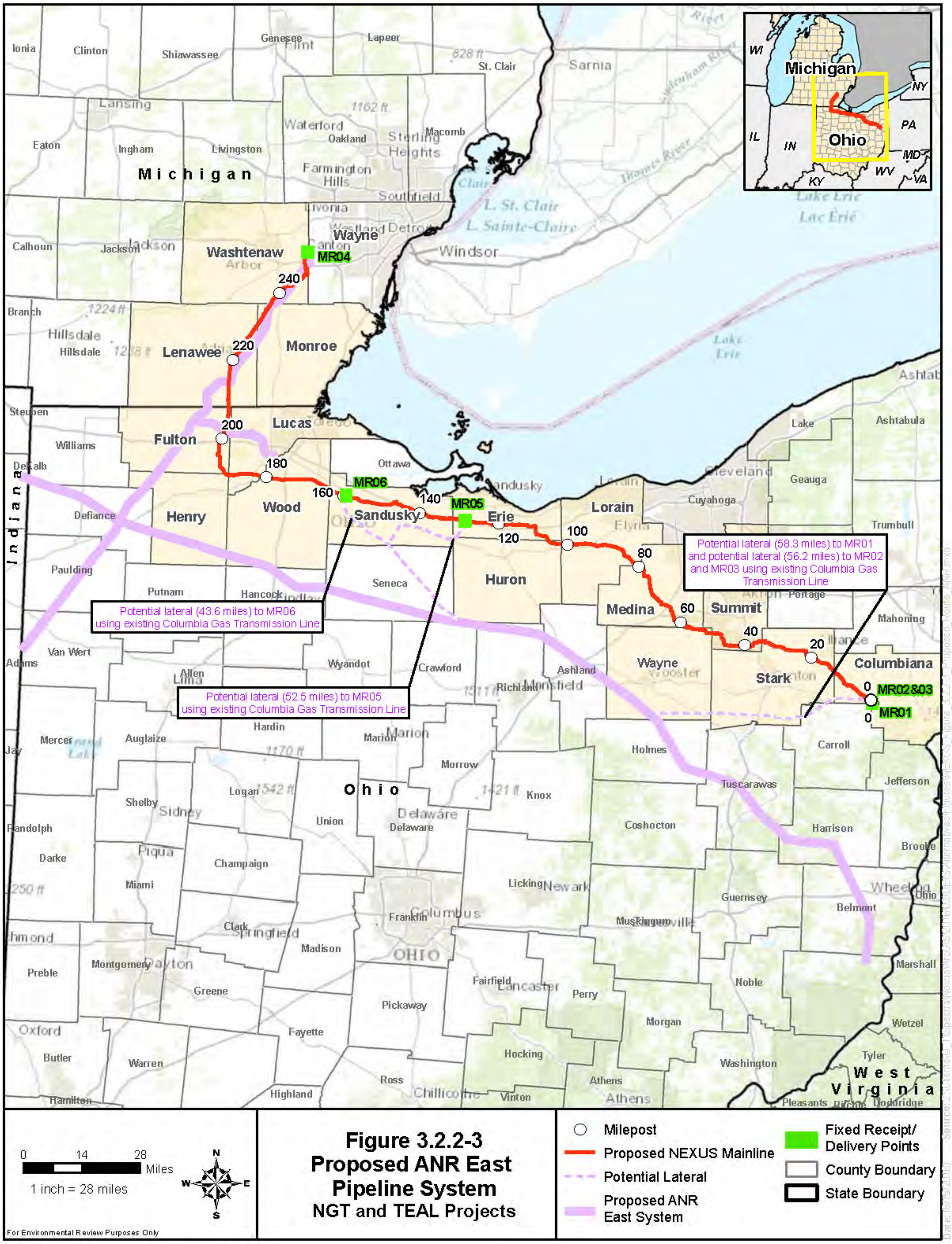

Potential lateral (58.3 miles) to MR01 and potential lateral (56.2 miles) to MR02 and MR03 using existing Columbia Gas Transmission Line

Potential lateral (43.6 miles) to MR06 using existing Columbia Gas Transmission Line

Potential lateral (52.5 miles) to MR05 using existing Columbia Gas Transmission Line

Figure 3.2.2-3
Proposed ANR East Pipeline System
NGT and TEAL Projects

3.3.1 Rover Route Alternative

The Rover Route Alternative was developed to address several stakeholder comments to co-locate the proposed pipeline with the proposed Rover Pipeline. The proposed Rover Pipeline route extends across Ohio and into Michigan south of the NGT Project. The two projects potentially could be routed in the same corridor being evaluated for Rover. The Rover Route Alternative would diverge from the NGT mainline at MP 0.0 in Columbiana County, Ohio and rejoin the NGT mainline at MP 255.0 in Washtenaw County, Michigan (see figure 3.3.1-1 and table 3.3.1-1). All four compressor stations would need to be re-sited to accommodate this alternative. Also, in order to meet the Projects' objective of delivering gas to MR04, MR05, and MR06, which would otherwise be bypassed by this alternative, approximately 137 miles of lateral pipelines extending from the alternative mainline to the M&R stations would be required. These lateral pipelines are included in our environmental analysis.

TABLE 3.3.1-1

Analysis of the Rover Route Alternative

Factor	Alternative	Proposed Route
Length (miles)	385.0	255.7
Greenfield Construction (miles) [a]	274.0	142.0
Wetland Affected (acres) [b]	110.0	38.2
Perennial Waterbody Crossings (no.)	140	116
WHPA (no.) [c]	47	22
Agricultural Land (acres) [d]	4,469.7	3,071.2
Forested Land (acres) [b]	409.1	279.1
Wildlife Management Areas (no./miles)	0/0.0	1/0.1 [e]
State Parks and Forest (no./mile)	0/0.0	2/0.8 [f]
County/Metro Parks (no./mile)	2/0.2 [g]	7/0.8 [h]
Steep Slopes (miles) [i]	4.0	1.3
Sidehill Construction (miles) [j]	5.7	2.2
Residential-type Structures within 150 feet Pipe Centerline (no.) [k]	495	247

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline. If the Rover Project is approved and constructed, the mileage of greenfield construction for the alternative route would drop substantially.
b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.
c WHPA = wellhead protection area.
d Based on a 125-foot-wide construction right-of-way in agricultural land.
e Missionary Island Wildlife Area.
f Portage Lakes State Park; Maumee State Forest.
g Canal Corridor; Apple Ridge Park.
h Ariss Park; Greensburg Park; Singer Lake Preserve; Chippewa Lake Nature Area; Buckeye Woods Park; Farnsworth Metropark; North Hydro Park.
i Calculated by identifying slopes greater than 20 percent.
j Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.
k Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Rover Route Alternative, including laterals, is 385.0 miles in length. The route alternative and proposed route would cross relatively similar amounts of steep slopes and have similar amounts of sidehill construction. The primary advantages of the route alternative is that it would not cross any wildlife management areas or state parks/forests, and 5 fewer county/metro parks. Conversely, the major disadvantages of the alternative are that it is 129.3 miles longer, has 132 miles more of greenfield construction, 71.8 acres more wetlands crossed, 24 more perennial waterbodies crossed, 25 more wellhead protection areas crossed, 1,398.5 acres more agricultural land, 130.0 acres more forested land, and is near 248 more residential-type structures. Based on our review of these routes and the need for 137 miles of lateral pipelines, we do not find the Rover Route Alternative provides a significant environmental advantage when compared to the proposed route and do not recommend that this alternative be incorporated as part of the Projects.

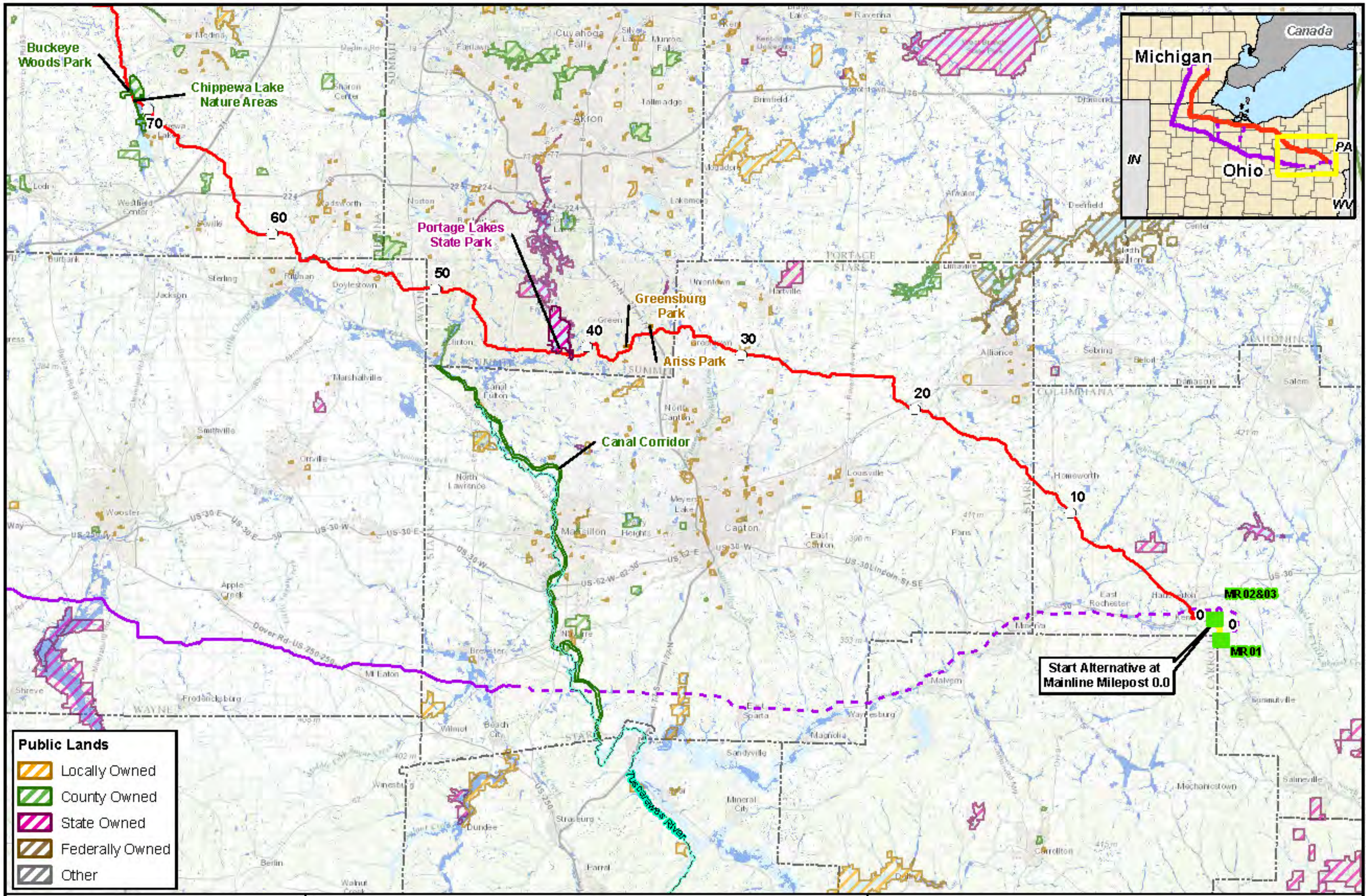

Figure 3.3.1-1
NGT and TEAL Projects
ROVER Route Alternative
Page 1 of 6

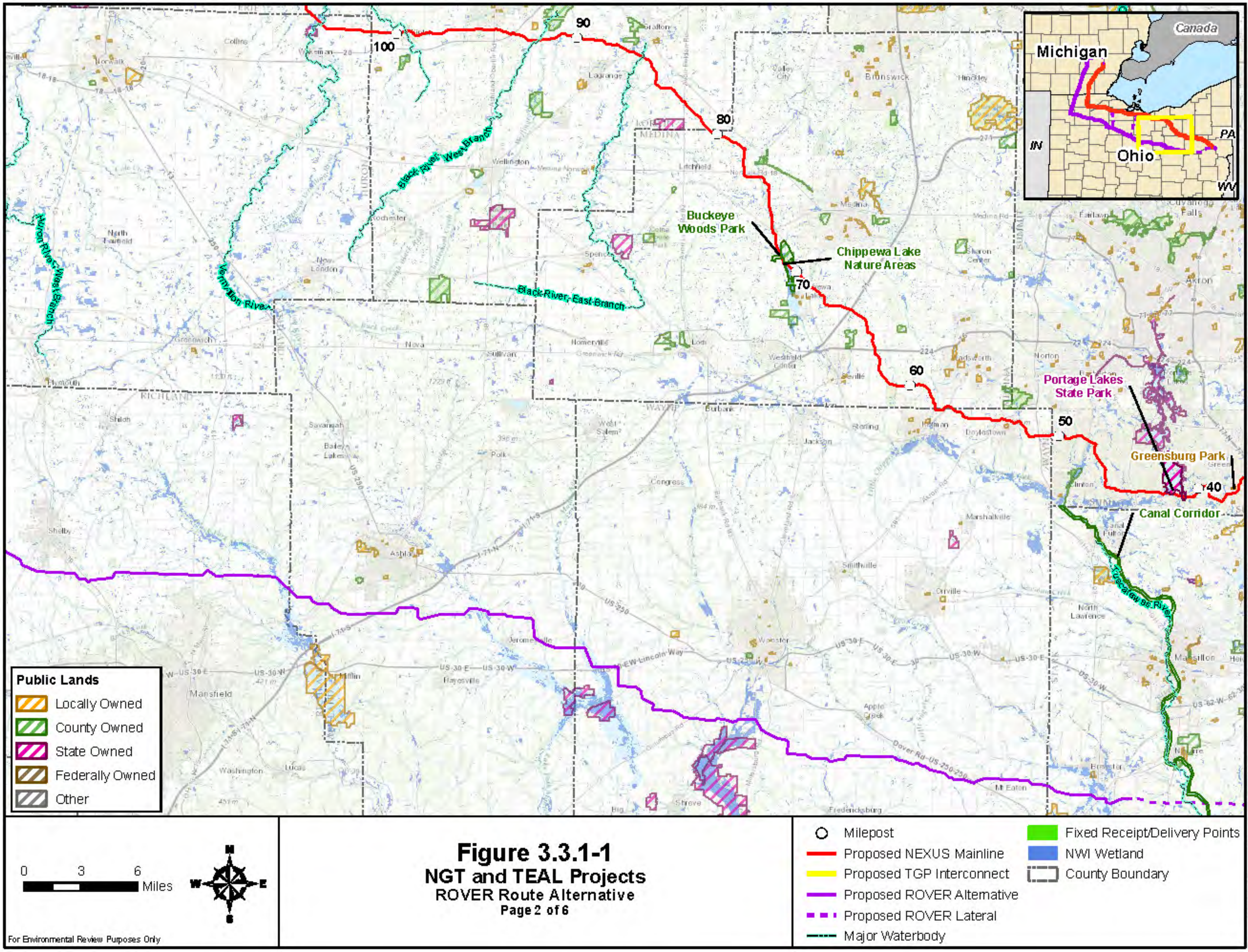

Figure 3.3.1-1
NGT and TEAL Projects
ROVER Route Alternative
Page 2 of 6

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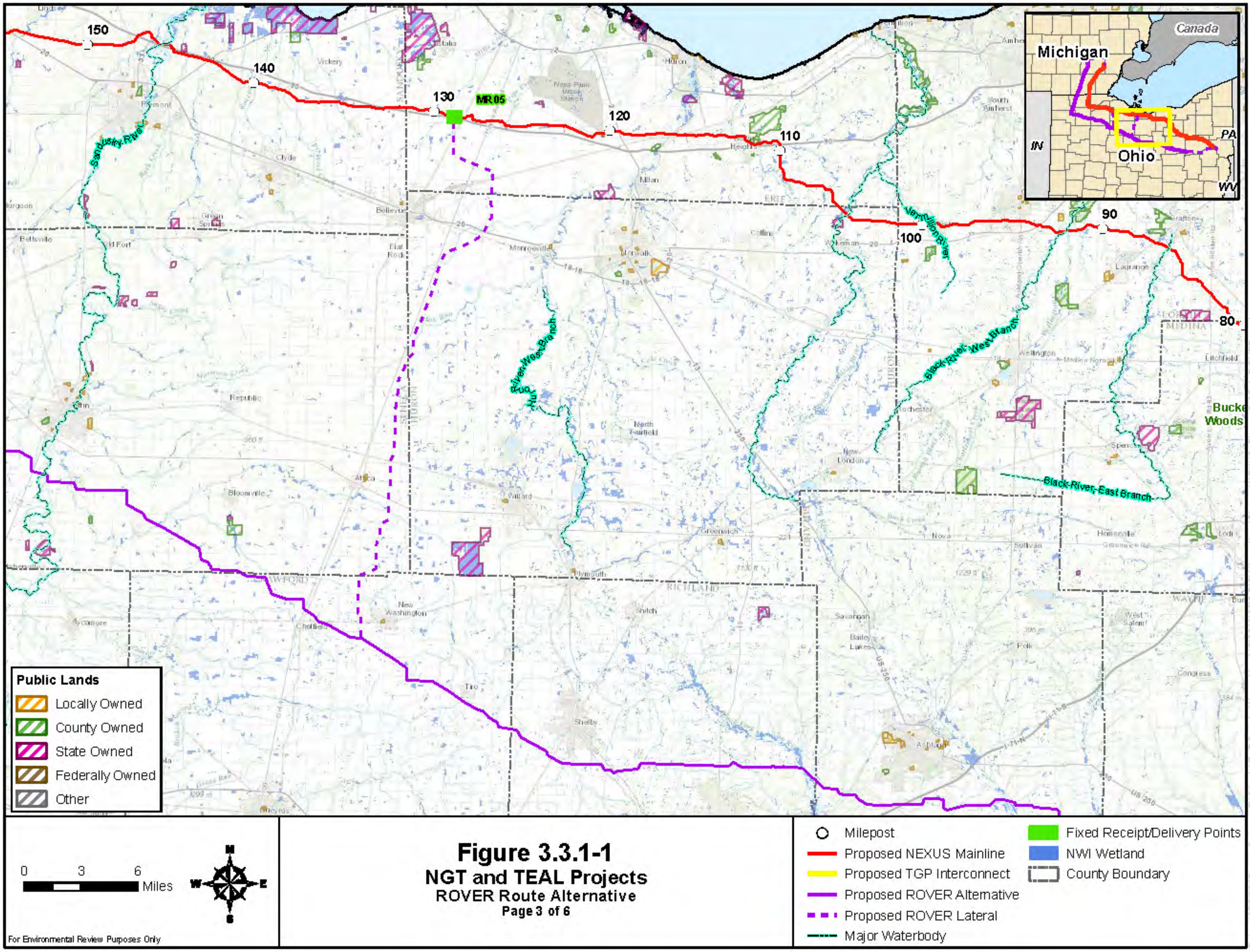

Figure 3.3.1-1
NGT and TEAL Projects
ROVER Route Alternative
Page 3 of 6

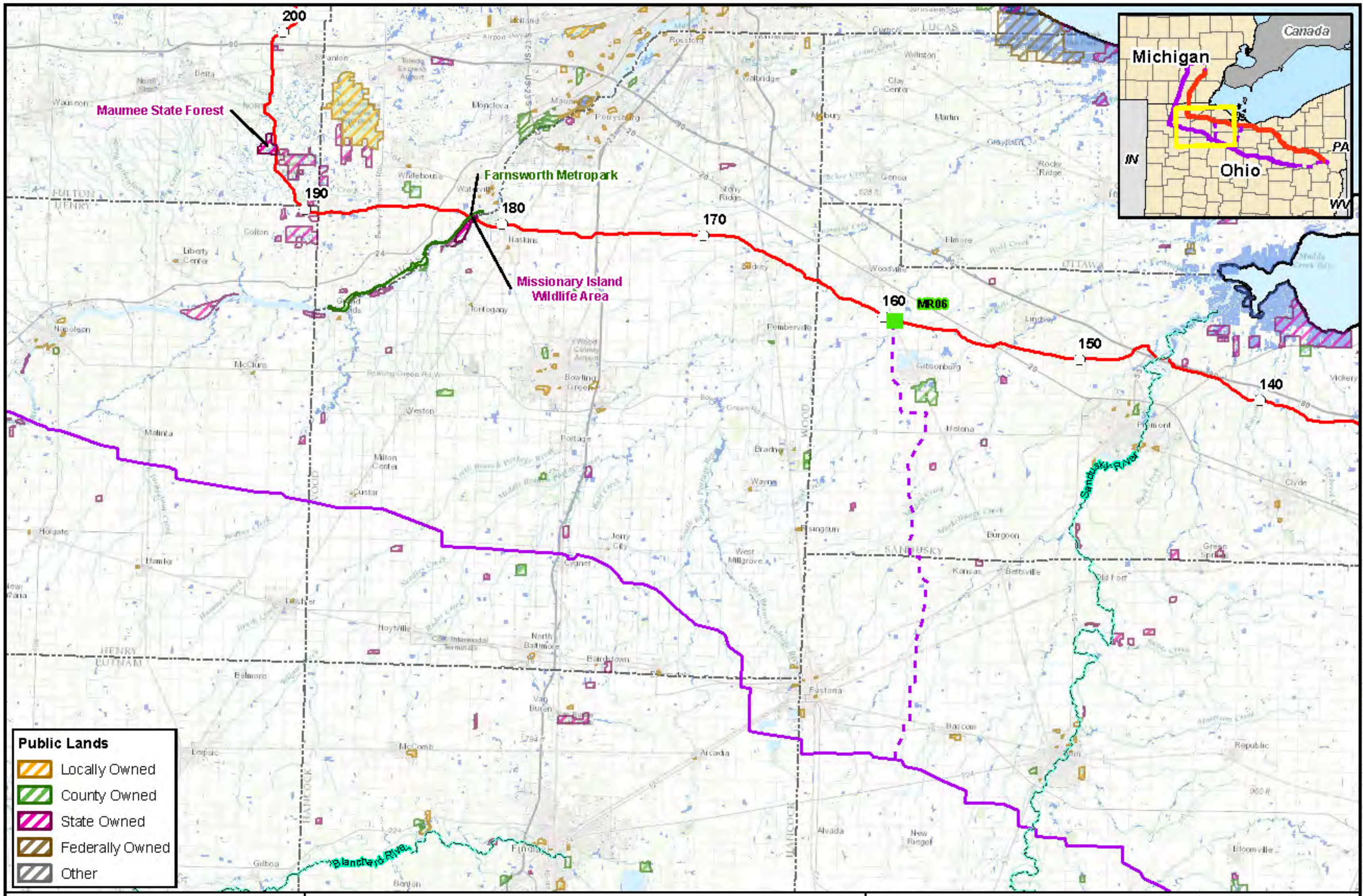

Figure 3.3.1-1
NGT and TEAL Projects
ROVER Route Alternative
Page 4 of 6

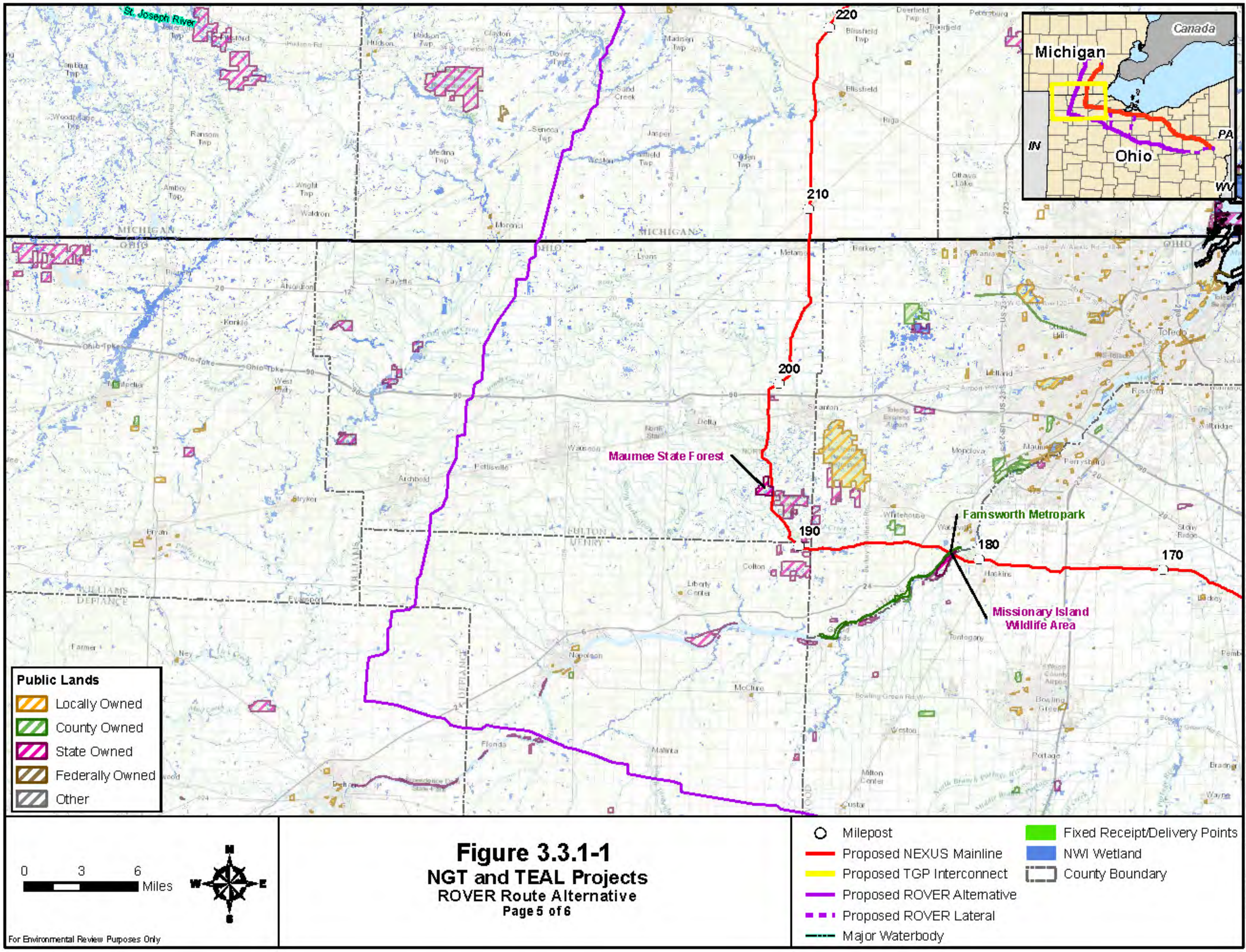

Figure 3.3.1-1
NGT and TEAL Projects
ROVER Route Alternative
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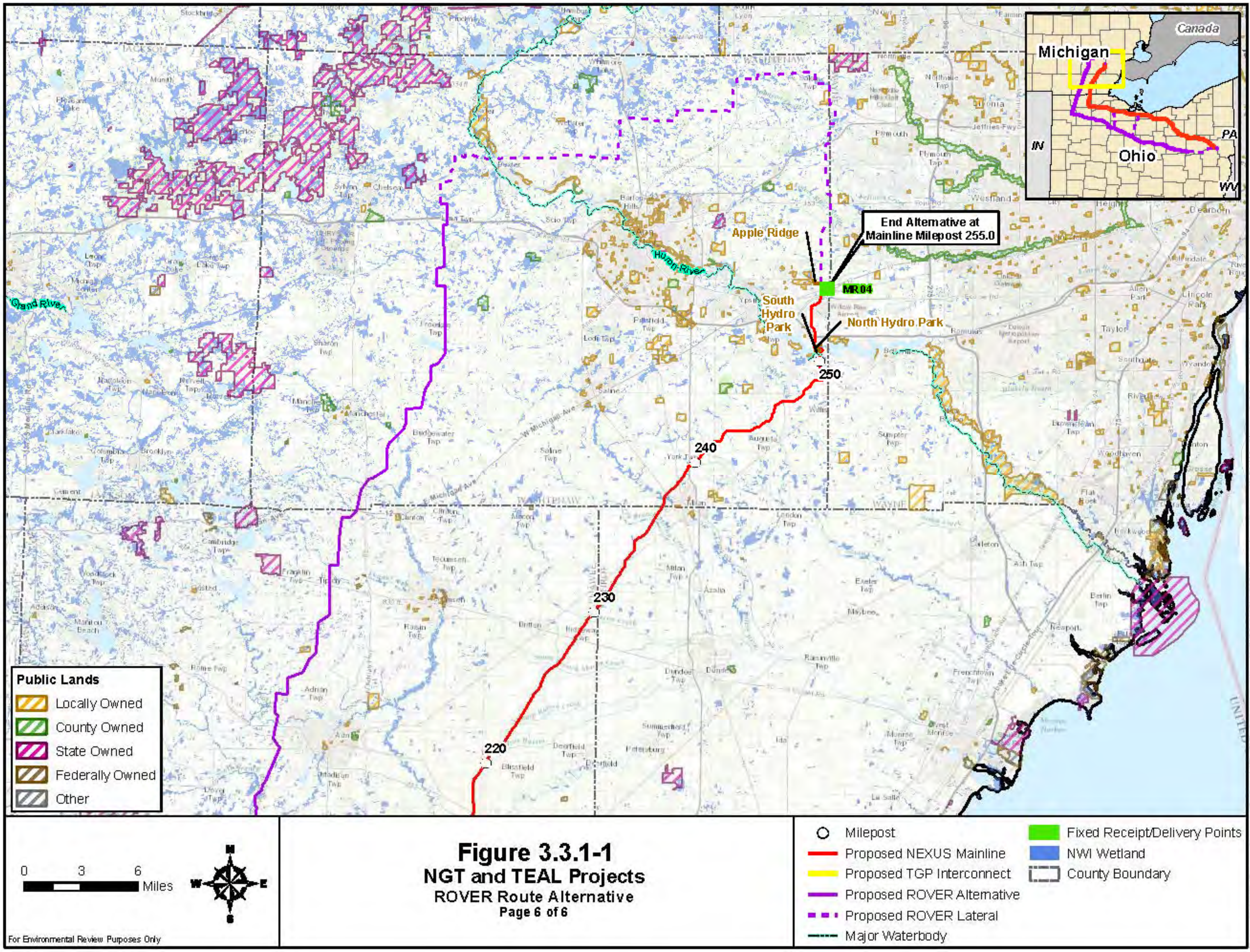

Figure 3.3.1-1
NGT and TEAL Projects
ROVER Route Alternative
Page 6 of 6

3.3.2 Southern Route Alternative

During scoping, we received a number of comments requesting that the NGT Project be routed through less densely populated areas south of the proposed route. Many of the commenters cited pipeline safety as the main reason for the alternative route. We analyzed the Southern Route Alternative (see figure 3.3.2-1 and table 3.3.2-1) to determine if it would provide a significant environmental advantage. The Southern Route Alternative diverges from the proposed NGT mainline at MP 1.4 in Columbiana County and connects back to the proposed NGT mainline at MP 170.5 in Wood County. Two compressor stations would need to be re-sited to accommodate this alternative. Also, in order to meet the objectives of delivering gas to MR05 and MR06, which would otherwise be bypassed by this alternative, approximately 29.7 miles of lateral pipelines extending from the alternative mainline to the M&R stations would be required. These lateral pipelines are included in our environmental analysis.

TABLE 3.3.2-1

Analysis of the Southern Route Alternative

Factor	Alternative	Proposed Route
Length (miles)	198.0	169.8
Greenfield Construction (miles) [a]	79.6	98.9
Wetland Affected (acres) [b]	15.5	28.2
Perennial Waterbody Crossings (no.)	88	89
WHPA (no.)	22	19
Agricultural Land (acres) [c]	2,369.7	1,962.1
Forested Land (acres) [b]	242.7	241.8
State Parks and Forest (no./mile)	0/0.0	1/0.3 [d]
County/Metro Parks (no./mile)	1/0.2 [e]	5/0.6 [f]
Steep Slopes (miles) [g]	4.1	1.1
Sidehill Construction (miles) [h]	5.5	2.0
Residential-type Structures within 150 feet Pipe Centerline (no.) [i]	208	218

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[a] Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.

[b] Based on a 75-foot-wide construction right-of-way in wetlands and forested land.

[c] Based on a 125-foot-wide construction right-of-way in agricultural land.

[d] Portage Lakes State Park.

[e] Canal Corridor.

[f] Ariss Park; Greensburg Park; Singer Lake Preserve; Chippewa Lake Nature Area; Buckeye Woods Park.

[g] Calculated by identifying slopes greater than 20 percent.

[h] Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.

[i] Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

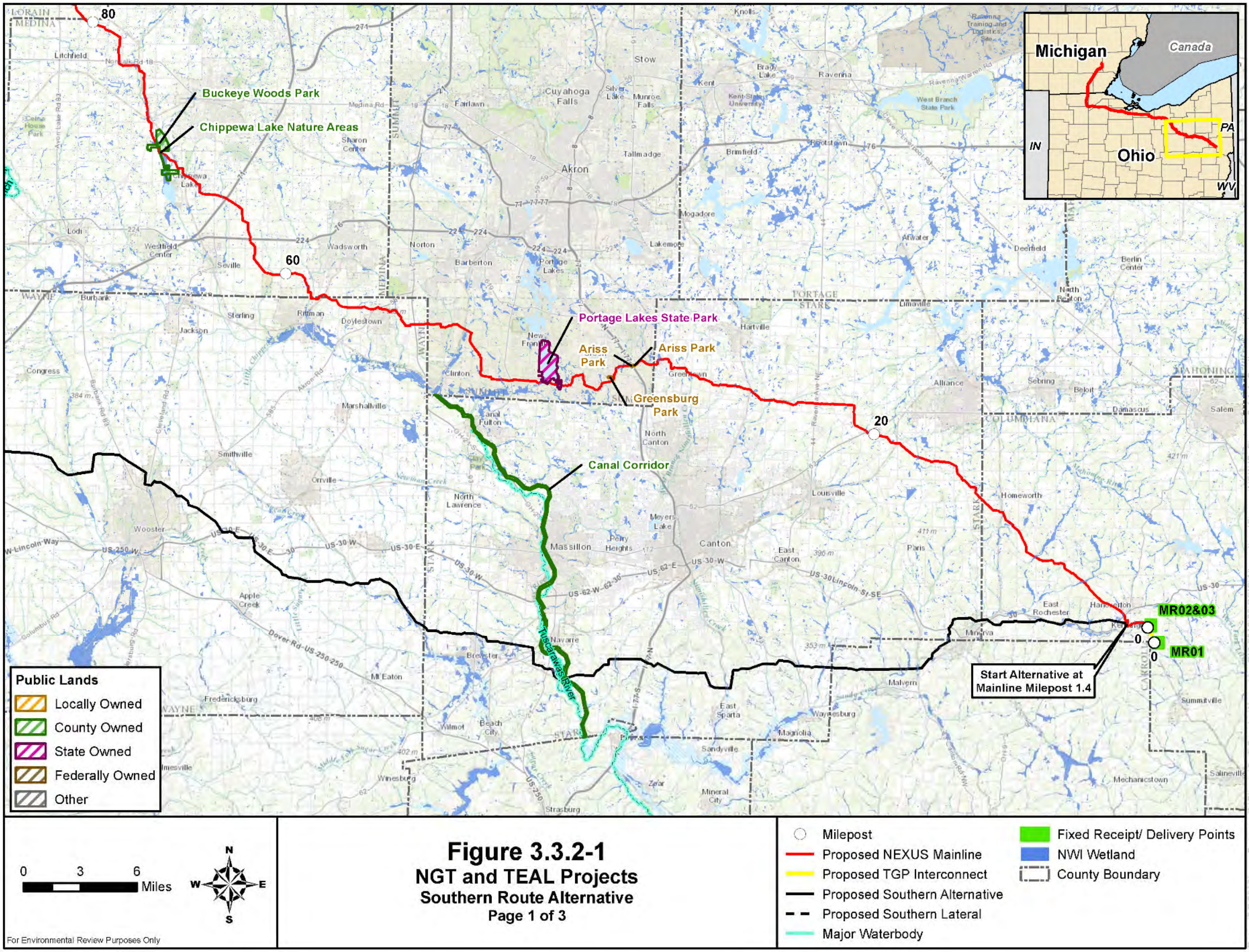

Figure 3.3.2-1
NGT and TEAL Projects
Southern Route Alternative
Page 1 of 3

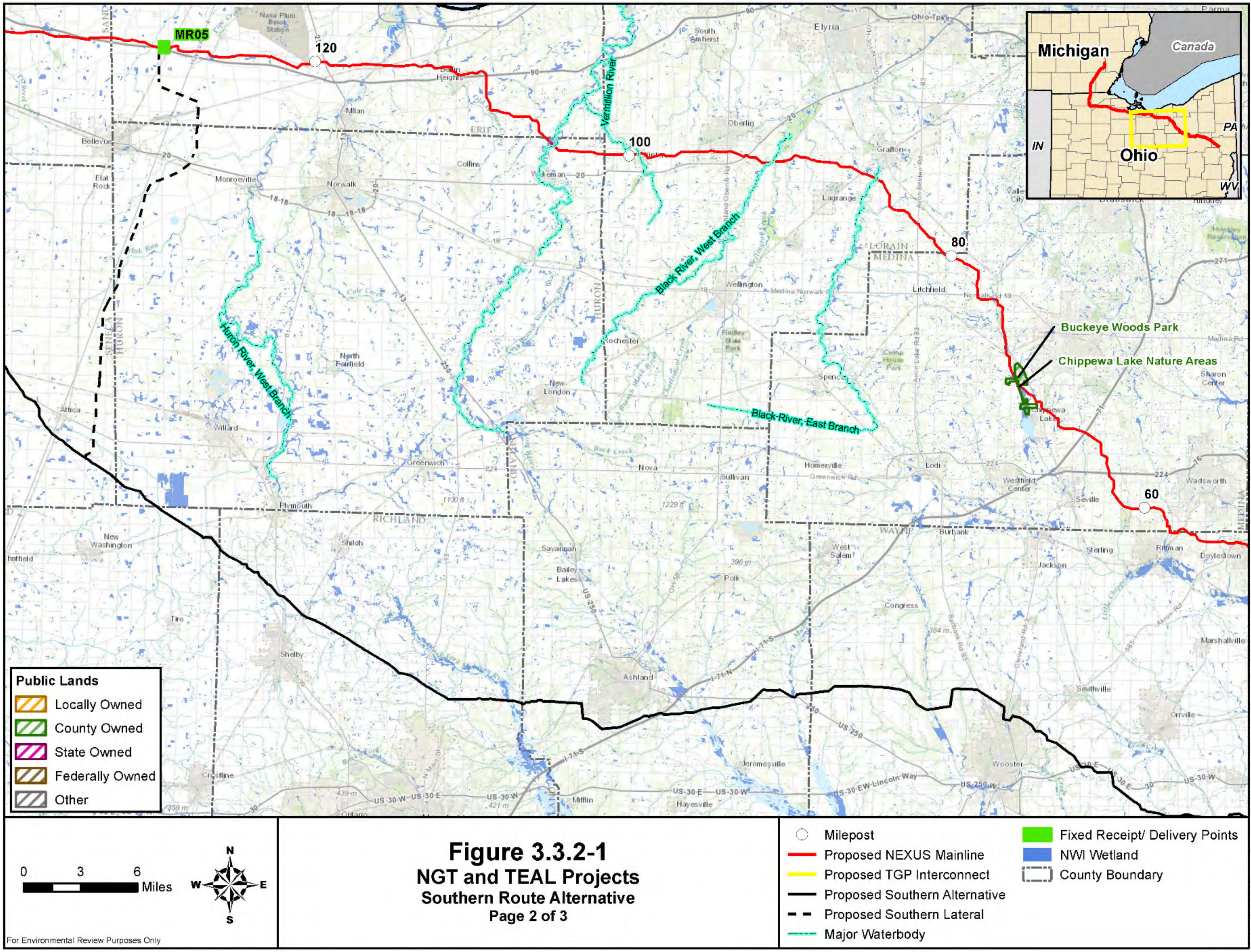

Figure 3.3.2-1
NGT and TEAL Projects
Southern Route Alternative
Page 2 of 3

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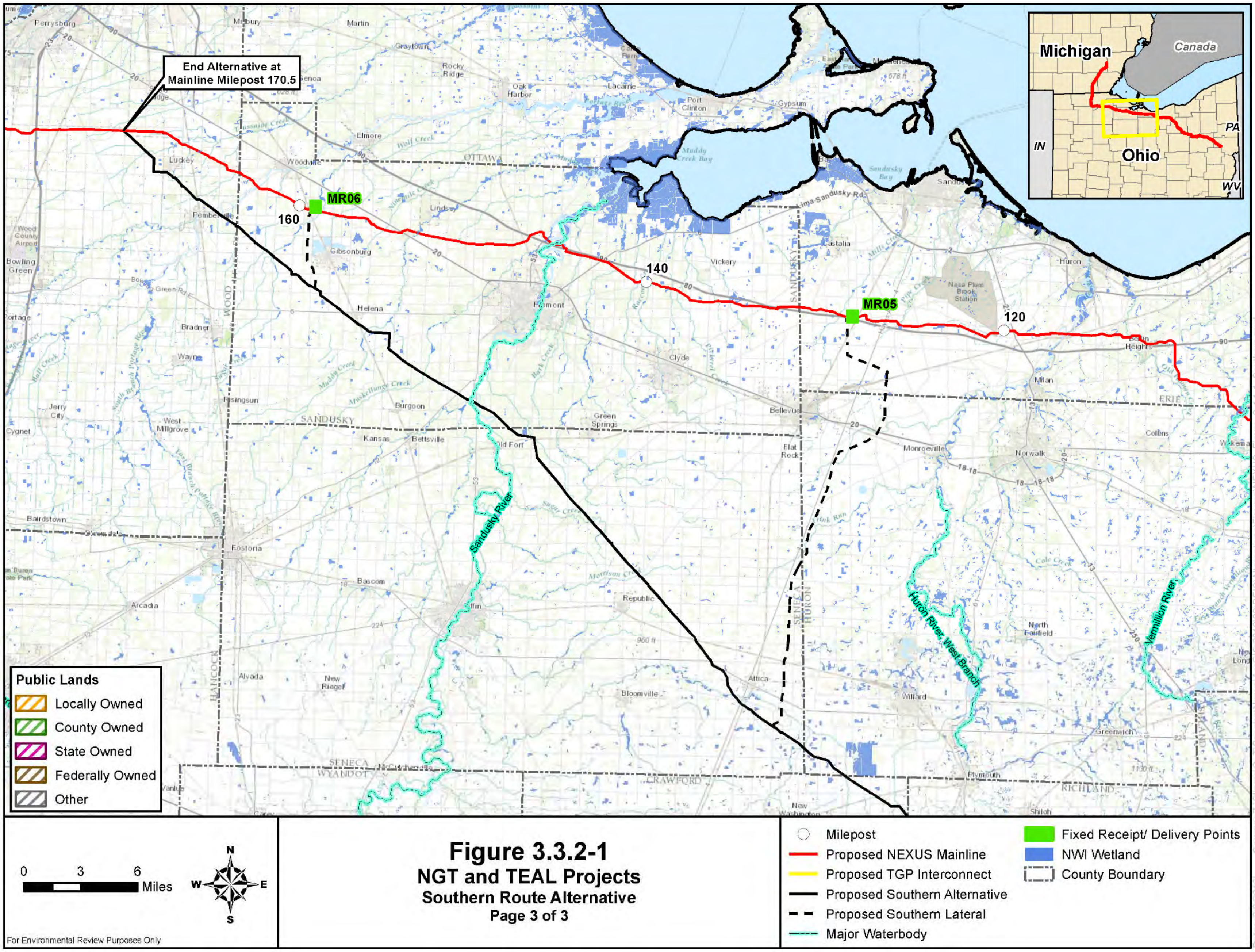

Figure 3.3.2-1
NGT and TEAL Projects
Southern Route Alternative
Page 3 of 3

The Southern Route Alternative, including laterals, is 198.0 miles long. Both routes would affect similar amounts of perennial waterbodies, forested land, and residential-type structures within 150 feet of the pipeline centerline. The main advantages of the alternative are that it would have 19.3 miles less greenfield construction, cross 12.7 acres less wetlands, no state parks/forests, and 4 fewer county/metro parks. Conversely, the disadvantages of the alternative are that it is 28.2 miles longer, has 3 more wellhead protection areas (WHPA), 407.6 acres more agricultural land, 3 miles more of steep slopes, and 3.5 miles more of sidehill construction. The purpose of the alternative was to route through less densely populated areas; however, given the laterals necessary to reach the required delivery points, only 10 fewer residential-type structures would be affected by the alternative. Therefore, based on these factors, we do not find the Southern Route Alternative provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this alternative be incorporated as part of the Projects.

3.3.3 City of Green Route Alternative

The City of Green Route Alternative was proposed to minimize the impacts of the NGT Project on areas zoned for future development in the vicinity of the City of Green. Prior to the route alternative, NEXUS met with city officials and other stakeholders during the pre-filing planning process to address specific routing issues and siting concerns with the proposed route. NEXUS, however, was not able to address all issues or concerns. Thus, City of Green officials submitted the route alternative to the FERC’s docket during the pre-filing period in a letter dated March 23, 2015. After the route alternative was submitted, NEXUS continued to communicate with city officials and other stakeholders regarding issues and concerns. Notwithstanding, NEXUS has not able to address all concerns, and City of Green officials and other stakeholders continue to maintain support for the route alternative.

The City of Green limits extend from about MP 34.2 to 42.1 along the proposed route. As a result of the meetings between NEXUS and stakeholders, about 66 percent of the proposed route within the city limits has been adjusted via minor route variations since NEXUS entered the pre-filing process. During pre-filing, NEXUS realigned the proposed route between MP 36.3 and 37.2 at a landowner’s request in order to parallel a property boundary rather than cutting across it. NEXUS incorporated additional route variations at MPs 40.7 to 41.3 and MPs 41.3 to 42.6 to avoid impacts to the Nimisila Reservoir by adding an HDD and maintaining the proper offset from Dominion East Ohio Gas facilities, respectively. NEXUS incorporated two additional minor route variations at MPs 35.8 to 36.6 and MPs 36.7 to 37.0 after the formal application was filed to avoid conflict with proposed business expansions. One additional route variation was then adopted between MP 39.7 and 41.9 based on stakeholder input and to avoid a Category III wetland. NEXUS, however, was not able to avoid all areas of concern that were identified by the City of Green, such as some areas identified for future residential, commercial, and industrial development, as well as Ariss Park, Greensburg Park, and Singer Lake Preserve (see section 4.9.3.1).

The City of Green Route Alternative diverges from the proposed NGT mainline at MP 1.8 in Columbiana County. The alternative heads in a westerly direction for approximately 62 miles, turns north for approximately 40.9 miles, and rejoins the proposed NGT mainline at MP 98.7 in Lorain County (see figure 3.3.3-1 and table 3.3.3-1 for a comparison of the alternative and proposed route). About 33.3 miles of the City of Green Route Alternative would follow the proposed Rover pipeline route. One compressor station would need to be re-sited to accommodate this alternative. Re-siting of the compressor station is discussed further below.

TABLE 3.3.3-1

Analysis of the City of Green Route Alternative

Factor	Alternative	Proposed Route
Length (miles)	102.8	97.3
Greenfield Construction (miles) [a]	78.9	62.7
Wetland Affected (acres) [b]	10.0	21.8
Perennial Waterbody Crossings (no.)	55	49
WHPA (no.)	6	7
Agricultural Land (acres) [c]	1,039.4	1,027.3
Forested Land (acres) [b]	234.5	181.8
State Parks and Forest (no./mile)	0/0.0	1/0.3 [d]
County/Metro Parks (no./mile)	1/0.2 [e]	5/0.6 [f]
Steep Slopes (miles) [g]	5.6	1.0
Sidehill Construction (miles) [h]	7.4	1.6
Dwellings within 50 feet of the Pipe Centerline (no.)	4	1
Dwellings within 100 feet of the Pipe Centerline (no.)	12	12
Dwellings within 150 feet of the Pipe Centerline (no.)	31	66
Other Residential-type Structures within 150 feet (no.) [i]	57	91

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.
c Based on a 125-foot-wide construction right-of-way in agricultural land.
d Portage Lakes State Park.
e Canal Corridor.
f Ariss Park; Greensburg Park; Singer Lake Preserve; Chippewa Lake Nature Area; Buckeye Woods Park.
g Calculated by identifying slopes greater than 20 percent.
h Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.
i Includes detached dwellings, garages, sheds, and other buildings often associated with a residence.

The City of Green Alternative is 102.8 miles in length. The route alternative and proposed route are similar and length and would cross a similar number of perennial waterbodies. The primary advantages of the route alternative are that it would cross 11.8 acres less wetlands, 1 less WHPA, no state parks/forest lands, 4 fewer county/metro parks, and 35 less homes within 150 feet. Conversely, the main disadvantages of the alternative are that it would have 16.2 miles more greenfield construction, 52.7 acres more forested land, 4.6 more miles of steep slopes, and 5.8 more miles of sidehill construction.

Pipeline safety in the proximity to residential, commercial, and industrial development is a primary concern raised by many stakeholders who commented in support of the City of Green Alternative. DOT safety standards are intended to ensure adequate protection regardless of proximity to development. The pipelines and aboveground facilities associated with the NGT and TEAL Projects must be designed, constructed, operated, and maintained in accordance with these safety standards. Therefore, we find that either route is safe, regardless of population density (see section 4.13). However, an important consideration in routing a natural gas transmission pipeline instead is the impact on land use.

Impacts on developed areas include mainly temporary disruption and inconveniences on residents and businesses during construction (see section 4.9.3.1). Some aboveground structures (e.g., fences, sheds, playgrounds, trailers) and landscaping may be removed for construction; however, no residents or businesses would be temporarily or permanently displaced. We are particularly concerned where the construction work area is within 10 feet of residences due to the increased potential for construction to disrupt the residences and to ensure that property owners have adequate input to a construction activity occurring so close to their homes. In these areas, we have recommend in section 4.9.4.1 that, prior to construction, NEXUS should file with the FERC evidence of landowner concurrence with the site-specific residential construction plans.

NEXUS would compensate landowners for an easement on their property. The easement acquisition process is designed to provide fair compensation to the landowner for the right to use the property for pipeline construction and operation (see section 4.9.3.1). Appraisal methods used to value land are typically based on objective characteristics of the property and any improvements. Landowners would continue to have use of their property following construction provided it does not interfere with the easement rights granted to NEXUS for construction and operation of the pipeline facilities. For example, no new trees or structures would be allowed within the permanent right-of-way, including houses, decks, playgrounds, tool sheds, garages, poles, guy wires, catch basins, swimming pools, trailers, leach fields, septic tanks, or other structures not easily removed. Semi-permanent structures that would be permitted to be used on the permanent right-of-way include items such as swing sets, sporting equipment, miniature swimming pools, doghouses, and gardens that are easily removed.

Rerouting the pipeline to less developed areas would shift impacts to other land uses, mainly forest/woodland, open land, and agricultural land. Impacts on forest/woodland would constitute the most pronounced effect (see section 4.9.1). Tree removal and ground disturbance would increase edge effects, and reduce the amount of available wildlife habitat. Trees would be cleared along the construction right-of-way and replaced by herbaceous plants, shrubs, saplings, and other successional species until trees can again flourish, which can take several decades or longer to occur. Forested areas within the permanent right-of-way would not be allowed to reestablish and would be permanently converted to open/edge habitat.

Impact on open land would be less pronounced (see section 4.9.1). Open land would be affected during construction by removing vegetation and disturbing soils. Following construction, open land would be restored to pre-construction conditions. Since the permanent pipeline right-of-way would be maintained as open land, there would be no permanent change in land use. During operations, these areas would continue to function as open land.

Impacts on agricultural land also would be mostly minor and temporary to short-term (see section 4.9.1). Crops within the construction work areas would be taken out of production for one growing season while construction occurs and landowners would be compensated for the lost crops. If irrigation lines are damaged during construction, temporary repairs would be conducted immediately and permanent repairs would be completed following construction. Following construction, impacted agricultural land (except certain specialty crops, such as fruit and Christmas trees) would be restored to pre-construction conditions allowing continued use of farming activities.

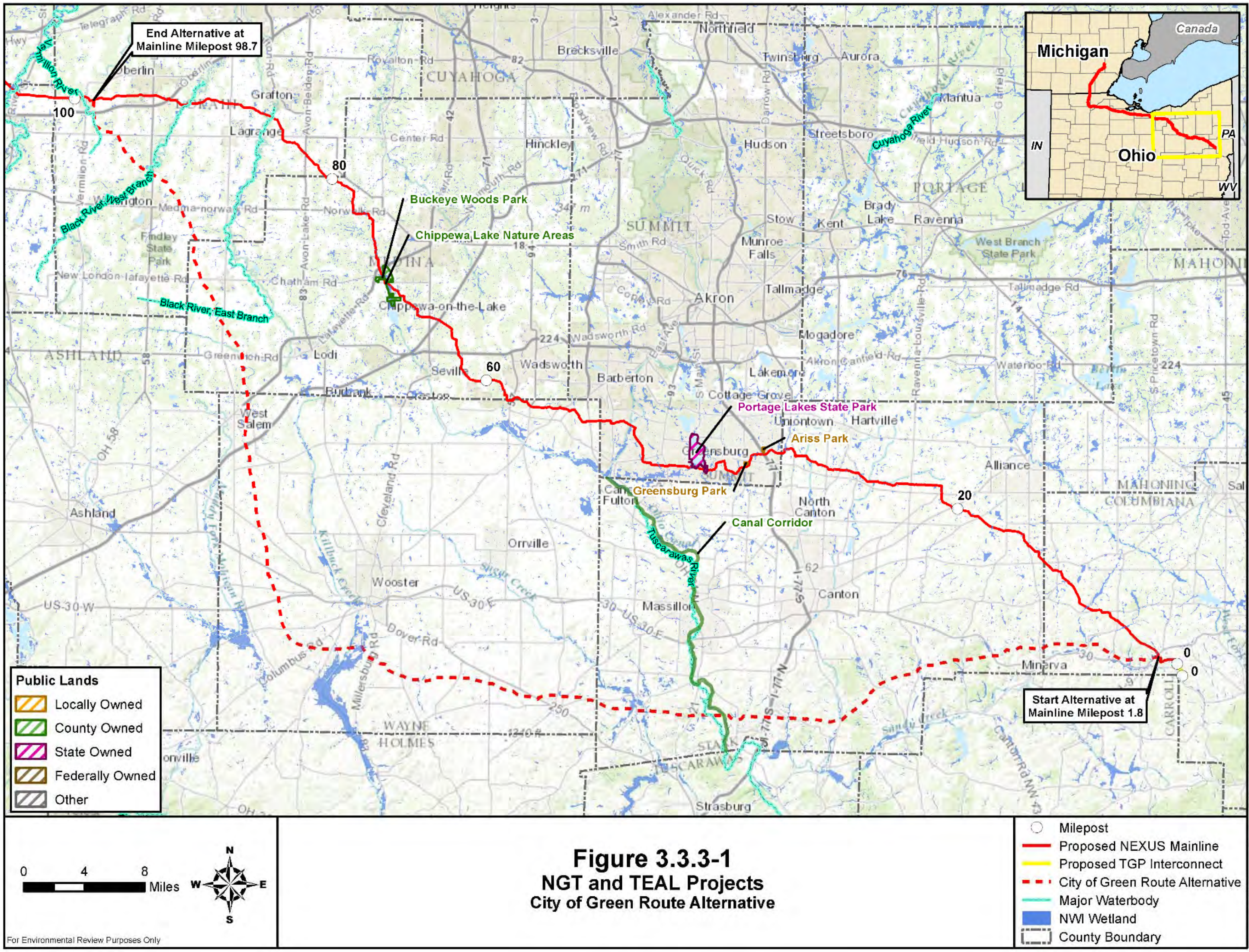

Figure 3.3.3-1
NGT and TEAL Projects
City of Green Route Alternative

One compressor station would need to be re-sited to accommodate the City of Green Route Alternative. According to NEXUS, the Wadsworth Compressor Station would need to be relocated to a site in the vicinity of Millbrook Road southwest of Wooster, Ohio. NEXUS indicated that the current land uses in this area include residential properties, mature forest, and agricultural lands. However, our review of the area suggests there are a number adequate sites in the general vicinity of Millbrook Road where impacts on residential properties and mature forest could be minimized while meeting the engineering and hydraulic requirements of the system.

NEXUS also indicated that four laterals would be required on the City of Green Route Alternative to deliver natural gas to market area connections located along the proposed route. The market area connections referred to by NEXUS are speculative receipt and delivery points based on the potential for future customers. None of these market area connections are based on binding precedent agreements. As such we do not consider them to be essential to the Project's objective and we find the City of Green Route Alternative to be viable as proposed, and we find no basis for evaluating laterals to market area connections that may never occur.

The City of Green commissioned an economic analysis of the impacts of the Projects and submitted it to the FERC. Most of the "highly relevant studies" used in the analysis to estimate the economic effects of the Projects were based on property value changes after pipeline incidents. Three of the five studies involved petroleum pipelines that resulted in surface or groundwater contamination and are not relevant to the type of incidents associated with natural gas pipelines. One of the studies involved a gasoline pipeline that ruptured into a stream and is not relevant to natural gas pipelines. The remaining study involved a natural gas pipeline. It showed no price effect on property values before or after the accident. Although pipelines have inherent risks (see section 4.13), we do not find the studies used in the analysis relevant to assessing the effects of constructing a new natural gas pipeline.

Additionally, we found the evaluation problematic because it appears to assume all developable property would be developed to its maximum potential within 50 years, and that parts of the City of Green development code would be amended in 10 years to allow an even greater density of development than is currently allowed. In making such assumptions, the analysis then fails to consider the additional energy or infrastructure that may be necessary to support this level of development. Furthermore, the analysis appears to assume that property or portions of property could not be developed after pipeline installation, insinuating that driveways or roads cannot be constructed over a pipeline and, therefore, certain portions of the property that otherwise would have been developed become "cut off" from development. This is not necessarily true because, in fact, it is possible to install roads and driveways over pipelines. The pipeline easement generally restricts constructing permanent or immobile buildings or planting/growing trees within 25 feet of the pipeline, but otherwise does not completely restrict use of the property.

Finally, the report seems to suggest that the proposed route would leave the City of Green to disproportionately suffer the effects of the Projects because the city is more affluent than other areas of the state. The report cites higher home values, higher employment rates, more buying power, and faster growth than other parts of the state. Conversely, relocating the route from more affluent areas to those that are less affluent presents an entirely different set of impacts. On the whole, we did not find the economic analysis compelling.

Perhaps the most compelling aspects of the alternative route are that 35 fewer homes would be within 150 feet of the proposed pipeline and 11.8 miles less wetlands would be crossed by the pipeline. Conversely, the most compelling aspects of the proposed route are it has 16.2 miles less greenfield construction and crosses 52.7 acres less forested land. We also note that, based on our review, although the alternative route has fewer home within 150 of the centerline, the proposed route actually has fewer home within a closer proximity that would experience greater construction impacts: both the proposed and alternative routes have 12 homes within 100 feet, and the proposed route has only one home within 50 feet, whereas the alternative route has four. Based on our analysis, we find both routes acceptable and recognize that the routes have their trade-offs, but overall are comparable. As described earlier in section 3.0, the alternative appears to shifts impacts from one area, group of landowners, and set of resources to another area, group of landowners, and set of resources. Based on the information available to us at this time, the alternative, while comparable, does not present a significant environmental advantage over the proposed route. However, we recognize that a more detailed routing analysis of the alternative route to avoid forested areas and other impacts, including a presentation of a proposed compressor station location, could improve the advantages of the alternative. Therefore, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period</u>, NEXUS should file with the Secretary:**

  a. a specific compressor station site on the City of Green Route Alternative between MPs 1.8 and MP 98.7. NEXUS should attempt to avoid or minimize impacts on environmental resources while adequately meeting the engineering and hydraulic requirements of the proposed pipeline system. NEXUS should identify the range of flexibility it has in moving the compressor station site on the route alternative; and

  b. minor route adjustments and realignments to the City of Green Route Alternative in order to minimize impacts on residences, forests, and other environmental resources.

We also note that we have received a fair amount of landowner input along the proposed route because these landowners have been on the Projects' mailing list early in the environmental review process; however, landowners along the City of Green Route Alternative only recently have been added to the mailing list. **We encourage the landowners along the City of Green Route Alternative to provide us additional comments on the proposed route and City of Green Route Alternative during the draft EIS comment period.**

3.3.4 Electric Transmission Line Route Alternative

The Electric Transmission Line Route Alternative was evaluated to address stakeholders' comments requesting the Project follow an existing electric transmission line right-of-way in Columbiana and Stark Counties, Ohio. Many stakeholders suggested that co-locating with the existing power line would be preferable to the proposed route. The Electric Transmission Line Alternative diverges from the proposed NGT mainline at MP 1.8 in Columbiana County. It heads west/southwest to an existing powerline right-of-way and follows the powerline right-of-way for approximately 22.0 miles where rejoins the proposed NGT mainline at MP 29.7 in Stark County (see figure 3.3.4-1 and table 3.3.4-1).

TABLE 3.3.4-1

Analysis of the Electric Transmission Line Route Alternative

Factor	Alternative	Proposed Route
Length (miles)	27.6	27.9
Greenfield Construction (miles) [a]	0.2	18.8
Wetland Affected (acres) [b]	6.4	6.4
Perennial Waterbody Crossings (no.)	19	24
WHPA (no.)	3	0
Agricultural Land (acres) [c]	27.3	25.8
Forested Land (acres) [b]	42.7	38.2
Steep Slopes (miles) [e]	0.9	0.3
Sidehill Construction (miles) [e]	1.2	0.7
Residential-type Structures within 150 feet Pipe Centerline (no.) [f]	115	23

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.

b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.

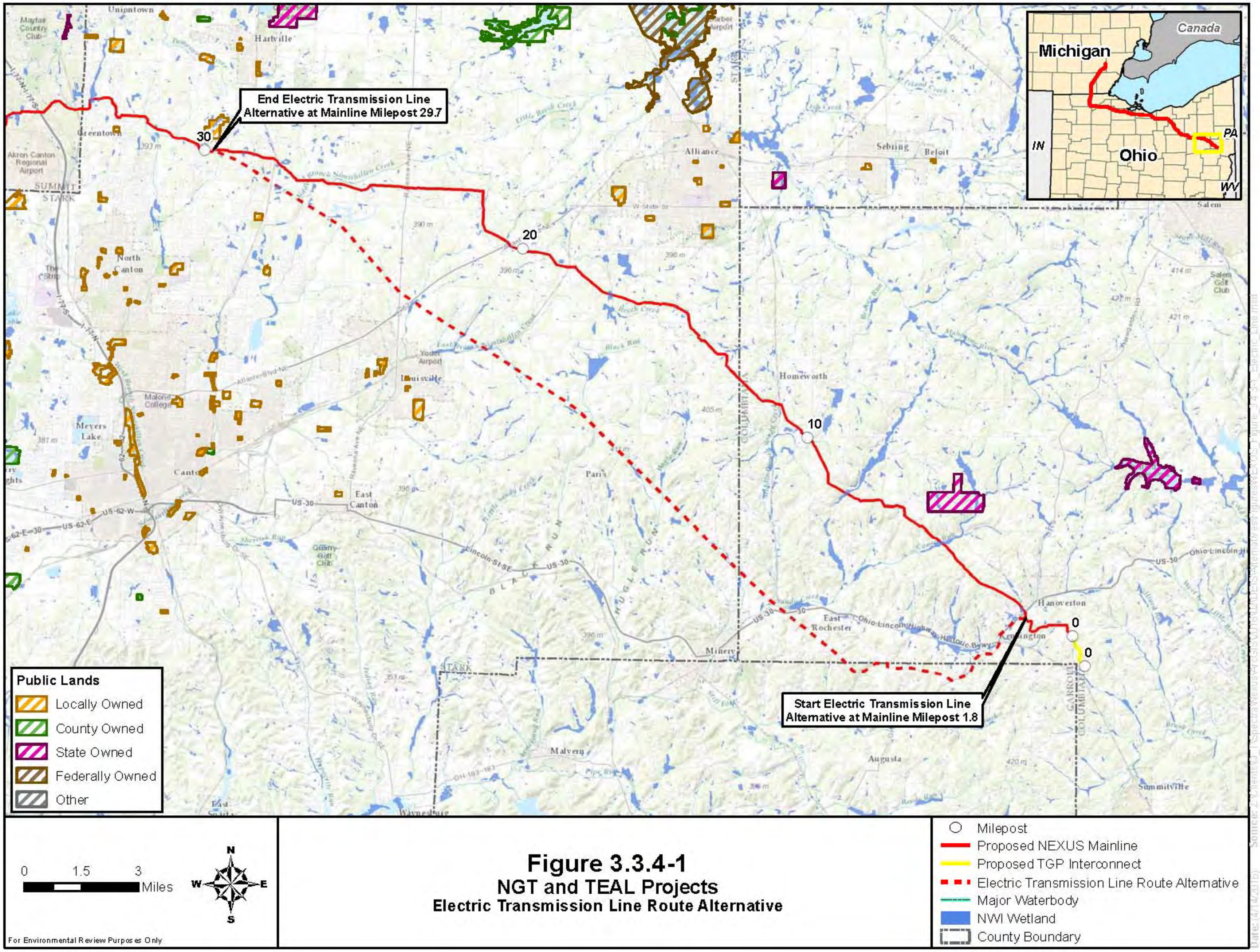
c Based on a 125-foot-wide construction right-of-way in agricultural land.

d Calculated by identifying slopes greater than 20 percent.

e Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.

f Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Electric Transmission Line Route Alternative is 27.6 miles in length. The route alternative and proposed route are similar in length and amount of wetlands, agricultural land, and steep slopes affected. The main advantages of the route alternative are that it would have 18.6 miles less greenfield construction and crosses 5 fewer perennial waterbodies. Conversely, the disadvantages of the alternative are that it would cross 3 more WHPA, 4.5 acres more forested land, and is near 92 more residential-type structures. As previously mentioned, many stakeholders suggested that co-locating with the existing power line would be preferable to proposed route. Although co-locating with an existing utility often can be a means of limiting impacts on sensitive resources, it does not appear to provide an environmental advantage in this case. Rather, it is merely shifting impacts from one area, group of landowners, and set of resources to another area, group of landowners, and set of resources. While limiting greenfield construction, this alternative also would greatly increase construction impacts on residential land. Based on our review, we find that the Electric Transmission Route Alternative would not provide a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this alternative be incorporated as part of the Project.



For Environmental Review Purposes Only

Figure 3.3.4-1
NGT and TEAL Projects
Electric Transmission Line Route Alternative

3.3.5 Canton A Route Alternative

The Canton A Route Alternative was proposed by a stakeholder to minimize the impacts on the City of Green, Canton, and other populated areas. The stakeholder submitted a high-level overview map of the alternative. The Canton A Route Alternative diverges from the proposed NGT mainline at MP 2.2 in Columbiana County, runs south of the City of Canton, and rejoins the proposed NGT mainline at MP 51.3 in Wayne County (see figure 3.3.5-1 and table 3.3.5-1).

TABLE 3.3.5-1

Analysis of the Canton A Route Alternative

Factor	Alternative	Proposed Route
Length (miles)	57.5	49.2
Greenfield Construction (miles) [a]	33.3	29.9
Wetland Affected (acres) [b]	17.3	12.7
Perennial Waterbody Crossings (no.)	40	31
WHPA (no.)	3	3
Agricultural Land (acres) [c]	493.9	474.2
Forested Land (acres) [b]	150.9	109.1
State Parks and Forest (no./mile)	0/0.0	1/0.3 [e]
County/Metro Parks (no./mile)	2/0.3 [e]	3/0.5 [f]
Steep Slopes (miles) [g]	16.6	6.7
Sidehill Construction (miles) [h]	5.2	1.2
Residential-type Structures within 150 feet Pipe Centerline (no.) [i]	191	116

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.
c Based on a 125-foot-wide construction right-of-way in agricultural land.
d Portage Lakes State Park.
e Canal Corridor, Warwick Park.
f Ariss Park, Singer Lake Preserve, Greensburg Park.
g Calculated by identifying slopes greater than 20 percent.
h Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.
i Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Canton A Route Alternative is 57.5 miles in length. The route alternative and proposed route would both cross the same number of WHPAs. The primary advantages of the route alternative are that would cross no state parks/forests and 1 fewer county/metro park than the proposed route. Conversely, the main disadvantages of the alternative are that it is 8.3 miles longer, has 3.4 miles more greenfield construction, crosses 4.5 acres more wetlands, crosses 9 more perennial waterbodies, 19.7 acres more agricultural land, 41.8 acres more forested land, 9.9 miles more steep slope, 4.0 miles more sidehill construction, and is near 75 more residential-type structures. Although the route avoids the City of Green and Canton, it increases impacts on residential land and would affect more environmental resources overall than the proposed route. Based on our review, the Canton A Route Alternative would not provide a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this alternative be incorporated as part of the Project.

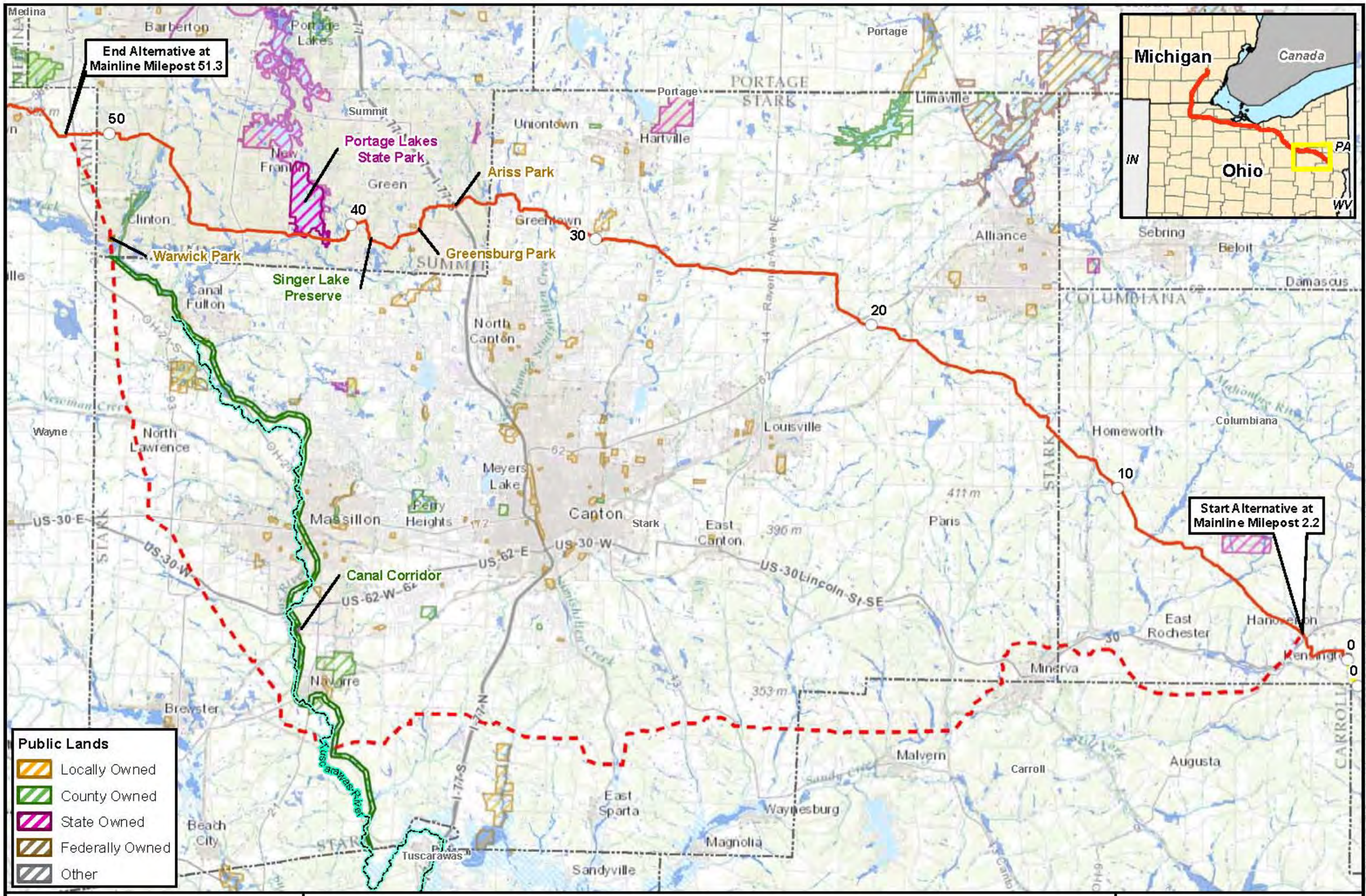

Figure 3.3.5-1

NGT and TEAL Projects

Canton A Route Alternative

3.3.6 Canton B Route Alternative

The Canton B Route Alternative was developed by FERC staff to address the concerns of stakeholders over impacts on the City of Green, Canton, and other populated areas. The goal of the alternative was to identify a route that avoided populated areas, while minimizing other environmental impacts. The Canton B Route Alternative diverges from the proposed NGT mainline at MP 1.4 in Columbiana County and runs south and west of Canton and rejoins the proposed NGT mainline at MP 62.1 in Medina County (see figure 3.3.6-1 and table 3.3.6-1).

TABLE 3.3.6-1

Analysis of the Canton B Route Alternative

Factor	Alternative	Proposed Route
Length (miles)	68.4	60.8
Greenfield Construction (miles) [a]	47.1	37.7
Wetland Affected (acres) [b]	11.8	14.5
Perennial Waterbody Crossings (no.)	37	35
WHPA (no.)	0	5
Agricultural Land (acres) [c]	734.8	590.9
Forested Land (acres) [b]	135.5	130.9
State Parks and Forest (no./mile)	0/0.0	1/0.3 [d]
County/Metro Parks (no./mile)	1/0.1 [e]	3/0.5 [f]
Steep Slopes (miles) [g]	5.5	1.3
Sidehill Construction (miles) [h]	4.2	0.7
Residential-type Structures within 150 feet Pipe Centerline (no.) [i]	72	154

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.
c Based on a 125-foot-wide construction right-of-way in agricultural land.
d Portage Lakes State Park.
e Canal Corridor.
f Ariss Park; Greensburg Park; Singer Lake Preserve.
g Calculated by identifying slopes greater than 20 percent.
h Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.
i Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Canton B Route Alternative is 68.4 miles in length. The primary advantages of the route alternative are that it would cross 5 fewer WHPAs, cross 2.7 acres less wetlands, no state parks/forests, 2 fewer county/metro parks, and would be near 82 fewer residential-type structures. Conversely, the main disadvantages of the alternative are that it would be 7.6 miles longer, cross 143.9 acres more agricultural land, 4.5 acres more forested land, 4.2 miles more steep slope, 3.5 miles more sidehill construction, and would have 9.4 more miles of greenfield construction. Our goal was to identify an alternative route that avoided resources associated with populated areas, while minimizing environmental impacts on other areas. In this case, temporary construction impacts on residences, wells, wetlands, and designated parks would be reduced. However, construction impacts on farms and waterbodies, and long-term impacts on forested land and rugged terrain would be increased. This represents a shift of impacts from one area, group of landowners, and set of resources to another area, group of landowners, and set of resources. The alternative also transitions from temporary construction impacts to increased long-term impacts. The route alternative would also be longer and would require more greenfield construction. For these reasons, we do not find the Canton B Route Alternative to have an environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this alternative be incorporated as part of the Project.

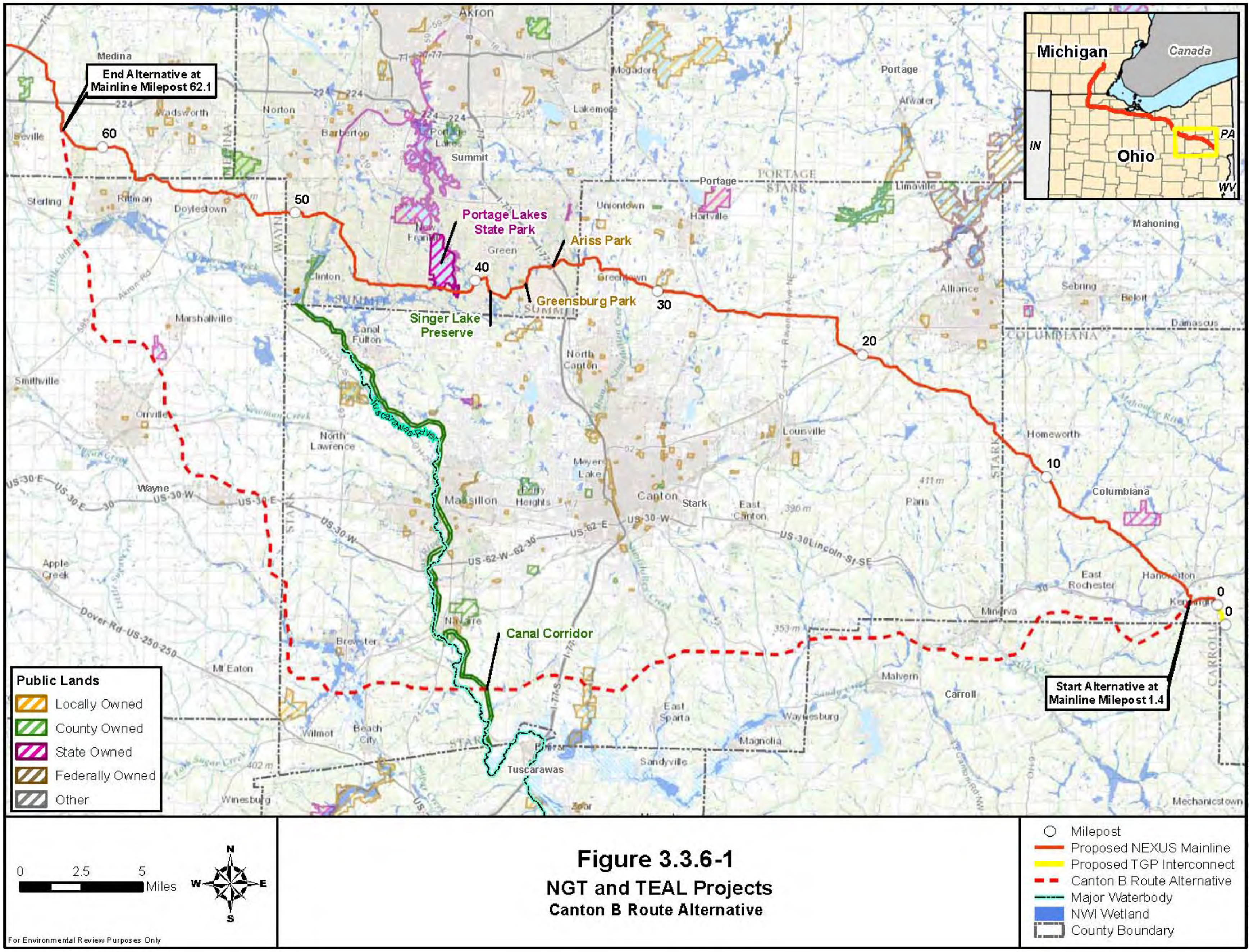

Figure 3.3.6-1

NGT and TEAL Projects

Canton B Route Alternative

3.3.7 Canton C Route Alternative

The Canton C Route Alternative was proposed by the same stakeholder that proposed the Canton A Route Alternative for the same reasons. The purpose of the Canton C Route Alternative is to minimize impacts on the City of Green, Canton, and other populated areas. The Canton C Route Alternative diverges from the proposed NGT mainline at MP 2.2 in Columbiana County, runs south of the City of Canton, and rejoins the proposed NGT mainline at MP 87.6 in Lorain County (see figure 3.3.7-1 and table 3.3.7-1). One compressor station would need to be re-sited to accommodate this alternative.

TABLE 3.3.7-1

Analysis of the Canton C Route Alternative

Factor	Alternative	Proposed Route
Length (miles)	92.3	85.6
Greenfield Construction (miles) [a]	59.9	56.5
Wetland Affected (acres) [b]	19.1	20.0
Perennial Waterbody Crossings (no.)	48	39
WHPA (no.)	3	7
Agricultural Land (acres) [c]	851.5	883.3
Forested Land (acres) [b]	225.5	169.1
Wildlife Management Areas (no./miles)	1/0.6 [d]	0/0.0
State Parks and Forest (no./mile)	0/0.0	1/0.3 [e]
County/Metro Parks (no./mile)	1/0.2 [f]	5/0.6 [g]
Steep Slopes (miles) [h]	5.2	1.5
Sidehill Construction (miles) [i]	3.9	0.8
Residential-type Structures within 150 feet Pipe Centerline (no.) [j]	296	197

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.

b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.

c Based on a 125-foot-wide construction right-of-way in agricultural land.

d Camp Beldon Wildlife Management Area.

e Portage Lakes State Park.

f Canal Corridor.

g Ariss Park; Greensburg Park; Singer Lake Preserve; Chippewa Lake Nature Area; Buckeye Woods Park.

h Calculated by identifying slopes greater than 20 percent.

i Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.

j Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Canton C Route Alternative is 92.3 miles in length, which is 6.7 miles longer than the proposed route. The route alternative and proposed route would require a similar amount of greenfield construction and would have similar impacts on wetlands. The primary advantages of the route alternative are that it would cross 4 fewer WHPAs, no state parks/forests, and 4 fewer county/metro parks. Conversely, the main disadvantages of the alternative are that would cross, 9 more perennial waterbodies, 56.4 acres more forested land, 1 more wildlife management area, 3.7 miles more steep slopes, 3.1 miles more sidehill construction, and is near 99 more residential-type structures. Although the route avoids the City of Green and Canton, it crosses other populated areas and affects other important environmental resources as compared to the proposed route. Based on our review of these routes, we do not find the Canton C Route Alternative provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this alternative be incorporated as part of the Projects.

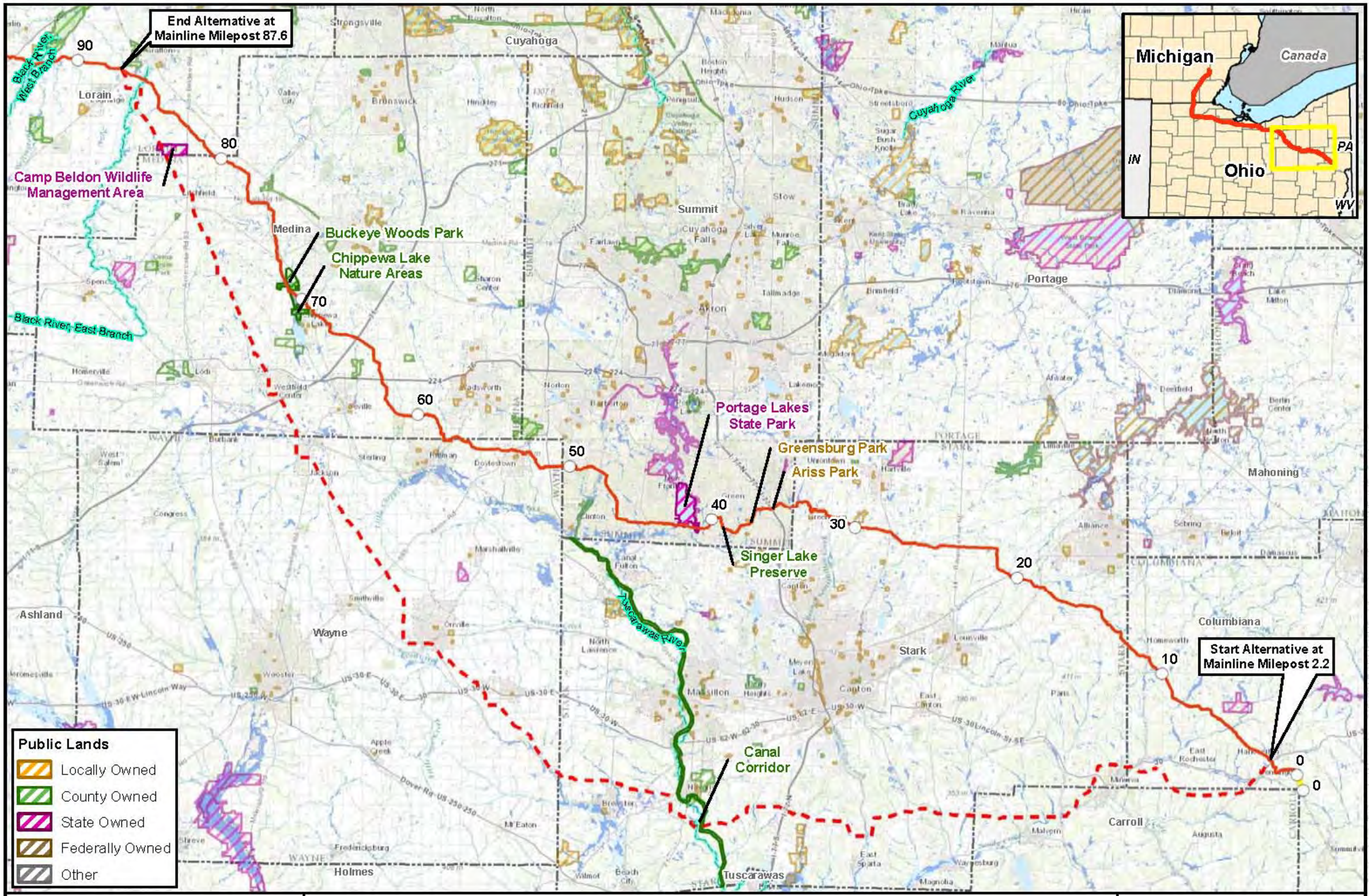

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Figure 3.3.7-1

NGT and TEAL Projects

Canton C Route Alternative

3.3.8 Doylestown Route Alternative

The Doylestown Route Alternative was developed after a stakeholder requested the proposed route be moved to a less populated area made up of predominately farm fields. The stakeholder submitted an overview map of the alternative. The route alternative diverges from the NGT mainline MP 41.8 in Summit County and continues south of the proposed route until it rejoins the NGT mainline at MP 65.6 in Medina County (see figure 3.3.8-1 and table 3.3.8-1). One compressor station would need to be re-sited to accommodate this alternative.

TABLE 3.3.8-1

Analysis of the Doylestown Route Alternative

Factor	Alternative	Proposed Route
Length (miles)	24.0	23.8
Greenfield Construction (miles) [a]	20.6	14.1
Wetland Affected (acres) [b]	39.1	2.7
Perennial Waterbody Crossings (no.)	17	8
WHPA (no.)	3	2
Agricultural Land (acres) [c]	219.7	231.8
Forested Land (acres) [b]	67.3	51.8
County/Metro Parks (no./mile)	2/0.1 [d]	0/0.0
Steep Slopes (miles) [e]	0.4	0.2
Sidehill Construction (miles) [f]	0.5	0.3
Residential-type Structures within 150 feet Pipe Centerline (no.) [g]	61	80

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.
c Based on a 125-foot-wide construction right-of-way in agricultural land.
d Franklin-Clinton Area; Ohio and Erie Canal.
e Calculated by identifying slopes greater than 20 percent.
f Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.
g Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Doylestown Route Alternative is 24.0 miles in length. The route alternative and proposed route are similar in length and amount of slopes crossed. The main advantages of the alternative are that it would cross 12.1 acres less agricultural land and would be near 19 fewer residential-type structures. Conversely, the primary disadvantages of the alternative are that it would cross 36.4 acres more wetlands, 9 more perennial waterbodies, 1 more WHPA, 15.5 acres more forested land, and 2 more county/metro parks. The alternative route would also require 6.5 miles more greenfield construction. Although this route is in a less populated area made up of predominately farm fields, it has several disadvantages that outweigh the advantages. Based on our review of these routes, we do not find the Doylestown Route Alternative provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this alternative be incorporated as part of the Projects.

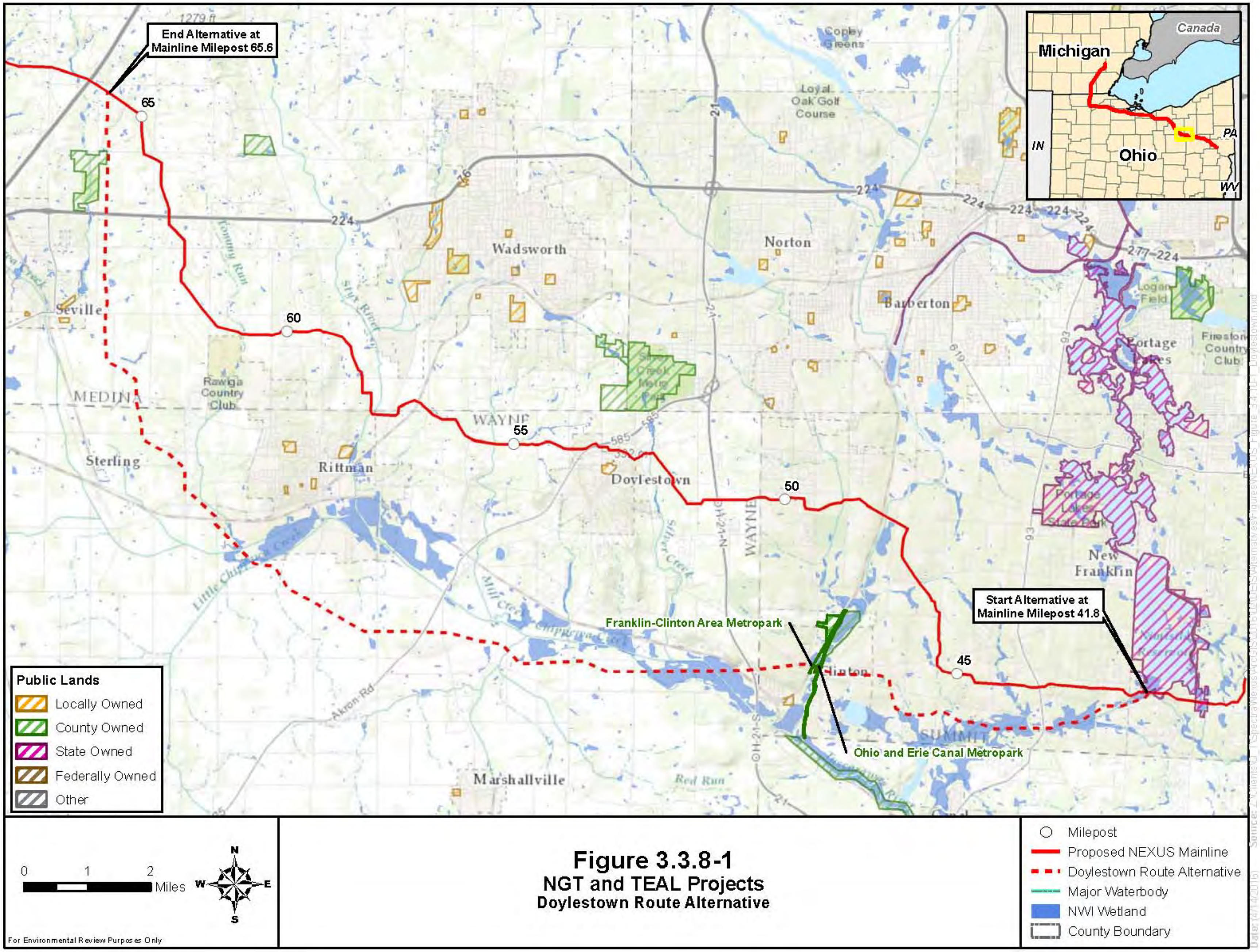

Figure 3.3.8-1
NGT and TEAL Projects
Doylestown Route Alternative

3.3.9 Turnpike Route Alternative

During scoping, we received several comments from stakeholders requesting that the NGT Project be routed along Interstate 80/90 in Erie, Sandusky, and Ottawa Counties, Ohio. The Turnpike Route Alternative was developed by NEXUS to address these comments. The Turnpike Alternative diverges from the NGT mainline at MP 88.5 in Lorain County and extends north and west along Interstate 80/90 until it rejoins the NGT mainline at MP 167.0 in Wood County (see figure 3.3.9-1 and table 3.3.9-1). One compressor station would need to be re-sited to accommodate this alternative.

TABLE 3.3.9-1

Analysis of the Turnpike Route Alternative

Factor	Alternative	Proposed Route
Length (miles)	79.8	79.0
Greenfield Construction (miles) [a]	25.0	40.9
Wetland Affected (acres) [b]	16.4	6.4
Perennial Waterbody Crossings (no.)	44	44
WHPA (no.)	11	12
Agricultural Land (acres) [c]	737.9	1,019.7
Forested Land (acres) [b]	60.0	65.5
Waterfowl/Wildlife Production Areas (no./miles)	1/0.3 [d]	0/0.0
County/Metro Parks (no./mile)	2/1.2 [e]	0/0.0
Steep Slopes (miles) [f]	0.4	0.3
Sidehill Construction (miles) [g]	1.0	0.5
Residential-type Structures within 150 feet Pipe Centerline (no.) [h]	52	51

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.
c Based on a 125-foot-wide construction right-of-way in agricultural land.
d Wildlife Production Area 30.
e Carlisle Reservation Park; Schendel Gardens and Arboretum.
f Calculated by identifying slopes greater than 20 percent.
g Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.
h Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Turnpike Route Alternative is 79.8 miles in length. The route alternative and proposed route are similar in length, number of waterbodies crossed, and amount of steep slopes. The main advantages of the route alternative are that it would have 15.9 less miles of greenfield construction, cross 1 fewer WHPA, 281.8 acres less agricultural land, and 5.5 acres less forested land. Conversely, the primary disadvantages of the alternative are that it would cross 10.0 acres more wetlands, one more waterfowl/wildlife production area, and 2 more county/metro parks. Although following an existing road often can be a means of limiting impacts on sensitive resources, it does not appear to provide an environmental advantage in this case. Rather it is merely shifting impacts from one area, group of landowners, and set of resources to another area, group of landowners, and set of resources. Based on our review of these routes, we do not find the Turnpike Route Alternative provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this alternative be incorporated as part of the Projects.

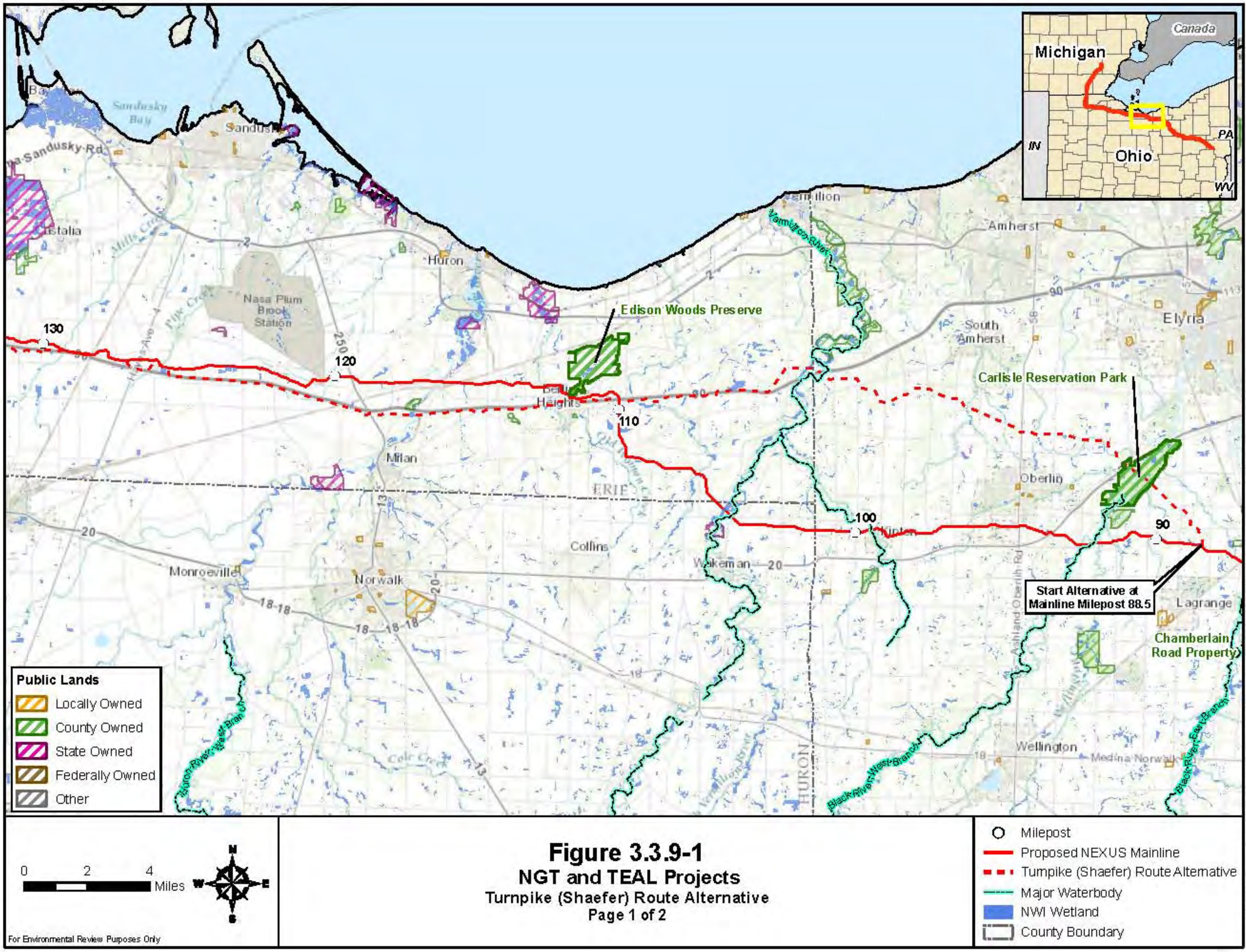

Figure 3.3.9-1
NGT and TEAL Projects
Turnpike (Shaefer) Route Alternative
Page 1 of 2

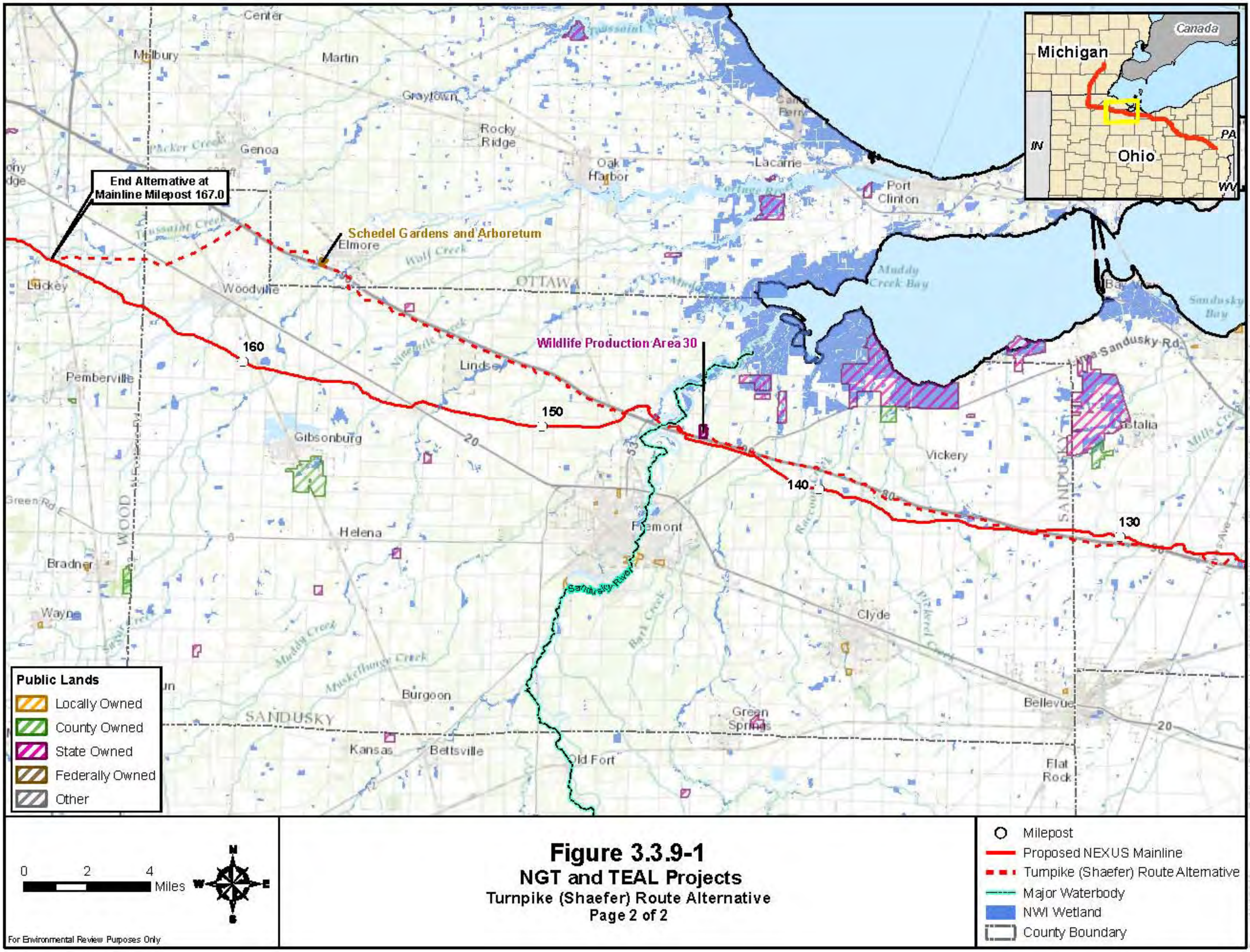

Figure 3.3.9-1
NGT and TEAL Projects
Turnpike (Shaefer) Route Alternative
Page 2 of 2

3.3.10 Oak Openings Route Alternative

During scoping, we received several comments from concerned stakeholders about the proposed route's impacts on the Oak Openings Region. The Oak Openings Route Alternative was proposed by NEXUS to address concerns with crossing the Oak Openings Region. The Oak Openings Region is an area of prairie and oak savanna surrounded by wetland forests in northwestern Ohio. The Oak Openings Region was originally made up of several unique ecological communities that contain numerous rare, endemic species. Presently, about 99 percent of the ecosystem has been altered and fragmented by development, primarily through tree clearing and wetland draining. Section 4.5.1.1 contains additional information about the Oak Openings Region. During pre-filing, NEXUS adjusted its route in several locations (see Appendix F) to reduce wetland and forest land impacts within the Oak Openings Region. The route alternative diverges from the NGT mainline at MP 159.3 in Sandusky County and runs south and west before rejoining the NGT mainline at MP 200.0 in Fulton County (see figure 3.3.10-1 and table 3.3.10-1). One compressor station would need to be re-sited to accommodate this alternative.

TABLE 3.3.10-1

Analysis of the Oak Openings Route Alternative

Factor	Alternative	Proposed Route
Length (miles)	54.0	40.6
Greenfield Construction (miles) [a]	48.8	19.7
Wetland Affected (acres) [b]	4.5	4.5
Perennial Waterbody Crossings (no.)	24	25
WHPA (no.)	7	5
Agricultural Land (acres) [c]	771.2	537.9
Forested Land (acres) [b]	3.6	27.3
Wildlife Management Areas (no./miles)	0/0.0	1/0.1 [d]
State Parks and Forest (no./mile)	0/0.0	1/0.4 [e]
County/Metro Parks (no./mile)	0/0.0	1/0.1 [f]
Residential-type Structures within 150 feet Pipe Centerline (no.) [g]	6	14

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a Based on not having an adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.
c Based on a 125-foot-wide construction right-of-way in agricultural land.
d Missionary Island Wildlife Area.
e Maumee State Forest.
f Farnsworth Metropark.
g Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Oak Openings Route Alternative is 54.0 miles in length. The route alternative and proposed route are similar in amount of wetlands crossed. The advantages of the route alternative are that it has 23.6 acres less forested land, no wildlife management areas, no state parks/forest, no county/metro parks, and is near 8 fewer residential-type structures. Conversely, the disadvantages of the alternative are that it would be 13.4 miles longer, have 29.1 miles more greenfield construction, and cross 2 more WHPAs.

Although this route alternative largely would be located outside the historic Oak Openings Region, the proposed route also would affect very little remnant Oak Openings communities. Almost all of the region already has been converted to agricultural and urban land uses. While portions of the region continue to support ecological diversity and rare species, these areas are generally limited to conservation lands such as preserves and state forests. Botanical surveys of the NGT mainline route conducted in 2015 identified two areas where the NGT Project would cross remnant Oak Openings communities. The first is located near MP 189, where characteristic species such as pin oak, red maple, spicebush, and fowl mannagrass were identified; however, non-characteristic species such as silver maple and cottonwood were also present along with invasive species such as common buckthorn and multiflora rose. The second location is near

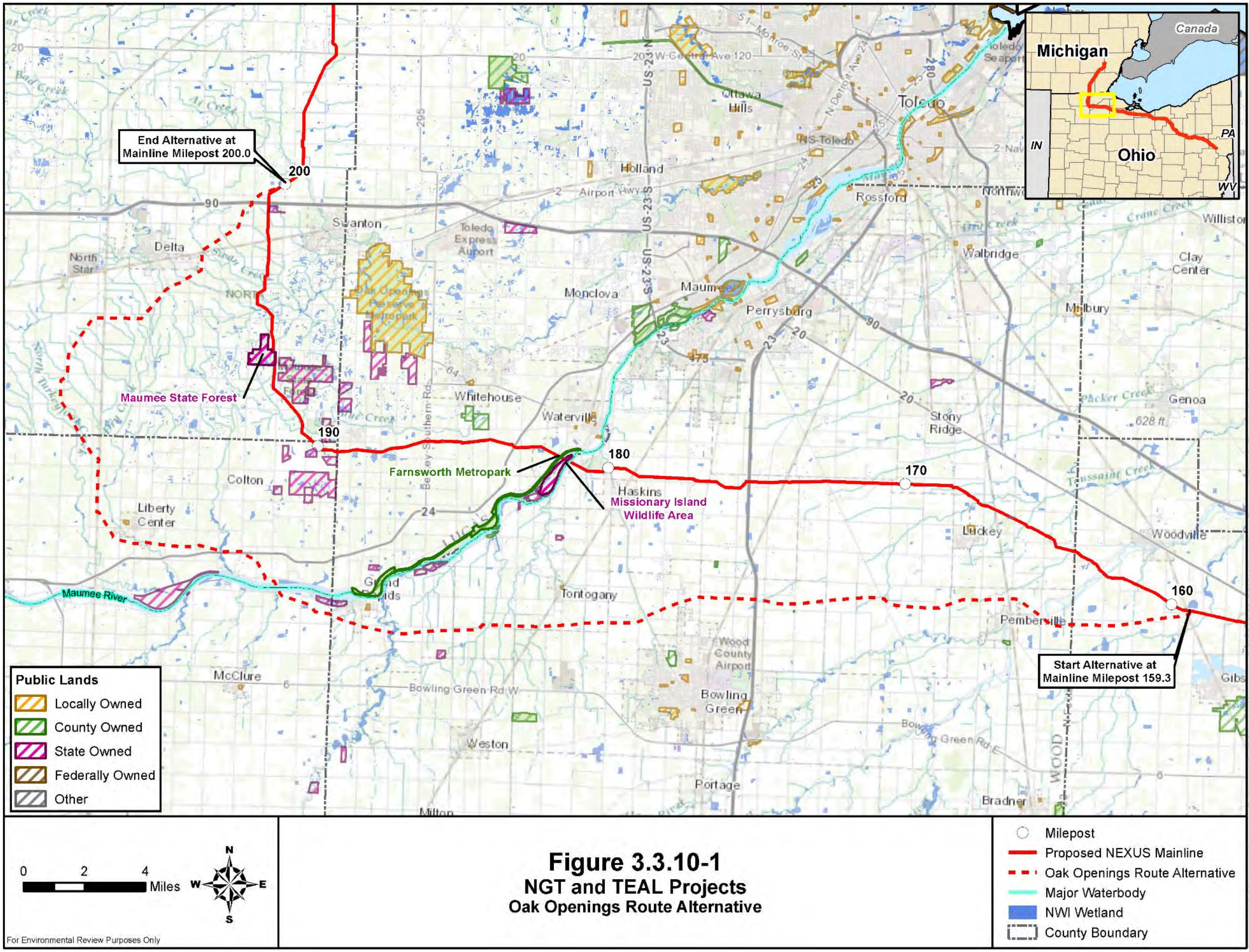

Figure 3.3.10-1
NGT and TEAL Projects
Oak Openings Route Alternative

MP 193, where the NGT Project crosses about 2,400 feet along the edge of a woodlot on the eastern edge of the Maumee State Forest. Component species such as pin oak, red maple, winterberry, spicebush, and common lake sedge were found. Neither of these areas contained all of the indicative species that would be present in high-quality remnant communities. Based on these factors, we do not find the Oak Openings Route Alternative provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this alternative be incorporated as part of the Projects.

3.3.11 Waterville Route Alternative

The Waterville Route Alternative was developed at the request of stakeholders that wanted the proposed route and the corresponding Waterville Compressor Station moved farther away from the populated area of the town of Waterville. The route alternative diverges from the NGT mainline at MP 178 in Lucas County and goes south and west until it rejoins the NGT mainline at MP 200.0 in Fulton County (see figure 3.3.11-1 and table 3.3.11-1).

TABLE 3.3.11-1

Analysis of the Waterville Route Alternative

Factor	Alternative	Proposed Route
Length (miles)	41.2	22.0
Greenfield Construction (miles) [a]	20.6	18.0
Wetland Affected (acres) [b]	7.3	2.7
Perennial Waterbody Crossings (no.)	14	15
WHPA (no.)	1	0
Agricultural Land (acres) [c]	365.2	295.5
Forested Land (acres) [b]	6.4	11.8
Wildlife Management Areas (no./miles)	0/0.0	1/0.1 [d]
State Parks and Forest (no./mile)	1/0.1 [e]	1/0.4 [f]
County/Metro Parks (no./mile)	0/0.0	1/0.1 [g]
Steep Slopes (miles) [h]	0.1	0.0
Residential-type Structures within 150 feet Pipe Centerline (no.) [i]	274	5

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.
c Based on a 125-foot-wide construction right-of-way in agricultural land.
d Missionary Island Wildlife Area.
e North Turkeyfoot State Park.
f Maumee State Forest.
g Farnsworth Metropark.
h Calculated by identifying slopes greater than 20 percent.
i Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Waterville Route Alternative is 41.2 miles in length. The route alternative and proposed route would be similar in number of perennial waterbodies and amount of steep slopes crossed. The advantages of the route alternative are that it would not cross any wildlife management areas or county/metro parks, and would impact 5.5 acres less forested land. Conversely, the disadvantages of the alternative are that it would be 19.2 miles longer, have 2.6 miles more greenfield construction, cross 4.5 acres more wetlands, 1 more WHPA, 69.7 acres more agricultural land, and is near 269 more residential-type structures. Although the route and compressor station site would be farther away from the populated area of the town of Waterville, it affects more residences and environmental resources in other than areas than the proposed route. This represent merely a shift of impacts from one area, group of landowners, and set of resources to another area, group of landowners, and set of resources. Based on our review of these routes, we do not find the Waterville Route provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this alternative be incorporated as part of the Projects.

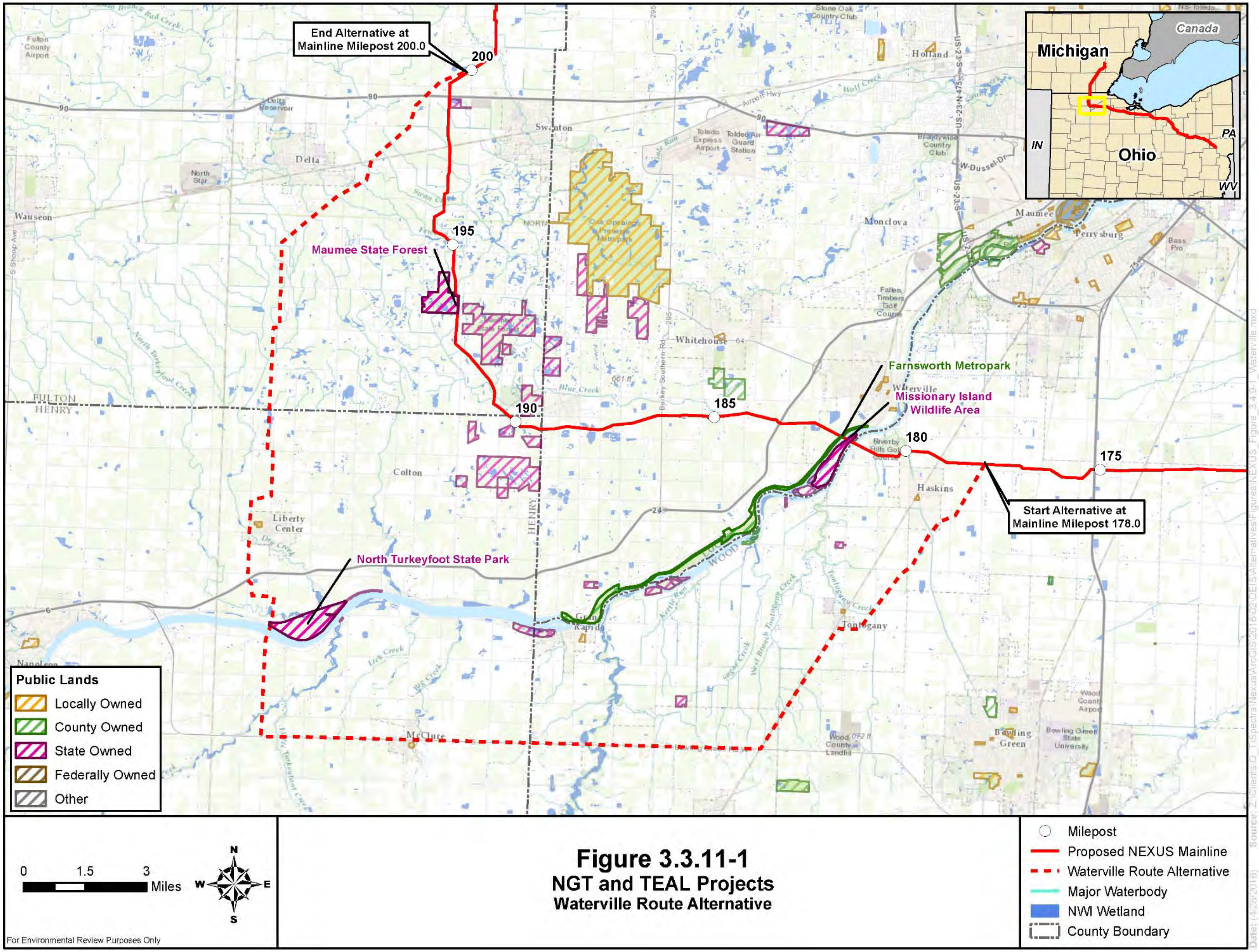

Figure 3.3.11-1
NGT and TEAL Projects
Waterville Route Alternative

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Date: (4/28/2016)

3.3.12 CORN Western Route Alternative

The Coalition to Reroute NEXUS (CORN) Western Route Alternative was developed by CORN to avoid the historical Oak Openings Region (also see section 3.3.10). The route alternative diverges from the NGT mainline at MP 189.8 in Henry County, Ohio and runs west and north until it returns to the proposed NGT mainline at MP 210.0 in Lenawee County, Michigan (see figure 3.3.12-1 and table 3.3.12-1).

TABLE 3.3.12-1

Analysis of the CORN Western Route Alternative

Factor	Alternative	Proposed Route
Length (miles)	31.1	20.2
Greenfield Construction (miles) [a]	13.6	11.1
Wetland Affected (acres) [b]	1.8	0.9
Perennial Waterbody Crossings (no.)	10	7
WHPA (no.)	1	0
Agricultural Land (acres) [c]	437.9	284.8
Forested Land (acres) [b]	10.9	5.5
State Parks and Forest (no./mile)	1/0.3 [d]	1/0.4 [d]
Potential for Subsidence (miles)	9.7	11.9
Residential-type Structures within 150 feet Pipe Centerline (no.) [e]	12	3

---

a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.
c Based on a 125-foot-wide construction right-of-way in agricultural land.
d Maumee State Forest.
e Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The CORN Western Alternative is 31.1 miles in length. There do not appear to be any substantial advantages to the route alternative. The disadvantages of the alternative are that it would be 10.9 miles longer, have 2.5 miles more greenfield construction, cross 3 more perennial waterbodies, 1 more WHPA, 153.0 acres more agricultural land, 5.5 acres more forested land, and is near 9 more residential-type structures. Based on our review of these routes and for reasons similar to those discussed in section 3.3.10, we do not find the CORN Western Route Alternative provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this alternative be incorporated as part of the Projects.

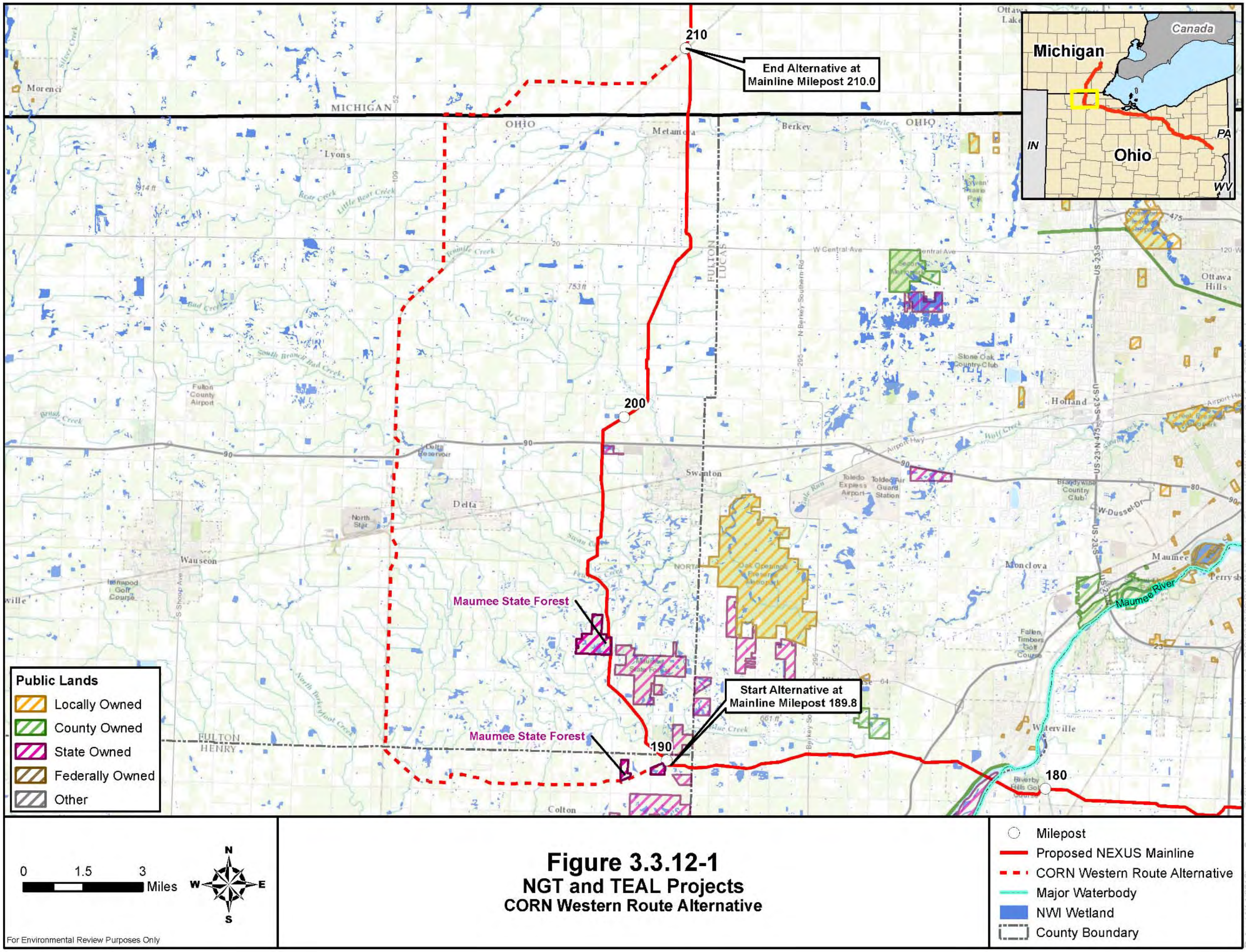

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Figure 3.3.12-1
NGT and TEAL Projects
CORN Western Route Alternative

Date: (4/14/2016) Source: Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\02\DEIS\Alternatives\Figures\NEXUS_Figure_3.4.5-1_CORN.mxd

3.4 MINOR ROUTE VARIATIONS

Although they can extend for several miles, minor route variations are different from major route alternatives in that they are usually shorter and are often designed to avoid a site-specific environmental resource or engineering constraint. They also typically remain within the same general area as the proposed route. As with major route alternatives, all minor route variations evaluated in this EIS are along the NGT mainline. We found no reason of our own nor any compelling reason based on stakeholder comments to evaluate minor route variations for the 0.9 mile of TGP interconnecting pipeline, the 4.4 miles of TEAL pipeline loop, or 0.3 mile of TEAL connecting pipeline.

During project planning, NEXUS incorporated many route alternatives and variations into its original route. In total, NEXUS adopted a total of 239 route changes totaling about 231 miles (91 percent of the Projects' route) for various reasons, including landowner requests, avoidance of sensitive resources, or engineering considerations. Appendix F lists the variations already incorporated into the route.

3.4.1 Middlebranch Avenue Route Variations

The Middlebranch Avenue Route Variation was considered at the request of a landowner to minimize impacts on wetlands, a waterbody, and forested areas by routing the pipeline partially along an existing electrical powerline south and west of the proposed route. This variation diverges from the NGT mainline at MP 26.7 and rejoins the NGT mainline at MP 29.8 (see figure 3.4.1-1 and table 3.4.1-1).

TABLE 3.4.1-1

Analysis of the Middlebranch Avenue Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	3.0	3.1
Greenfield Construction (miles) [a]	1.2	2.8
Wetland Affected (acres) [b]	0.9	0.9
Perennial Waterbody Crossings (no.)	1	1
Agricultural Land (acres) [c]	33.3	34.8
Forested Land (acres) [b]	3.6	4.5
Steep Slopes (miles) [d]	<0.1	0.0
Residential-type Structures within 150 feet Pipe Centerline (no.) [e]	19	3

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.

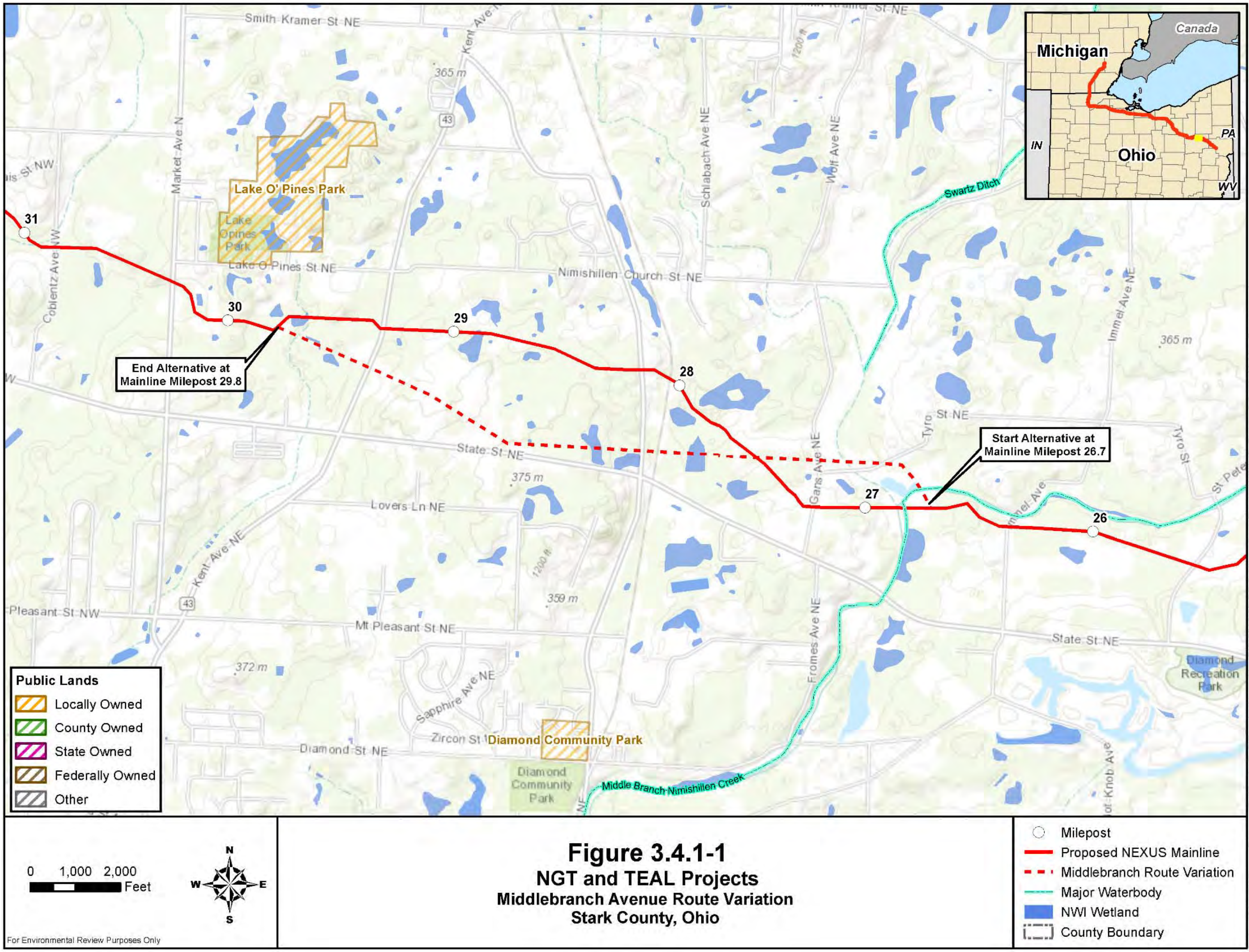
b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.

c Based on a 125-foot-wide construction right-of-way in agricultural land.

d Calculated by identifying slopes greater than 20 percent.

e Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Middlebranch Avenue Route Variation is 3.0 miles in length. The route variation and proposed route are similar in length and would affect the similar amount of wetlands, waterbodies, agricultural land, and steep slopes. The advantage of the route variation is that it would require 1.6 miles less greenfield construction. Conversely, the disadvantage of the variation is that it would be near 16 more residential-type structures. The purpose of the alternative was to minimize impacts on wetlands, a waterbody, and forested areas. Only impacts on forested areas would be slightly reduced (less than one acre), whereas impacts on wetlands and waterbodies appear to be about the same. Based on our review of these factors, we do not find the Middlebranch Avenue Route Variation provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this variation be incorporated as part of the Projects.



Public Lands
- ▨ Locally Owned
- ▨ County Owned
- ▨ State Owned
- ▨ Federally Owned
- ▨ Other

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Figure 3.4.1-1
NGT and TEAL Projects
Middlebranch Avenue Route Variation
Stark County, Ohio

- ○ Milepost
- Proposed NEXUS Mainline
- Middlebranch Route Variation
- Major Waterbody
- 🟦 NWI Wetland
- ⬚ County Boundary

3.4.2 Electric Transmission Line Route Variation

The Electric Transmission Line Route Variation is in the same vicinity as the Middlebranch Avenue Route Variation. The route variation was suggested by a landowner as a means of co-locating the pipeline along the electric transmission line corridor off of and west of their property. The variation diverges from the NGT mainline at MP 27.5 and rejoins the NGT mainline at MP 29.8 (see figure 3.4.2-1 and table 3.4.2-1).

TABLE 3.4.2-1

Analysis of the Electric Transmission Line Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	2.5	2.3
Greenfield Construction (miles) [a]	0.8	2.1
Wetland Affected (acres) [b]	0.5	0.9
Agricultural Land (acres) [c]	27.3	25.8
Forested Land (acres) [b]	3.6	4.5
Steep Slopes (miles) [d]	<0.1	0.0
Residential-type Structures within 150 feet Pipe Centerline (no.) [e]	6	3

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[a] Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.

[b] Based on a 75-foot-wide construction right-of-way in wetlands and forested land.

[c] Based on a 125-foot-wide construction right-of-way in agricultural land.

[d] Calculated by identifying slopes greater than 20 percent.

[e] Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Electric Transmission Line Route Variation is 2.5 miles long. The main advantage of the route variation is that it would have 1.3 less miles of greenfield construction. It also would affect slightly less wetland and forested land. The main disadvantage of the variation is that it would be near 3 more residential-type structures. It also would be slightly longer and affect more agricultural land and steep slopes. Although co-locating with an existing utility often can be a means of limiting impacting on sensitive resources, it does not appear to provide a substantial environmental advantage in this case. The variation merely transfers impacts from one area, group of landowners, and set of resource to another. Based on our review of this routes, we do not find that the Electric Transmission Line Route Variation provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this variation be incorporated as part of the Projects.

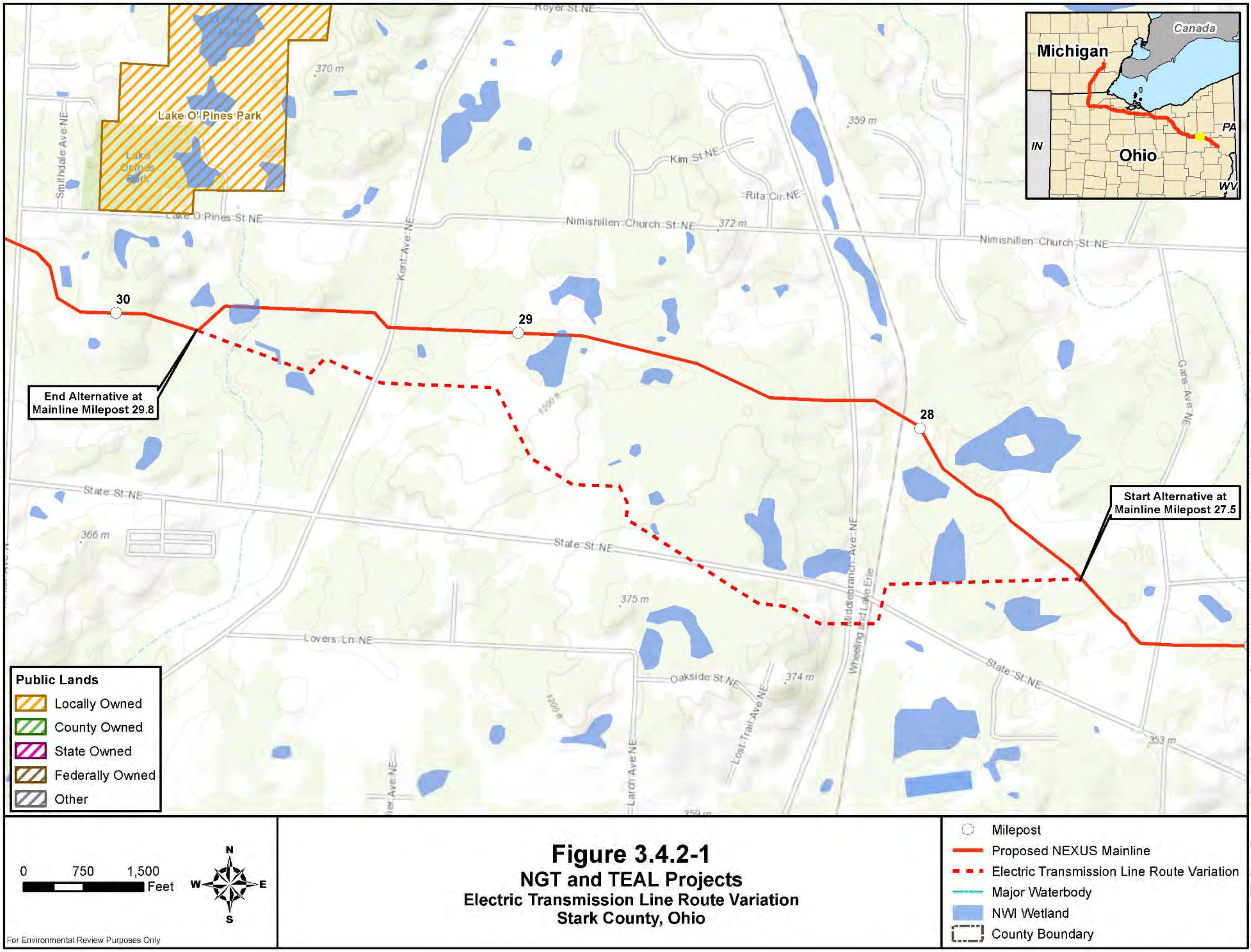

Figure 3.4.2-1
NGT and TEAL Projects
Electric Transmission Line Route Variation
Stark County, Ohio

3.4.3 Kent Avenue Route Variation

The Kent Avenue Route Variation is in the same vicinity as the Middlebranch Avenue Route Variation and Electric Transmission Line Route Variation. The variation was proposed by a stakeholder who suggested that route the pipeline along a nearby electrical powerline would minimize impacts on wetlands and forested land. The variation diverges from the NGT mainline at MP 27.7 and rejoins the NGT mainline at MP 29.7 (see figure 3.4.3-1 and 3.4.3-1).

TABLE 3.4.3-1

Analysis of the Kent Avenue Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	2.0	2.0
Greenfield Construction (miles) [a]	1.0	1.8
Wetland Affected (acres) [b]	0.5	0.9
Agricultural Land (acres) [c]	21.2	21.2
Forested Land (acres) [b]	4.5	4.5
Residential-type Structures within 150 feet Pipe Centerline (no.) [d]	7	3

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.
c Based on a 125-foot-wide construction right-of-way in agricultural land.
d Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

Both the proposed route and the Kent Avenue Route Variation would be of equal length and their impacts on waterbodies, forested land, and public roads would be identical or similar. The advantages of the route variation is that it would have 0.8 less miles of greenfield construction and would cross slightly less wetland. Conversely, the disadvantage of the variation is that it is near 4 more residential-type structures. Based on our review of these routes, it appears that the route variation would merely shift impacts away from wetlands to residential land use. Therefore, we do not find that the Kent Avenue Route Variation provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this variation be incorporated as part of the Projects.

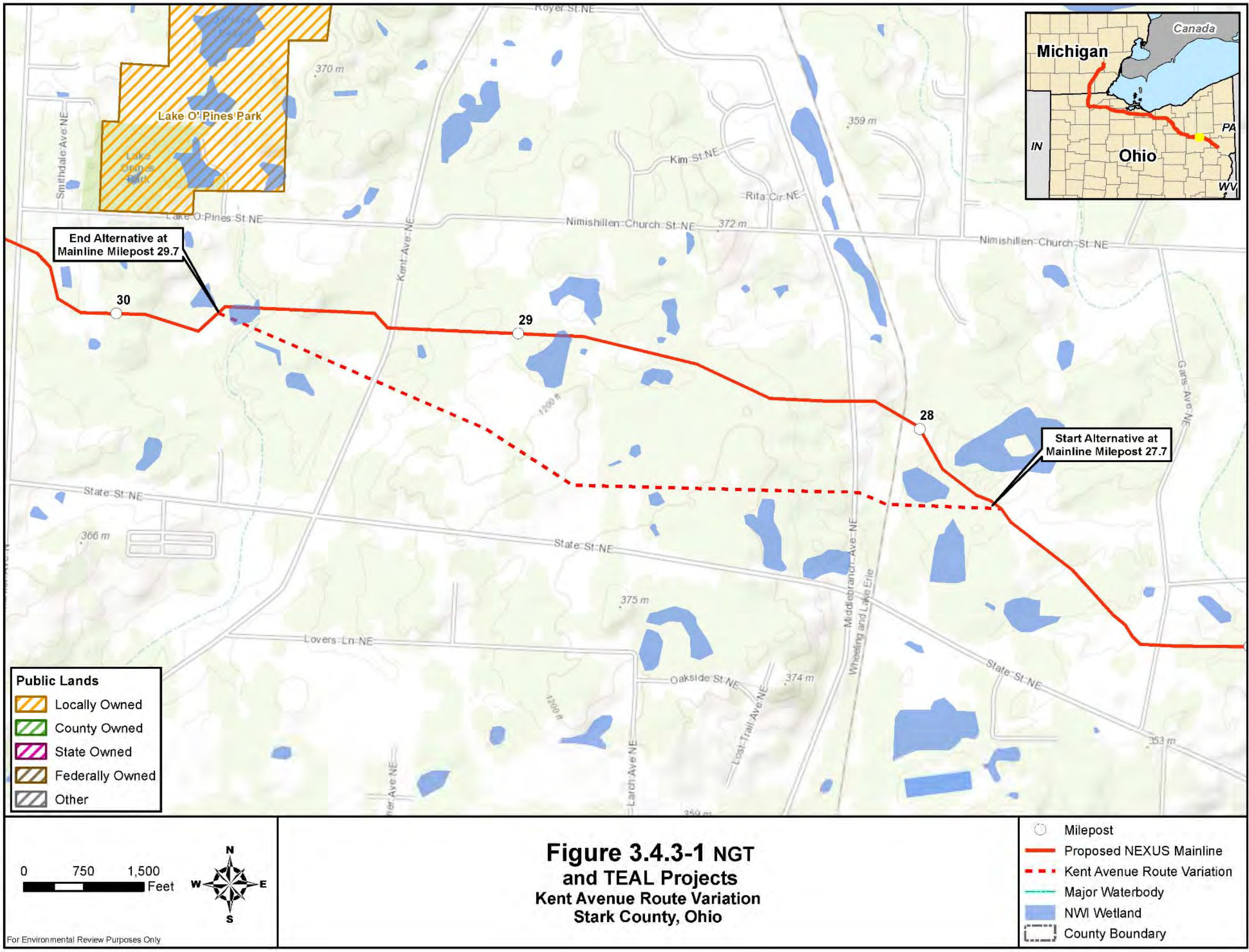

Figure 3.4.3-1 NGT and TEAL Projects
Kent Avenue Route Variation
Stark County, Ohio

3.4.4 Interstate 76 Route Variation

The Interstate 76 Route Variation was requested by a landowner based on a concern that placement of the proposed route on their property would preclude them from constructing a private natural gas well on their property. The variation diverges from the NGT mainline at MP 52.7 and head north along the eastern edge of the city of Wadsworth until it reaches U.S. Interstate 76, where it travels west along the interstate and eventually rejoin the NGT mainline at MP 63.2 (see figure 3.4.4-1 and table 3.4.4-1).

TABLE 3.4.4-1

Analysis of the Interstate 76 Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	12.2	10.5
Greenfield Construction (miles) [a]	0.4	8.4
Wetland Affected (acres) [b]	0.8	0.8
Perennial Waterbody Crossings (no.)	3	1
WHPA (no.)	3	0
Agricultural Land (acres) [c]	50.0	116.7
Forested Land (acres) [b]	8.2	14.5
County/Metro Parks (no./mile)	3/0.8 [d]	0/0.0
Steep Slopes (miles) [e]	1.0	0.1
Sidehill Construction (miles) [f]	1.0	0.1
Residential-type Structures within 150 feet Pipe Centerline (no.) [g]	82	34

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.

b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.

c Based on a 125-foot-wide construction right-of-way in agricultural land.

d Sliver Creek Metropark; Silver Creek North Metropark; Holmsbrook Park.

e Calculated by identifying slopes greater than 20 percent.

f Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.

g Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Interstate 76 Route Variation is approximately 12.2 miles long. The route variation and proposed route would have similar impacts on wetlands. The advantages of the route variation are that that is would cross 66.7 acres less agricultural land, 6.4 acres less forested land, and would require 8.0 miles less greenfield construction. Conversely, the disadvantages of the variation are that it would cross 2 more perennial waterbodies, 3 more WHPA, 3 more county/metro parks, 0.9 miles more steep slopes, 0.9 miles more sidehill construction, and is near 48 more residential-type buildings. The purpose of the route variation is to avoid a potential conflict with a future natural gas well on a landowner’s property. Although landowners would continue to have use of their property following construction, the use cannot interfere with the easement rights granted to NEXUS for construction and operation of the pipeline facilities. As such, landowners would be prohibited from installing natural gas wells within the 50-foot-wide permanent right-of-way. However, natural gas is a deeply buried resource that likely also could be access by wells adjacent to the permanent right-of-way. If the route variation were adopted, it would merely shift easement restrictions from one group of landowners to another. Based on our review of both routes, we do not find the Interstate 76 Route Variation provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this variation be incorporated as part of the Projects.

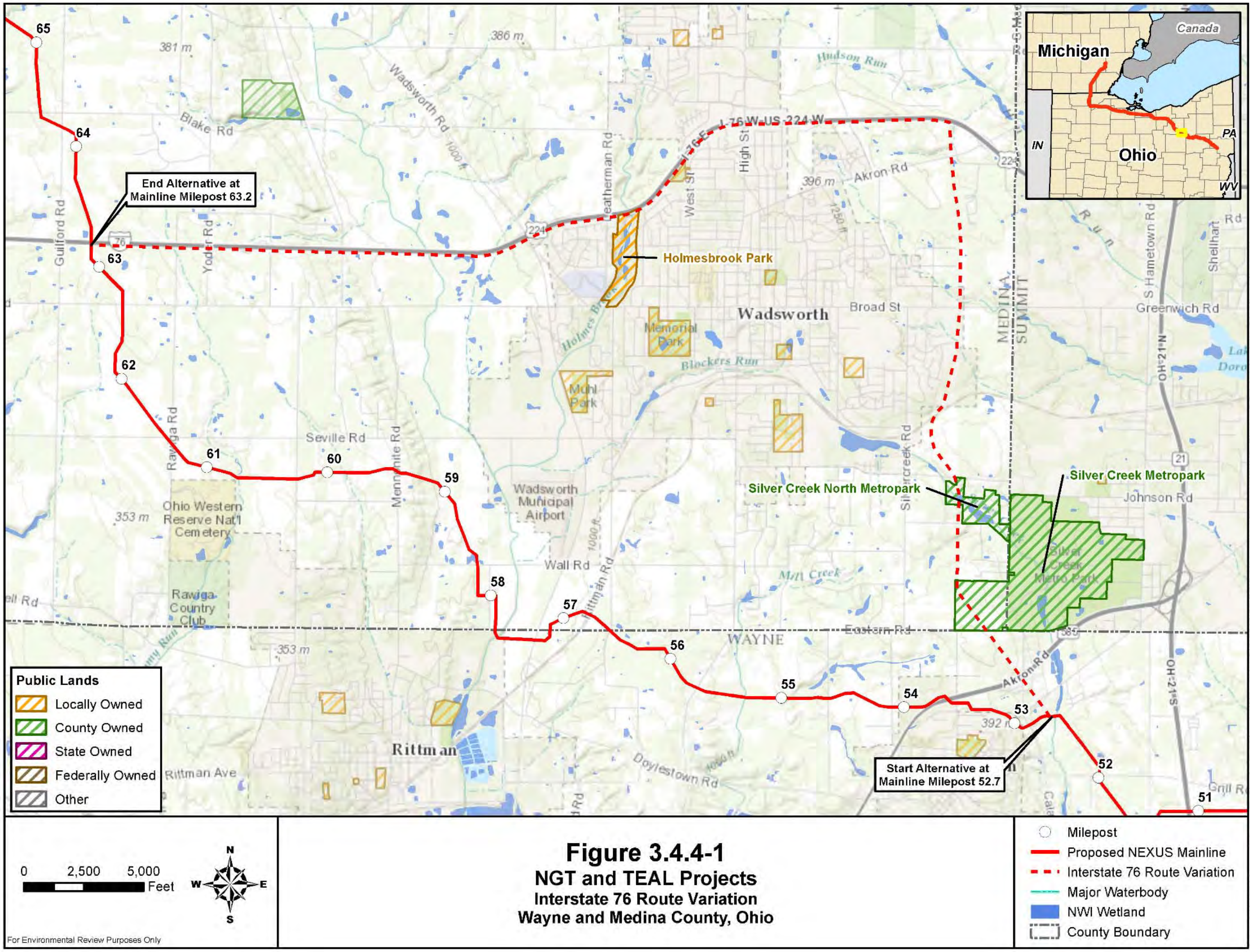

Figure 3.4.4-1
NGT and TEAL Projects
Interstate 76 Route Variation
Wayne and Medina County, Ohio

3.4.5 Mount Eaton Road Route Variation

The Mount Eaton Road Variation was proposed by a landowner who is concerned about how the proposed pipeline would impact the flow of runoff water above and below ground near their property and about safety issues related to having the proposed pipeline routed in close proximity to the residence. The proposed variation runs north of the proposed route diverging from the NGT mainline at MP 54.5 and rejoining the NGT mainline at MP 56.1 (see figure 3.4.5-1 and table 3.4.5-1).

TABLE 3.4.5-1

Analysis of the Mount Eaton Road Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	1.5	1.5
Greenfield Construction (miles) [a]	1.4	1.4
Perennial Waterbody Crossings (no.)	1	1
Agricultural Land (acres) [b]	20	20
Forested Land (acres) [c]	0.9	0.9
Steep Slopes (miles) [d]	<0.1	<0.1
Sidehill Construction (miles) [e]	<0.1	<0.1
Residential-type Structures within 150 feet Pipe Centerline (no.) [f]	4	3

---

a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 125-foot-wide construction right-of-way in agricultural land.
c Based on a 75-foot-wide construction right-of-way in forested land.
d Calculated by identifying slopes greater than 20 percent.
e Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.
f Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Mount Eaton Road Route Variation and the corresponding portion of the proposed route are of equal length and their impact on most environmental features would be nearly identical (see table 3.4.5-1). There appears to be no advantage to the route variation, whereas the only disadvantage to the variation is that it would be near one additional residence-type structure. This represents merely a shift of impacts from one area and group of landowners to another area and group of landowners. To address the landowner’s concerns about the flow of runoff water on their property, NEXUS would implement erosion control and revegetation procedures outlined in its *E&SCP* to ensure that construction and operation of the pipeline does not create drainage problems along the pipeline route and the proposed pipeline does not impact surface or subsurface water quality or quantities. Based on our review of the routes, we do not find the Mount Eaton Road Route Variation provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this variation be incorporated as part of the Projects.

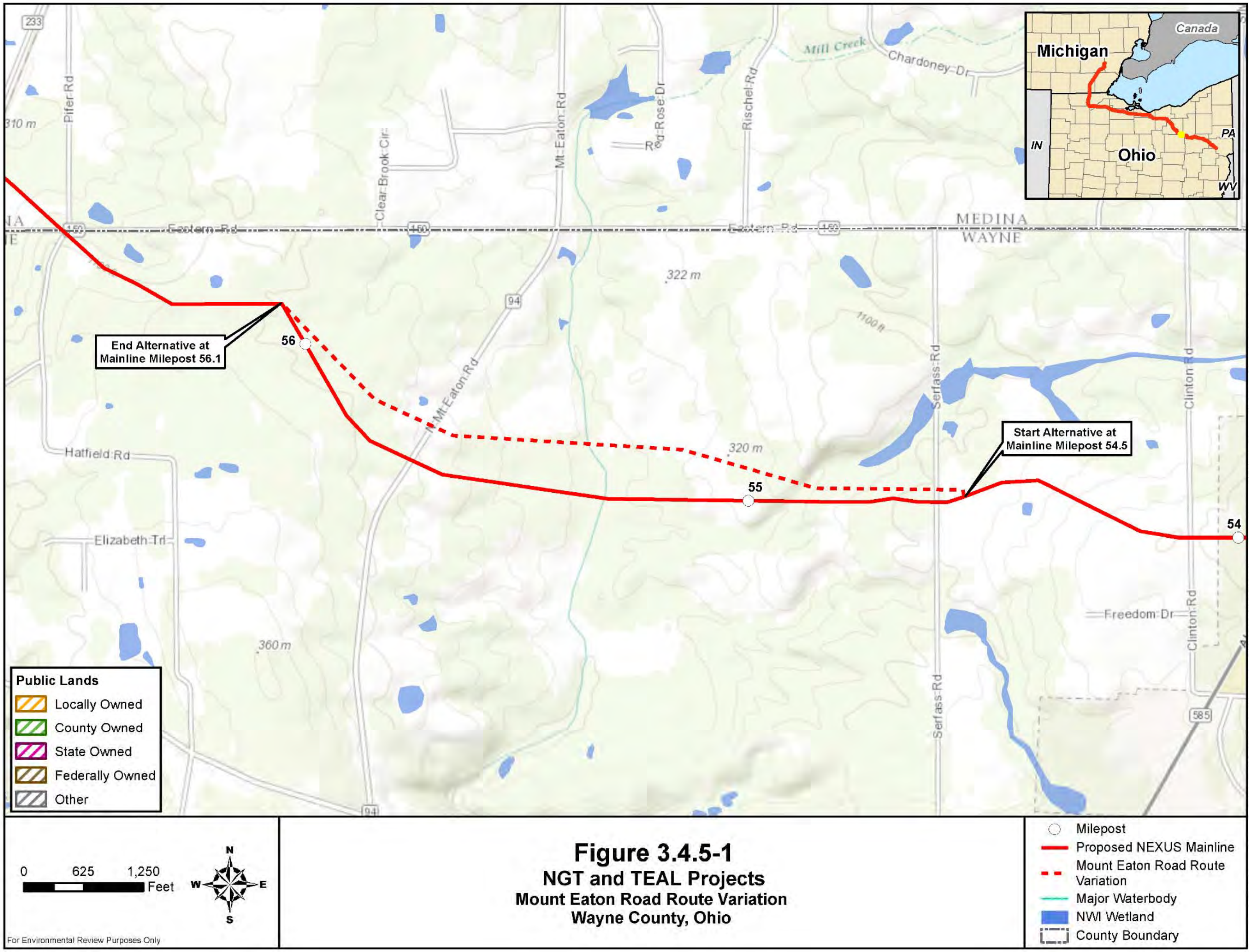

Figure 3.4.5-1
NGT and TEAL Projects
Mount Eaton Road Route Variation
Wayne County, Ohio

3.4.6 Eastern Road North Route Variation

The Eastern Road North Route Variation was suggested by a landowner concerned about impacts on forested areas and wildlife on their property. Furthermore, the landowner is concerned that placement of the proposed route would restrict their ability to construct additional buildings on their property. The variation diverges from the NGT mainline at MP 55.7 and runs north of the proposed route before it crosses to the south side and rejoins the NGT mainline at MP 62.0 (see figure 3.4.6-1 and table 3.4.6-1).

TABLE 3.4.6-1

Analysis of the Eastern Road North Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	7.7	6.3
Greenfield Construction (miles) [a]	6.6	5.2
Wetland Affected (acres) [b]	0.0	0.6
Perennial Waterbody Crossings (no.)	1	1
WHPA (no.)	2	2
Agricultural Land (acres) [c]	90.9	77.3
Forested Land (acres) [b]	2.7	5.5
Steep Slopes (miles) [d]	0.2	<0.1
Sidehill Construction (miles) [e]	0.2	0.0
Residential-type Structures within 150 feet Pipe Centerline (no.) [f]	20	14

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.
c Based on a 125-foot-wide construction right-of-way in agricultural land.
d Calculated by identifying slopes greater than 20 percent.
e Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.
f Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Eastern Road North Route Variation is 7.7 miles in length. The routes would have similar impacts on perennial waterbodies, WHPAs, and rugged terrain. The advantages of the route variation are that it would cross no wetlands and 2.7 acres less forested land. Conversely, the disadvantages of the variation are that it would be 1.4 miles longer, have 1.4 miles more greenfield construction, cross 13.6 acres more agricultural land and would be near six more residential-type structures. The purpose of the route variation is to minimize impacts on forested land, wildlife, and future development. Although it may meet some of these objectives, it would also affect more land and shift greater impacts to agricultural land and residential areas. Regarding future development, landowners would continue to be able to develop their property following construction provided it does not interfere with the easement rights granted to NEXUS for construction and operation of the pipeline facilities. Based on our review of the routes, we do not find the Eastern Road North Route Variation provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this variation be incorporated as part of the Projects.

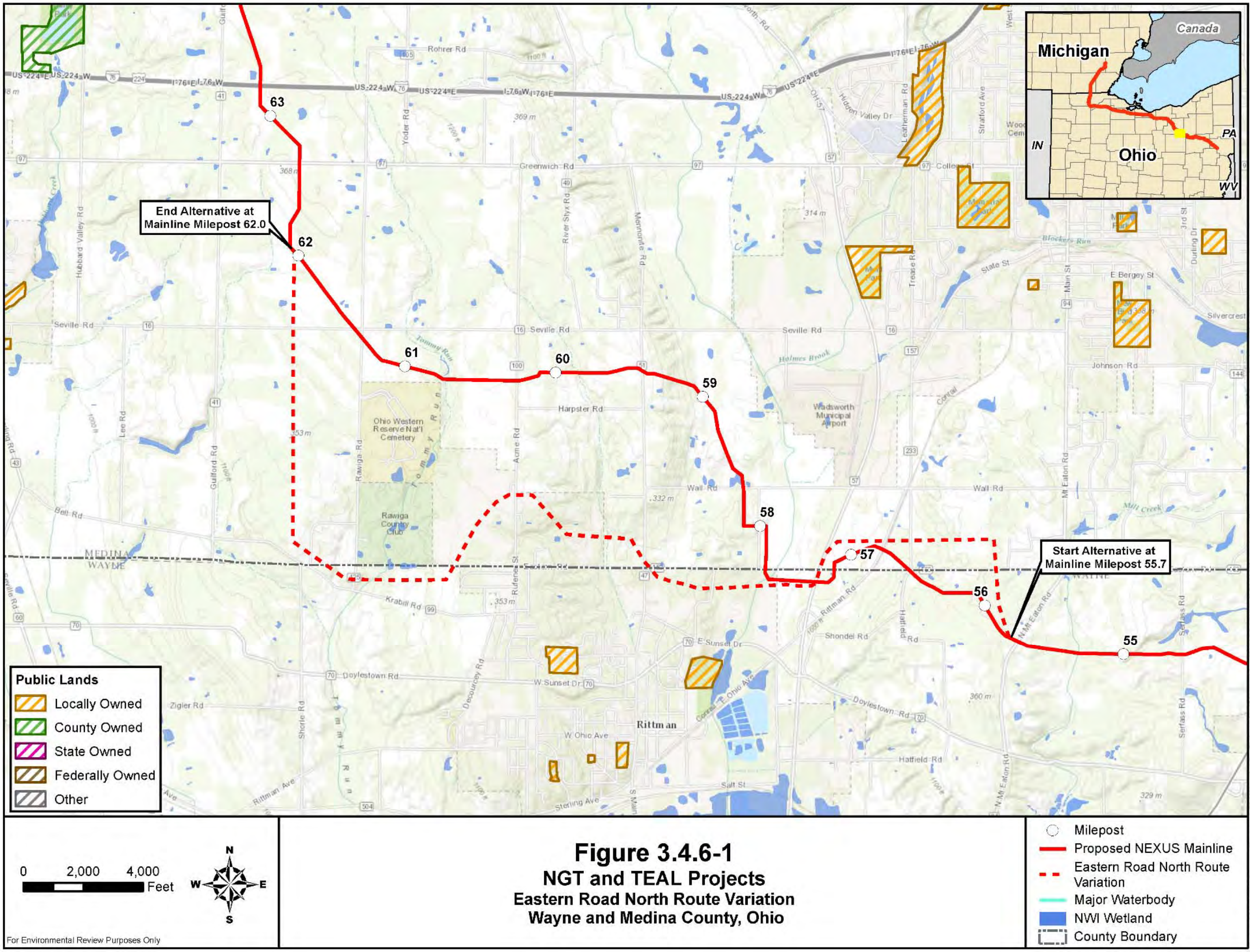

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Figure 3.4.6-1
NGT and TEAL Projects
Eastern Road North Route Variation
Wayne and Medina County, Ohio

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Date: (4/14/2016)

3.4.7 Eastern Road South Route Variation

The Eastern Road South Route Variation was proposed by the same landowner that proposed the Eastern Road North Route Variation, and for the same reasons. The route variation diverges from the NGT mainline at MP 55.7 and runs south of the proposed route until it rejoins the NGT mainline at MP 62.0 (see figure 3.4.7-1 and table 3.4.7-1).

TABLE 3.4.7-1

Analysis of the Eastern Road South Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	9.9	6.3
Greenfield Construction (miles) [a]	6.3	5.2
Wetland Affected (acres) [b]	0	0.8
Perennial Waterbody Crossings (no.)	1	1
WHPA (no.)	2	2
Agricultural Land (acres) [c]	86.4	77.3
Forested Land (acres) [b]	9.1	5.5
Steep Slopes (miles) [d]	0.3	<0.1
Sidehill Construction (miles) [e]	0.2	0.0
Residential-type Structures within 150 feet Pipe Centerline (no.) [f]	29	14

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.
c Based on a 125-foot-wide construction right-of-way in agricultural land.
d Calculated by identifying slopes greater than 20 percent.
e Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.
f Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Eastern Road South Route Variation is 9.9 mile in length. The routes would have similar impacts on perennial waterbodies, WHPAs, and rugged terrain. The advantage of the route variation is that it crosses no wetlands. Conversely, the disadvantages of the variation are that it would be 3.6 miles longer than the proposed route, have 1.1 miles more greenfield construction, 9.1 acre more agricultural land, 3.6 acre more forested land, and is near 15 more residential structures. The purpose of the route variation is to minimize impacts on forested land, wildlife, and future development. The route variation does not meet these objectives and would increase impacts on other resources. Regarding future development, landowners would continue to be able to develop their property following construction provided it does not interfere with the easement rights granted to NEXUS for construction and operation of the pipeline facilities. Based on our review of these routes, we do not find the Eastern Road South Route Variation provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this variation be incorporated as part of the Projects.

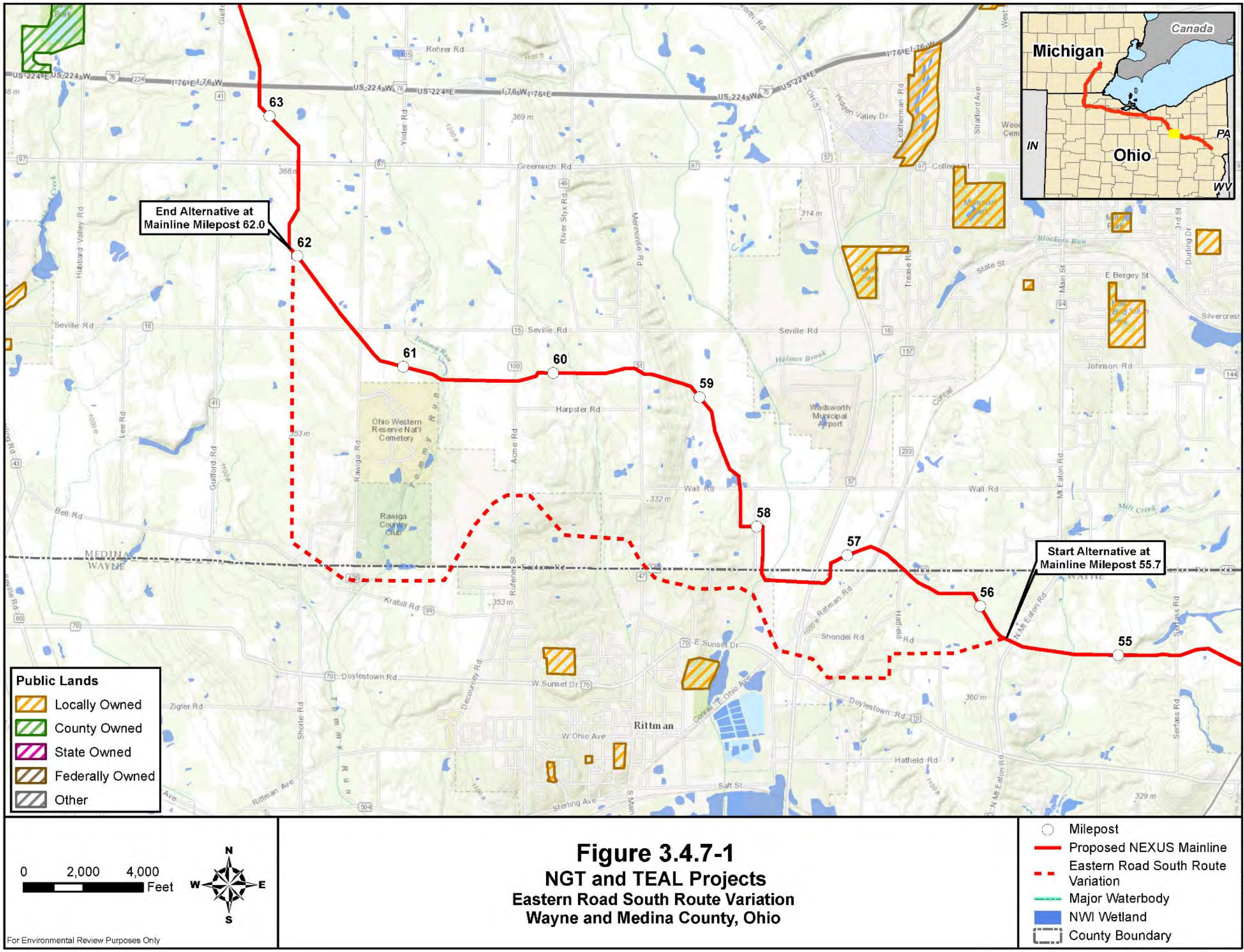

Figure 3.4.7-1
NGT and TEAL Projects
Eastern Road South Route Variation
Wayne and Medina County, Ohio

3.4.8 Pifer Road Route Variation

The Pifer Road Route Variation was proposed by a landowner that was concerned about the impacts on wildlife and spring fed wells located on their property. The variation diverges from the NGT mainline at MP 56.0 and runs north and then west along a sewer line easement until it rejoins the NGT mainline at MP 56.8 (see figure 3.4.8-1 and table 3.4.8-1).

TABLE 3.4.8-1

Analysis of the Pifer Road Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	1.0	0.8
Greenfield Construction (miles) [a]	0.7	0.6
Agricultural Land (acres) [b]	6.1	7.6
Forested Land (acres) [c]	4.5	1.8
Steep Slopes (miles) [d]	0.0	<0.1
Sidehill Construction (miles) [e]	0.0	<0.1
Residential-type Structures within 150 feet Pipe Centerline (no.) [f]	1	4

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 125-foot-wide construction right-of-way in agricultural land.
c Based on a 75-foot-wide construction right-of-way in forested land.
d Calculated by identifying slopes greater than 20 percent.
e Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.
f Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Pifer Road Route Variation is 1.0 mile in length. The route variation and proposed route would have similar impacts on most resources. The main advantages of the route variation are that it would cross 1.5 acres less agricultural land and is near three fewer residential-type structures. Conversely, the main disadvantage of route variation is that it has crosses 2.7 acres more forested land. The purpose of the route variation is to reduce impacts on wildlife and spring fed wells located on their property. We note that the proposed route is not within 150 feet of any recorded wells on the landowner's property and the additional forest clearing associated with the variation may actually increase impacts on wildlife. Further, the variation appears to merely shift impacts to a different group of landowners. Based on our comparison of the environmental impacts of the two routes, we do not find the Pifer Road Route Variation provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this variation be incorporated as part of the Projects.

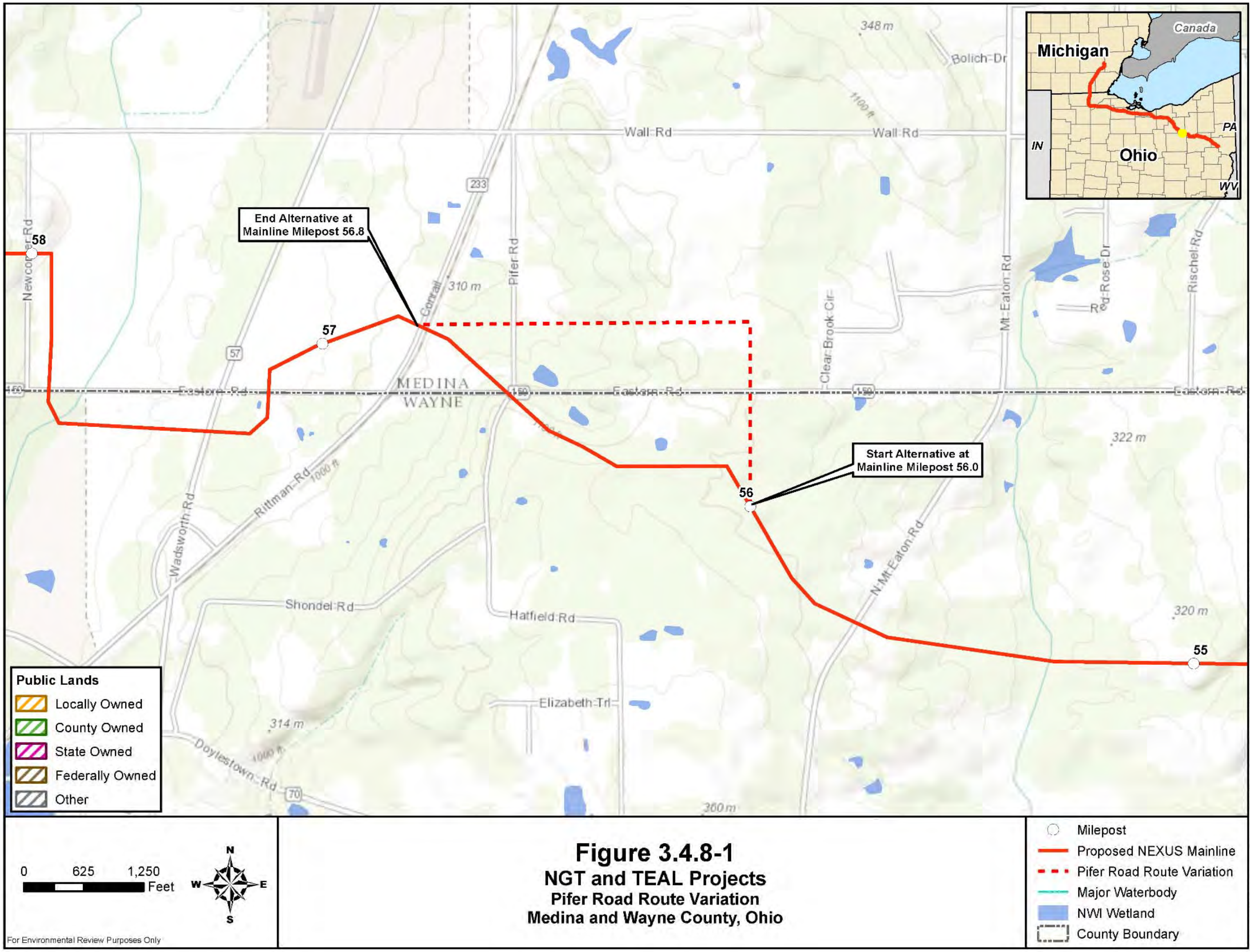

Figure 3.4.8-1
NGT and TEAL Projects
Pifer Road Route Variation
Medina and Wayne County, Ohio

3.4.9 Mennonite Road Route Variation

The Mennonite Road Route Variation was proposed by a landowner with concerns about the potential impacts the proposed route would have on the watershed and drain tile subsystem located on his property. This variation diverges from the NGT mainline at MP 59.6 and rejoins NGT mainline at MP 60.2 (see figure 3.4.9-1 and table 3.4.9-1).

TABLE 3.4.9-1

Analysis of the Mennonite Road Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	0.6	0.6
Greenfield Construction (miles) [a]	0.6	0.6
Agricultural Land (acres) [b]	9.1	7.6
Forested Land (acres) [c]	0.5	0.5

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a Based on not having an adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 125-foot-wide construction right-of-way in agricultural land.
c Based on a 75-foot-wide construction right-of-way in forested land.

The Mennonite Road Route Variation is the same length as the proposed route and the impacts on environmental features would be identical, except that the route variation crosses 1.5 acres more agricultural land. The variation appears to merely shift impacts from one group of landowners to a different group of landowners. NEXUS developed a *Drain Tile Mitigation Plan* to address landowner concerns about impacts on drain tile systems. The plan identifies procedures to be implemented before, during, and after construction to minimize impacts on drain tile systems. Prior to the start of construction, NEXUS would work with landowners to identify the type of drain system in place and to develop strategies to mitigate impacts. After completion of construction, NEXUS would repair drain tiles, as needed, restore the area to preconstruction conditions, and conduct post-construction monitoring to ensure successful restoration of the area. Based on our comparison of the environmental impacts of each route, and our review of NEXUS' *Drain Tile Mitigation Plan*, we do not find the Mennonite Road Route Variation provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this variation be incorporated as part of the Projects.

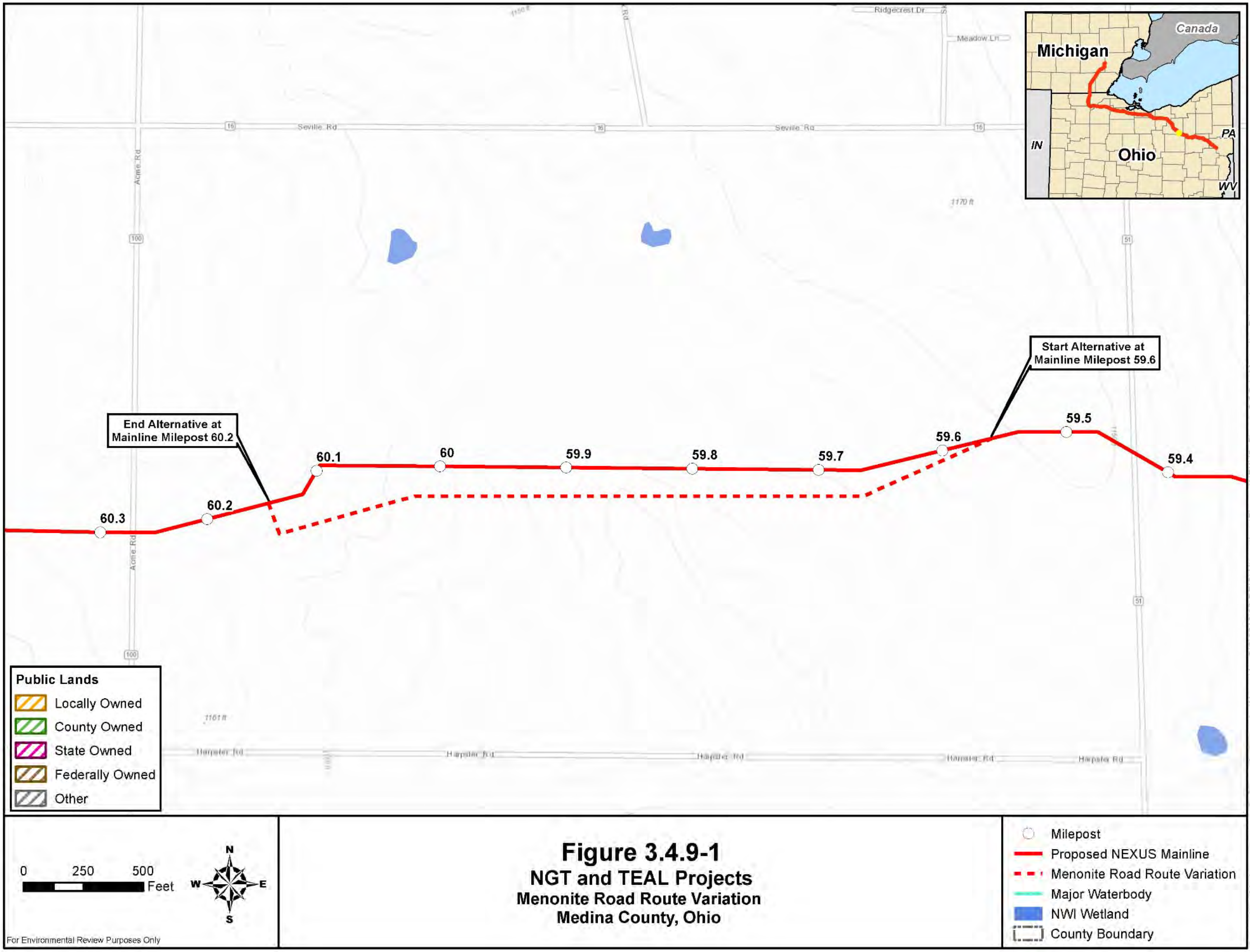

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Figure 3.4.9-1
NGT and TEAL Projects
Menonite Road Route Variation
Medina County, Ohio

3.4.10 Chippewa Lake Route Variations

Stakeholders expressed concern regarding the impacts that the proposed route would have near Chippewa Lake on the local hydrology and flooding, the watershed district, Buck Creek, Chippewa Lake, Buckeye Woods Park, and a number of housing developments and other facilities. One landowner was particularly concerned that forest clearing upstream of the Muskingum Watershed Conservancy District's Flood Control Structure II-A (Structure II-A) could adversely affect runoff and exacerbate the already problematic flooding that occurs periodically in the area. Stakeholders and NEXUS suggested various route variations to address these issues. Those route variations are the subject of the Chippewa Lake A, Chippewa Lake B, and Chippewa Lake C Route Variations discussed below.

The Chippewa Subdistrict of the Muskingum Watershed Conservancy District (Chippewa MWCD) operates eight different flood control dams throughout the 120,320-acre watershed (Chippewa MWCD, 2016). Structure II-A was constructed along Buck Creek in 1969 and has an upstream drainage area of 1,665 acres. The landowner has also expressed concern that the proposed pipeline route would increase flooding upstream of Structure II-A by converting the permanent right-of-way from forested land to an open grassland.

The proposed project intersects forested land within the 1,616-acre watershed that drains into Structure II-A for a total of 0.7 mile. The permanent easement throughout the subwatershed would be 50 feet wide, resulting in the conversion of 4.0 acres of forest to grassland. The change in runoff that would result from this conversion was calculated using the rational method (Chin, 2000). The rational method is one of the most commonly used procedures for calculating peak discharge from small watersheds and calculates discharge based on a combination of rainfall intensity, drainage area, and a runoff coefficient specific to land use.

Small drainages ranging from 285.6 to 616.9 acres were delineated for the proposed route based on topography in order to assess the impacts of right-of-way conversion on peak discharge using the rational method. The 10-year, 1-hour rainfall for this part of Ohio is approximately 1.7 inches and the 100-year, 1-hour rainfall is approximately 2.6 inches. The post-construction analysis involved converting all forested land (runoff coefficient of 0.15) within the 50-foot permanent right-of-way to maintained grassland (runoff coefficient of 0.30). The proposed project crosses Drainages B, C, and D (see figure 3.4.10-1). The analysis evaluates the relative changes in rainfall-runoff processes as a result of the proposed project.

Table 3.4.10-1 shows that the impact of converting the right-of way from forested to grassland within the Structure II-A drainage area is minor; it only increases the 10-year flood flow by 1.1 cubic feet per second (cfs) (0.15 percent) and increases the 100-year flood flow by 1.7 cfs (0.14 percent).

TABLE 3.4.10-1

Chippewa Hydrologic Assessment

Measurement	Drainage A	Drainage B	Drainage C	Drainage D	Total
Size (acres)	616.9	285.6	400.9	312.9	1616.3
Pre-construction					
Runoff Coefficient	0.2870	0.2505	0.2447	0.2837	0.2694 (area weighted avg.)
10-year peak discharge (cfs)	301.0	121.6	166.7	150.9	740.2
100-year peak discharge (cfs)	478.0	193.1	264.8	239.7	1175.6
Post-construction					
Runoff Coefficient	0.2870	0.2506	0.2457	0.2842	0.2698 (area weighted avg.)
10-year peak discharge (cfs)	301.0	121.7	167.5	151.2	741.3
100-year peak discharge (cfs)	478.0	193.2	266.0	240.1	1177.3

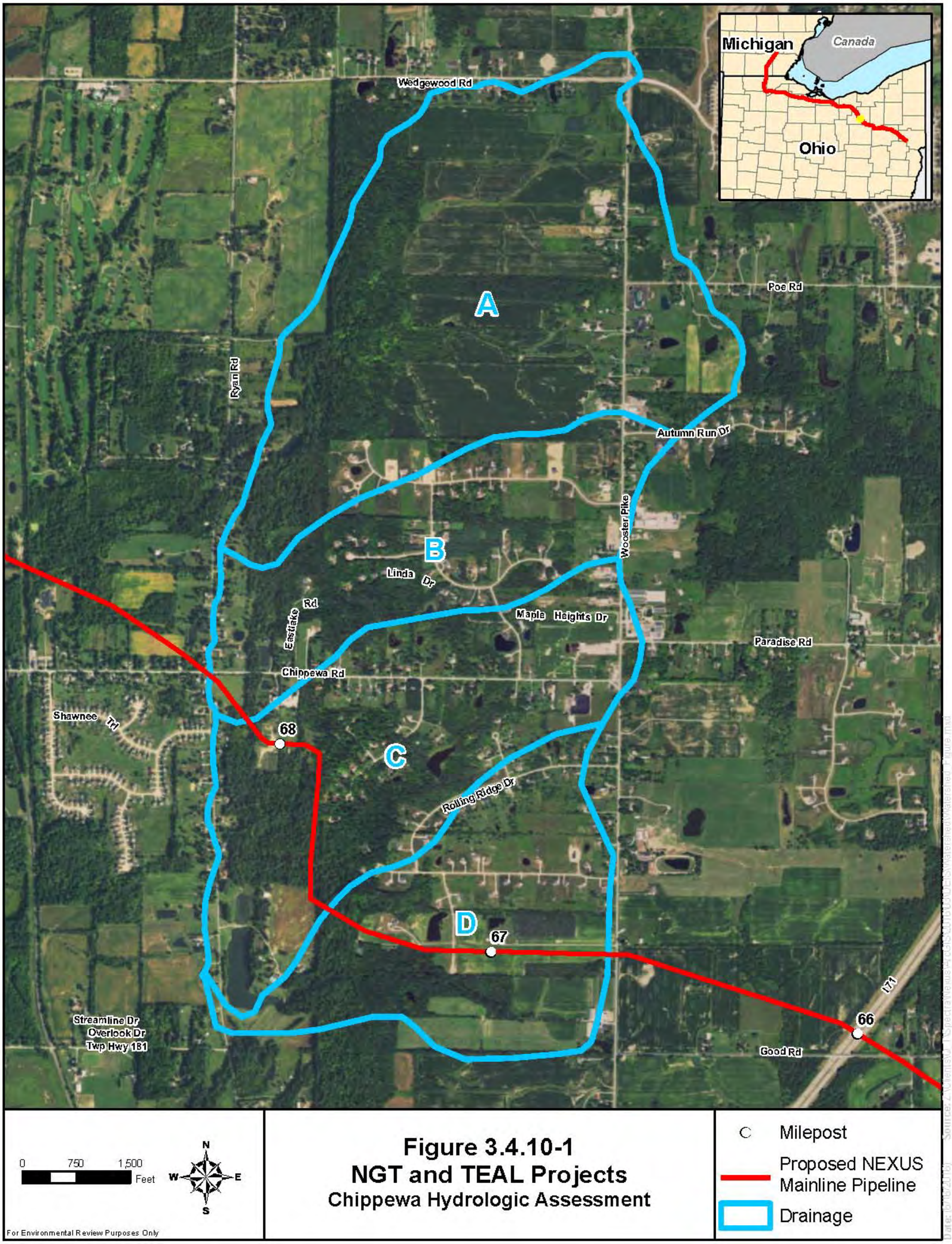

Figure 3.4.10-1
NGT and TEAL Projects
Chippewa Hydrologic Assessment

The Chippewa Lake A Route Variation diverges from the NGT Mainline at MP 66.1 and runs east of the proposed route, then rejoins the NGT mainline at MP 71.4. The Chippewa Lake B Route Variation is similar to the Chippewa Lake A Route variation as it deviates from the proposed route at MP 66.1, but rejoins the route farther to the north at MP 73.6. The Chippewa Lake C Route Variation diverges from the NGT Mainline at MP 66.1 and runs east of the proposed route, then rejoins the NGT mainline at MP 72.5. See figures 3.4.10-2 through 3.4.10-4 and tables 3.4.10-2 through 3.4.10-4 for comparisons of each variation and the proposed route.

TABLE 3.4.10-2

Analysis of the Chippewa Lake A Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	5.8	5.4
Greenfield Construction (miles) [a]	4.7	4.9
Wetland Affected (acres) [b]	4.5	4.5
Perennial Waterbody Crossings (no.)	1	4
Agricultural Land (acres) [c]	54.5	53.0
Forested Land (acres) [b]	12.7	14.5
County/Metro Parks (no./mile)	1/0.7 [d]	2/0.2 [e]
Steep Slopes (miles) [f]	<0.1	0.1
Sidehill Construction (miles) [g]	<0.1	0.1
Residential-type Structures within 150 feet Pipe Centerline (no.) [h]	12	18

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.
c Based on a 125-foot-wide construction right-of-way in agricultural land.
d Buckeye Woods Park.
e Buckeye Woods Park; Chippewa Lake Nature Areas.
f Calculated by identifying slopes greater than 20 percent.
g Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.
h Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Chippewa Lake A Route Variation is 5.8 miles in length, which is 0.4 mile longer than the proposed route. Both routes would cross equal amounts of wetlands and would result in similar impact from greenfield construction, crossing steep slopes, and sidehill construction. The advantages of the route variation are that it would cross three fewer perennial waterbodies, minimizes construction impacts on residential areas, avoids one designated nature area, and reduces impacts associated with crossing forested land. Although the variation would avoid crossing the Chippewa Lake Nature Areas, it increases the crossing and impacts on Buckeye Woods Park. Overall, it appears that the proposed route meets more stakeholder concerns than the route alternative in that it would have only minor impacts on local hydrology, flooding, and the watershed district; the proposed route does not directly cross Buck Creek or Chippewa Lake; and the proposed route minimizes the crossing of Buckeye Woods Park. Therefore, we do not recommend that the Chippewa Lake A Route Variation be incorporated as part of the Projects.

TABLE 3.4.10-3

Analysis of the Chippewa Lake B Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	7.5	7.6
Greenfield Construction (miles) [a]	4.0	6.5
Wetland Affected (acres) [b]	0.2	0.6
Perennial Waterbody Crossings (no.)	1	4
Agricultural Land (acres) [c]	4.1	4.9
Forested Land (acres) [b]	2.4	2.1
County/Metro Parks (no./mile)	0/0.0	2/0.2 [d]
Steep Slopes (miles) [e]	0.1	0.1
Sidehill Construction (miles) [f]	0.1	0.2
Residential-type Structures within 150 feet Pipe Centerline (no.) [g]	18	28

---

a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.

b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.

c Based on a 125-foot-wide construction right-of-way in agricultural land.

d Buckeye Woods Park; Chippewa Lake Nature Areas.

e Calculated by identifying slopes greater than 20 percent.

f Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.

g Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Chippewa Lake B Route Variation is 7.5 miles long, which is similar in length to the proposed route and would result in similar impacts from crossing steep slopes and sidehill construction. The advantages of the route variation are that it would have 2.5 fewer miles of greenfield construction, cross 3.6 acres less wetlands, 3 fewer perennial waterbodies, 2 fewer WHPAs, 12.1 acres less agricultural land, and is near 10 fewer residential-type structures. The variation also completely avoids the crossing of county/metro parks. Conversely, the primary disadvantages of the route variation are that it would result in clearing 2.7 acres more forested land. Based on the environmental comparison of the two routes, it appears that the Chippewa Lake B Route Variation may be preferable; however, the Chippewa Lake C Route Variation (see below), which shares much of the same route as Chippewa Lake B, appears to have an even greater advantage and has been recommended for incorporation in the Projects. Based on the recommendation to adopt the Chippewa Lake C Route Variation below, we do not recommend that the Chippewa Lake B Route Variation be incorporated as part of the Projects.

The Chippewa Lake C Route Variation is 7.2 miles in length, which is 0.7 miles longer than the proposed route. The routes would have similar impacts related to crossing steep slopes and sidehill construction. The advantages of the route variation are that it would have 1.5 fewer miles of greenfield construction, crosses 3 fewer perennial waterbodies, minimizes wetland crossings, and reduces construction impacts on residential areas by about half. The variation would also completely avoids the crossing of county/metro parks. Conversely, the minor disadvantages of the variation are the long-term impacts for crossing 1.8 acres more forested land and the construction related impacts associated with longer length.

TABLE 3.4.10-4

Analysis of the Chippewa Lake C Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	7.2	6.5
Greenfield Construction (miles) [a]	4.4	5.9
Wetland Affected (acres) [b]	0.9	4.5
Perennial Waterbody Crossings (no.)	1	4
Agricultural Land (acres) [c]	59.1	62.1
Forested Land (acres) [b]	19.1	17.3
County/Metro Parks (no./mile)	0/0	2/0.2 [e]
Steep Slopes (miles) [e]	<0.1	0.1
Sidehill Construction (miles) [f]	<0.1	0.1
Residential-type Structures within 150 feet Pipe Centerline (no.) [g]	10	23

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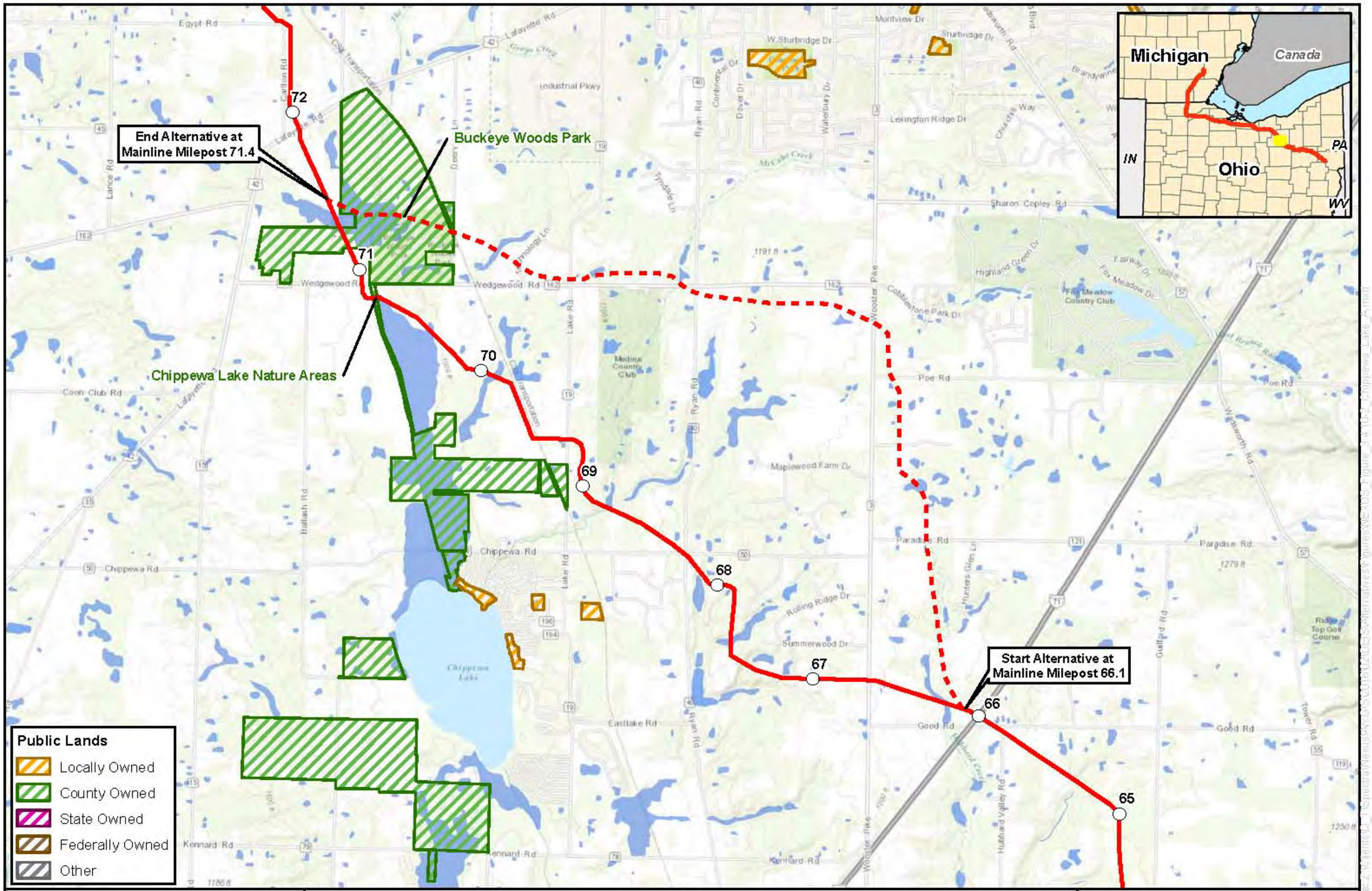
a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 75-foot-wide construction right-of-way in wetlands and forested land.
c Based on a 125-foot-wide construction right-of-way in agricultural land.
d Buckeye Woods Park; Chippewa Lake Nature Areas.
e Calculated by identifying slopes greater than 20 percent.
f Calculated by identifying slopes greater than 20 percent, and determining if the pipeline direction differed from the direction of the ground aspect.
g Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

Overall, it appears that the Chippewa Lake C Route Variation offers a significant environmental advantage in comparison to the corresponding segment of the proposed route. Therefore, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period</u>, NEXUS should incorporate into the NGT Project route the Chippewa Lake C Route Variation between MPs 66.1 and 72.5, as depicted in figure 3.4.10-4 of the draft EIS. NEXUS should file with the Secretary revised alignment sheets and updated land use and resource tables. NEXUS should also provide documentation that newly affected landowners have been notified in accordance with 18 CFR 157.6(d).**



0 2,000 4,000 Feet

N E S W

Figure 3.4.10-2
NGT and TEAL Projects
Chippewa Lake A Route Variation
Medina County, Ohio

○ Milepost
Proposed NEXUS Mainline
Chippewa Lake A Route Variation
Major Waterbody
NWI Wetland
County Boundary

For Environmental Review Purposes Only

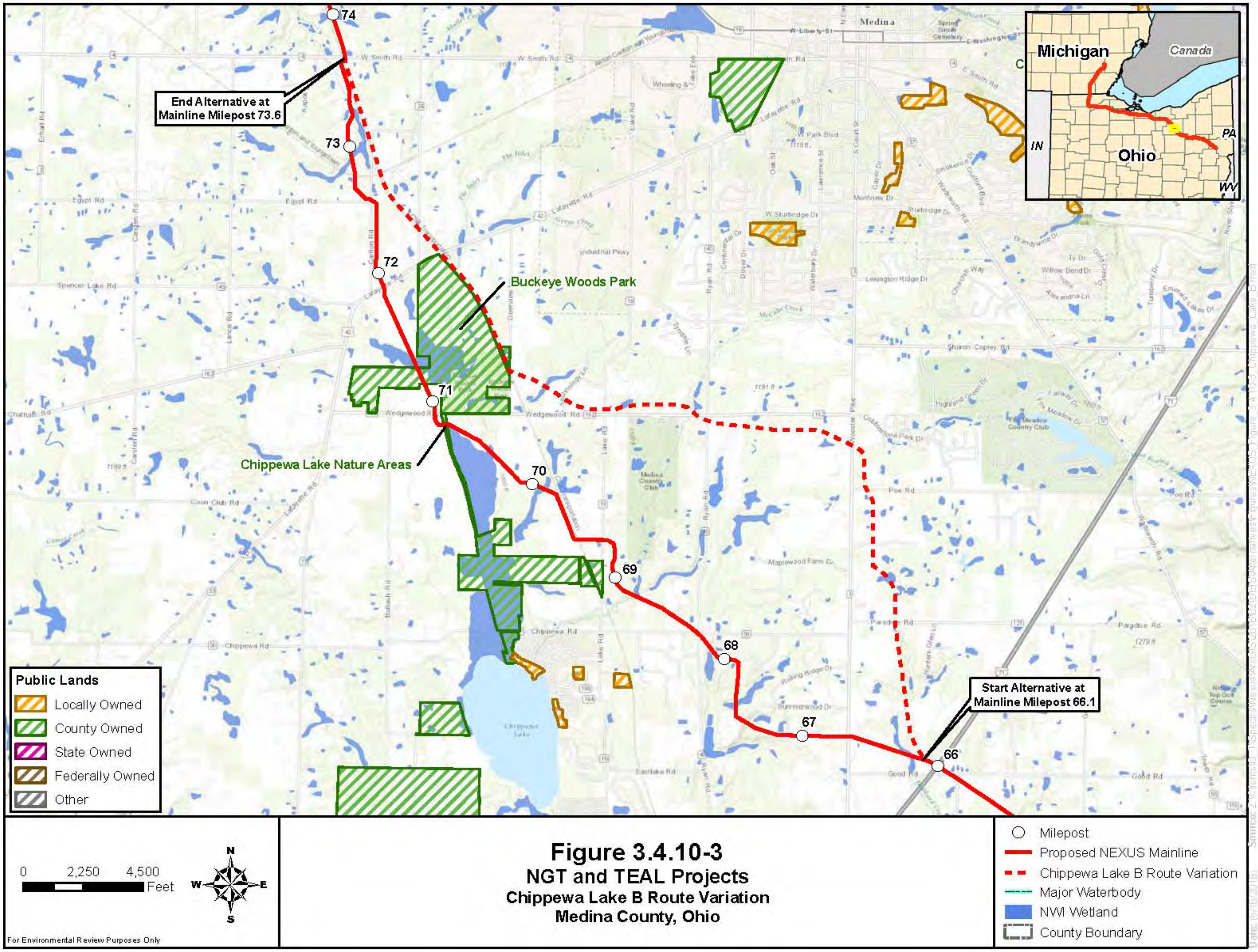


Figure 3.4.10-3
NGT and TEAL Projects
Chippewa Lake B Route Variation
Medina County, Ohio

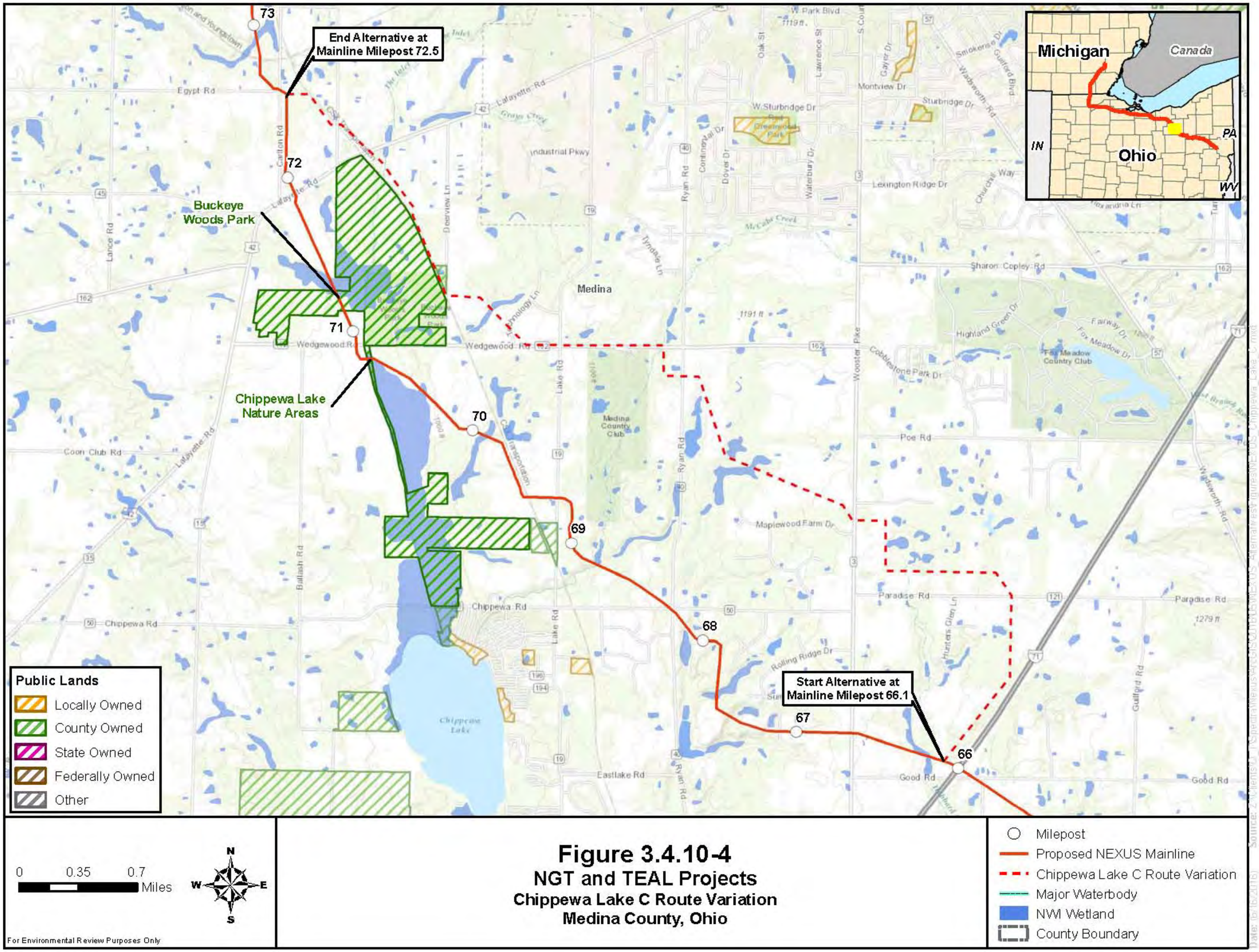


Figure 3.4.10-4
NGT and TEAL Projects
Chippewa Lake C Route Variation
Medina County, Ohio

3.4.11 Kennedy Road Route Variation

The Kennedy Road Route Variation was proposed by a landowner with concerns about the proximity of the proposed route to their residence and the potential for damage to drain tile systems within their agricultural fields. The variation diverges from the NGT mainline at MP 79.3 and rejoins the NGT mainline at MP 80.1 (see figure 3.4.11-1 and table 3.4.11-1).

TABLE 3.4.11-1

Analysis of the Kennedy Road Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	0.9	0.8
Greenfield Construction (miles) [a]	0.5	0.5
Agricultural Land (acres) [b]	10.6	12.1
Forested Land (acres) [c]	1.8	0.0

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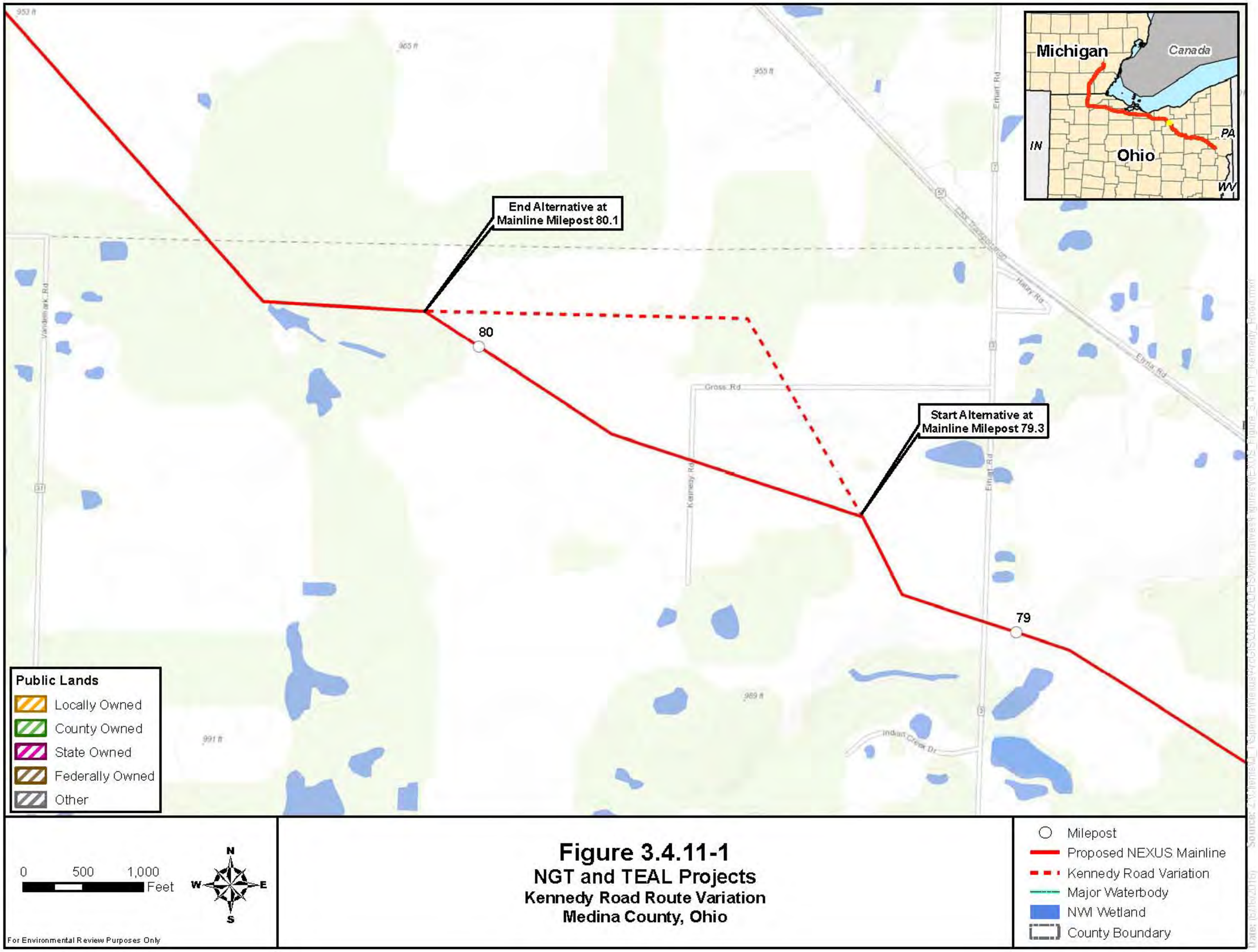
a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on a 125-foot-wide construction right-of-way in agricultural land.
c Based on a 75-foot-wide construction right-of-way in forested land.

The Kennedy Road Route Variation is 0.9 mile long. The routes have similar impacts related on most resources, except that less agricultural land and more forested land would be affected by the route variation.. Overall, the route variation appears to merely shift impacts from one set of landowners to another. The landowner who requested the route variation has a home that is about 325 feet from the proposed route centerline. The pipeline must be designed, constructed, operated, and maintained in accordance with DOT safety standards, which are intended to ensure adequate protection for the public and nearby homeowners. With regard to drain tiles, NEXUS developed a *Drain Tile Mitigation Plan* that identifies procedures to be implemented before, during, and after construction to minimize impacts on drain tile systems. Based on our environmental review of both routes, we do not find the Kennedy Road Route Variation provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this variation be incorporated as part of the Projects.



For Environmental Review Purposes Only

Figure 3.4.11-1
NGT and TEAL Projects
Kennedy Road Route Variation
Medina County, Ohio

3.4.12 Reserve Avenue Route Variation

The Reserve Avenue Route Variation was proposed by a condominium owner who is concerned with the close proximity of the proposed route to their residence and other single family residences in the area. The landowner’s primary concern is that the proposed route would be unsafe and would negatively impact their property values. The variation diverges from the NGT mainline at MP 94.6 and rejoins the NGT mainline at MP 96.0 (see figure 3.4.12-1 and table 3.4.12-1).

TABLE 3.4.12-1

Analysis of the Reserve Avenue Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	1.7	1.6
Greenfield Construction (miles) [a]	0.2	1.2
Co-location with Existing Utility [b]	1.5	0.4
Agricultural Land (acres) [d]	22.7	19.7
Forested Land (acres) [c]	0.0	1.8
Residential-type Structures within 150 feet Pipe Centerline (no.) [e]	9	25

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a Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
b Based on the presence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.
c Based on a 75-foot-wide construction right-of-way in wetlands and forested land.
d Based on a 125-foot-wide construction right-of-way in agricultural land.
e Includes dwellings, detached dwellings, garages, sheds, and other buildings often associated with a residence.

The Reserve Avenue Route Variation is 1.7 miles long, which is 0.1 mile longer than the proposed route. The routes have similar impacts on most resources, except that the route variation would have 1.0 fewer miles of greenfield construction, would have no impact on forested land, and reduces construction impacts on residential areas compared to the proposed route. The disadvantages of the route variation are that it is 0.1 mile longer and crosses 0.2 more mile of agricultural land. As we discussed for the Chippewa Lake Variations, the Projects must be constructed in accordance with DOT's safety regulations, and would be considered safe regardless of population density. However, based on the comparison of these two routes and the fact that the route variation largely would be co-located with a nearby utility, we have determined that the Reserve Avenue Route Variation provides a significant environmental advantage to the corresponding segment of the propose route. Therefore, **we recommend that:**

- **Prior to the end of the draft EIS comment period, NEXUS should incorporate into the NGT Project route the Reserve Avenue Route Variation between MPs 94.6 and 96.0, as depicted in figure 3.4.12-1 of the draft EIS. NEXUS should file with the Secretary revised alignment sheets and updated land use and resource tables. NEXUS should also provide documentation that newly affected landowners have been notified in accordance with 18 CFR 157.6(d).**

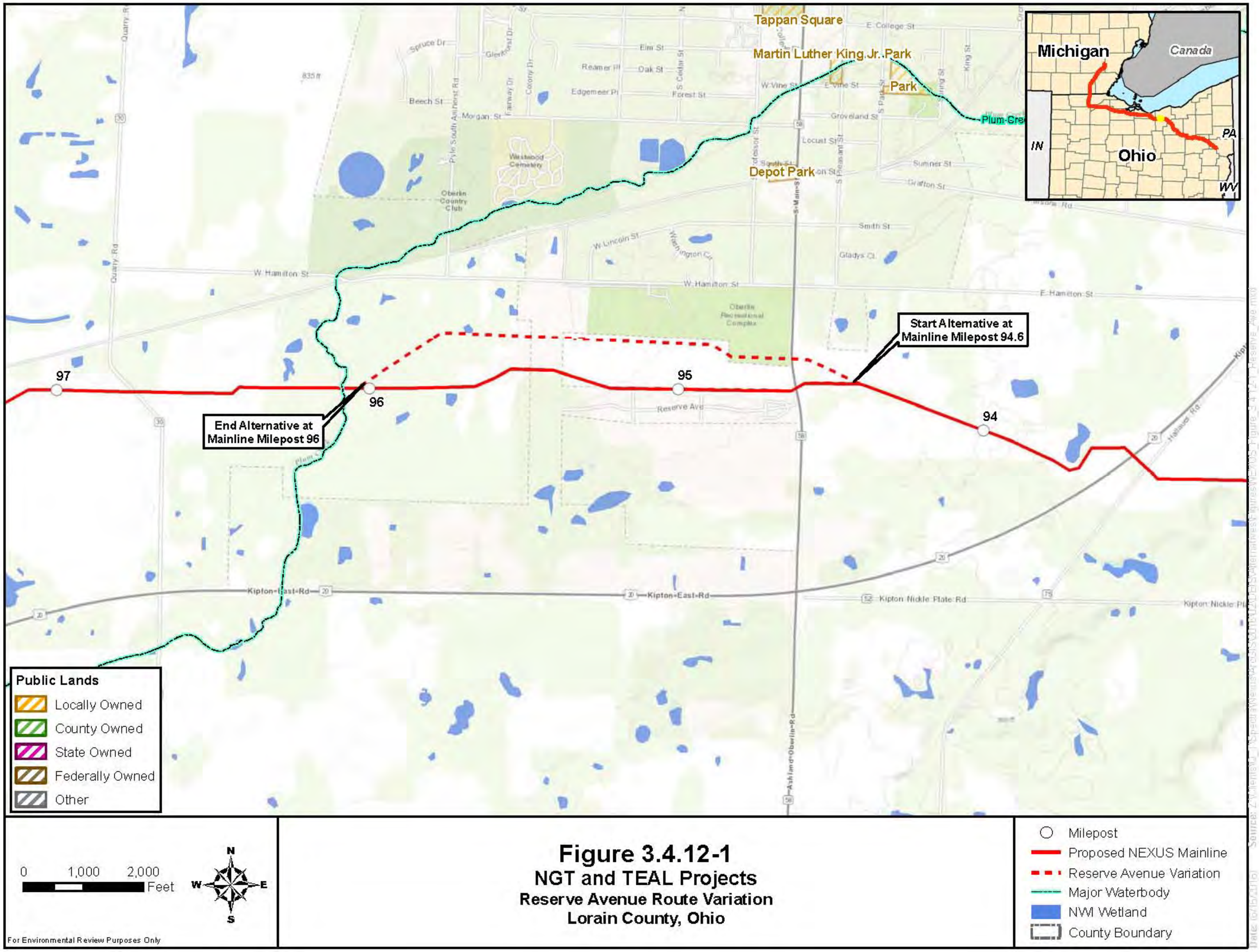

Figure 3.4.12-1
NGT and TEAL Projects
Reserve Avenue Route Variation
Lorain County, Ohio

3.4.13 Butler Road Route Variation

The Butler Road Route Variation was developed at the request of a landowner with concerns about the proposed route crossing their land. This variation proposed by the landowner would reroute the proposed pipeline behind a forested area which would act as a buffer between the landowner's residences and would not limit the use of their land for farming. The route variation diverges from the NGT mainline at MP 102.4 and rejoins NGT mainline at MP 103.7 (see figure 3.4.13-1 and table 3.4.13-1).

TABLE 3.4.13-1

Analysis of the Butler Road Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	1.4	1.4
Greenfield Construction (miles) [a]	1.4	1.4
Agricultural Land (acres) [b]	21.2	25.8

---

[a] Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.

[b] Based on a 125-foot-wide construction right-of-way in agricultural land.

The Butler Road Route Variation is 1.4 miles in length, which is the same as the proposed route. The environmental effects of the route variation and proposed route are similar, except that the route crosses slightly less agricultural land than the proposed route. Based on our environmental review of both routes, we do not find the Butler Road Route Variation provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this variation be incorporated as part of the Projects.

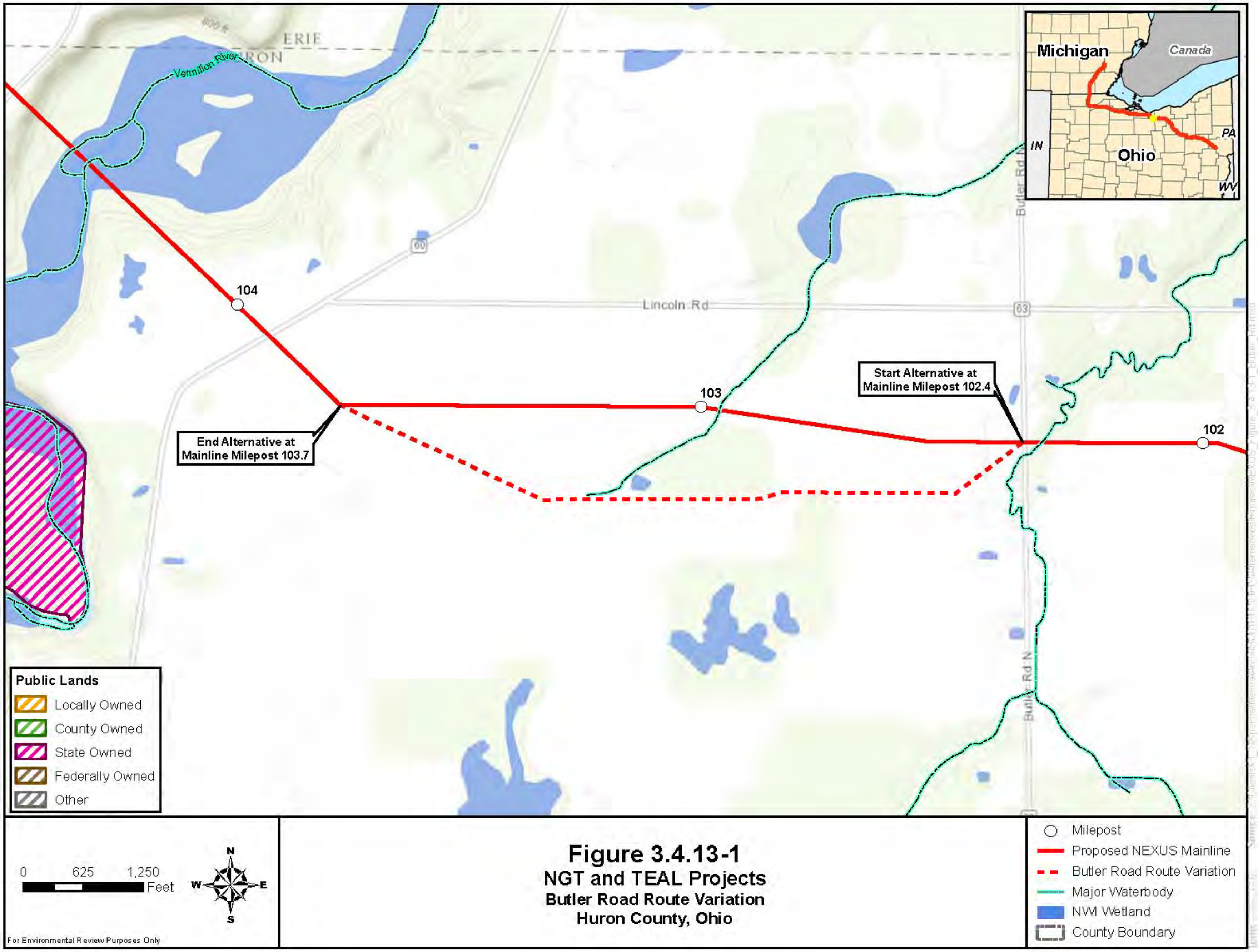

Figure 3.4.13-1
NGT and TEAL Projects
Butler Road Route Variation
Huron County, Ohio

3.4.14 Luckey Road Route Variation

The Luckey Road Route Variation was proposed by a landowner concerned about impacts on drain tiles, a deep ditch, and Conservation Reserve Program (CRP) filter strips on their property adjacent to Luckey Road. The variation diverges from the NGT mainline at MP 168.1 and rejoins the NGT mainline at MP 168.5 (see figure 3.4.14-1 and table 3.4.14-1).

TABLE 3.4.14-1

Analysis of the Luckey Road Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	0.5	0.4
Total Waterbody Crossings (no.)	1	1
Agricultural Land (acres) [a]	7.6	6.1
Potential for Subsidence (miles)	0.5	0.4

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[a] Based on a 125-foot-wide construction right-of-way in agricultural land.

The Luckey Road Route Variation is 0.5 miles in length, which is about 0.1 mile longer than the proposed route. The environmental effect of the route variation and proposed route are similar, except that the route variation crosses slightly more agricultural land and more land with the potential for subsidence. With regard to drain tiles, NEXUS developed a *Drain Tile Mitigation Plan* that identifies procedures to be implemented before, during, and after construction to minimize impacts on drain tile systems. With regard to CRP land, NEXUS would restore the right-of-way to meet the long-term objectives for the land enrolled in this program. However, some enrolled lands may have provisions for tree plantings that overlap the permanent right-of-way. Construction of the pipeline would not change the general use of the land but trees would be not allowed to be maintained within the permanent right-of-way. Because tree removal within the permanent right-of-way could preclude enrollment in the program, we recommended in section 4.9.5.3 that NEXUS should provide the FERC with a discussion of how construction and operation of the NGT Project would affect landowners' continued participation in the CRP. Based on our environmental review of both routes and because the Luckey Road Route Variation appears to affect an additional landowner, we do not find the route variation provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this variation be incorporated as part of the Projects.

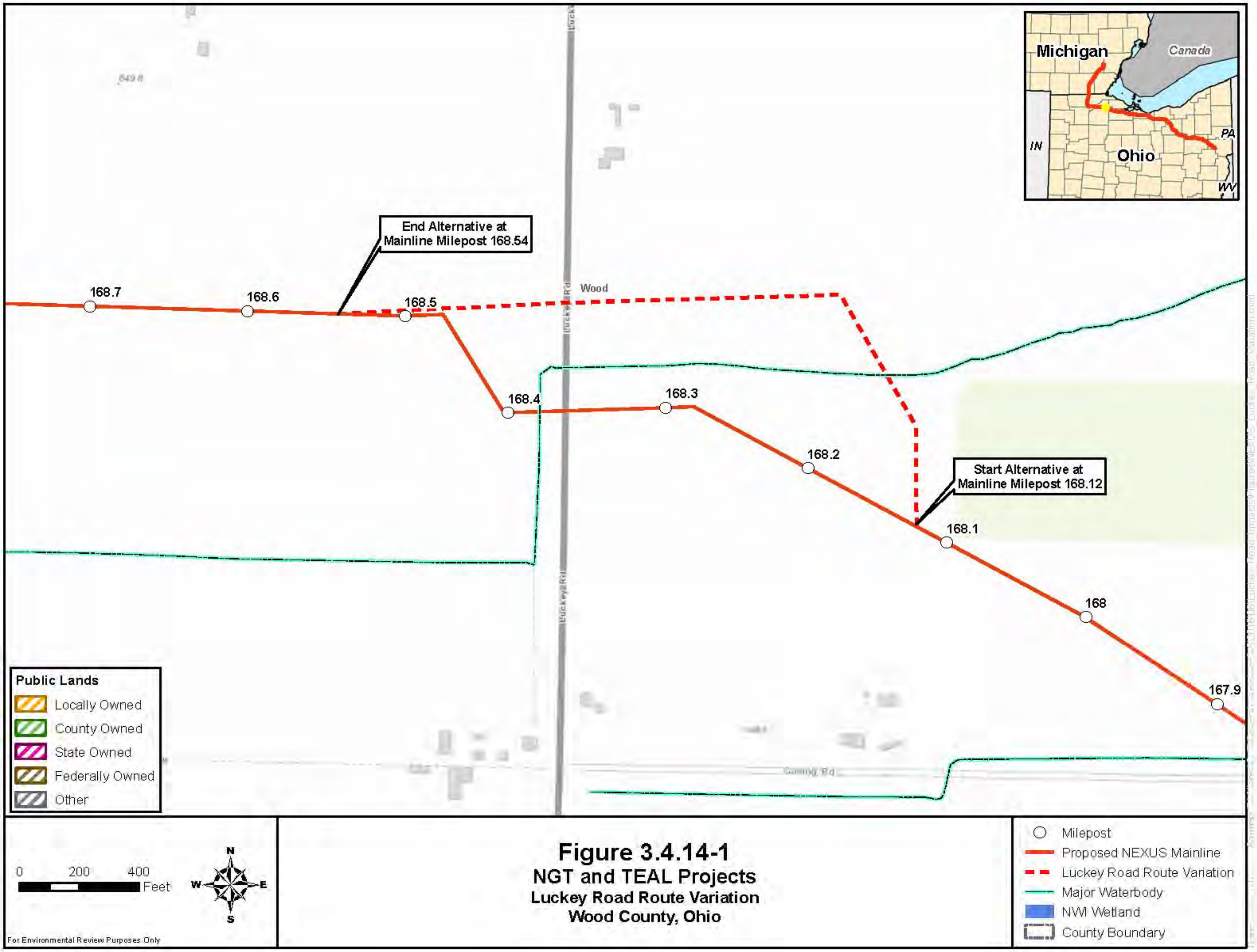

Figure 3.4.14-1
NGT and TEAL Projects
Luckey Road Route Variation
Wood County, Ohio

3.4.15 Martz Road Route Variation

The Martz Road Route Variation was proposed by a landowner that was concerned the proposed route running diagonally through their land would preclude their ability to subdivide the land and allow their children to build on their property. The variation diverges from the NGT mainline at MP 248.3 and rejoins the NGT mainline at MP 248.6 (see figure 3.4.15-1 and table 3.4.15-1).

TABLE 3.4.15-1

Analysis of the Martz Road Route Variation

Factor	Route Variation	Proposed Route
Length (miles)	0.3	0.3
Greenfield Construction (miles) [a]	0.3	0.3
Agricultural Land (acres) [b]	3.0	3.0
Forested Land (acres) [c]	0.9	0.9

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[a] Based on the absence of adjacent or parallel rights-of-way within 300 feet of the pipe centerline.

[b] Based on a 125-foot-wide construction right-of-way in agricultural land.

[c] Based on a 75-foot-wide construction right-of-way in forested land.

The Martz Road Route Variation is 0.3 mile in length, which is the same as the proposed route. Both the route variation and proposed route would have virtually identical impacts. Based on our environmental review of both routes, we do not find the Martz Road Route Variation provides a significant environmental advantage when compared to the corresponding segment of the proposed route and do not recommend that this variation be incorporated as part of the Projects.

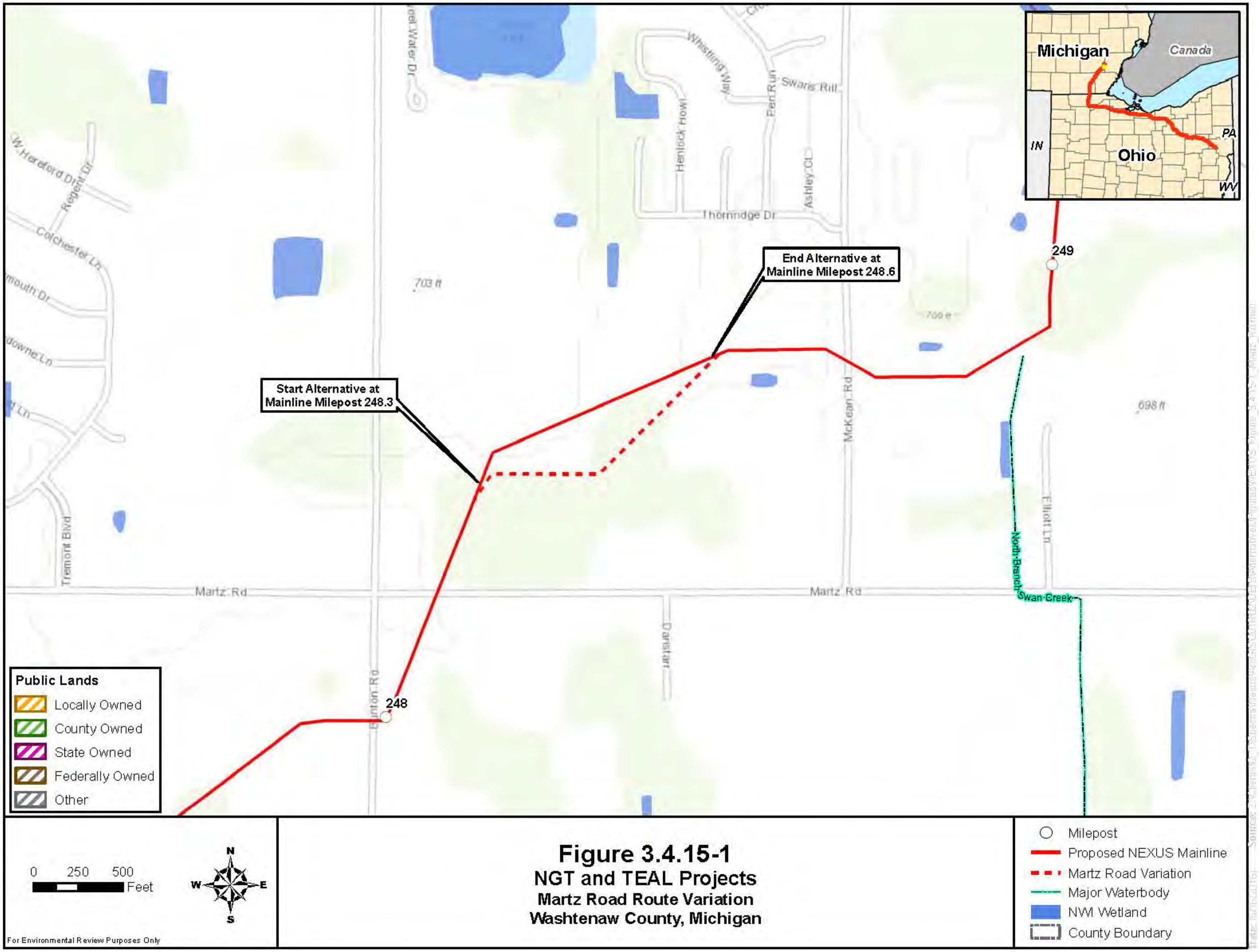

Figure 3.4.15-1
NGT and TEAL Projects
Martz Road Route Variation
Washtenaw County, Michigan

3.5 ABOVEGROUND FACILITY SITE ALTERNATIVES

An evaluation of the siting process for the layout and location of the aboveground facilities along the proposed route was conducted for the NGT and TEAL Projects. We evaluated the locations of the five proposed new compressor station sites (four on the NGT Project and one on the TEAL Project) to determine whether environmental impacts would be reduced or mitigated by the use of alternative sites for these facilities. Our evaluation involved inspection of aerial photography and mapping. The following sections address the placement of the compressor stations.

We did not evaluate alternative locations for other aboveground facility sites. The locations of the six new M&R station sites are limited to those locations where shippers have indicated they would deliver or receive natural gas; these locations are essential to the project objective as previously discussed. We also did not evaluate alternative locations for new MLVs, pig launchers, pig receivers, or communication towers because they are either co-located with other aboveground facilities, are located entirely within the permanent pipeline right-of-way, or their locations are partly determined by regulations. For example, for MLVs, DOT regulations specify the maximum distance between sectionalizing block valves and require that these facilities be located in readily accessible areas. All MLVs are proposed within the permanent pipeline right-of-way and we did not identify any significant environmental constraints with the proposed valve locations. Further, we did not receive comments concerning the locations of the valves. Given these considerations, alternatives to their locations were not evaluated.

Finally, we did not evaluate alternative locations where modification to existing aboveground facilities are being proposed. Additional work would be required at or immediately adjacent to those sites and we did not identify any significant environmental constraints with the proposed locations. Further, we did not receive comments concerning those locations. Given these considerations, alternatives to their locations were not evaluated.

3.5.1 NGT Compressor Station Alternatives

NEXUS proposed four compressor stations along the proposed routes. During the pre-filing process, NEXUS identified and evaluated alternative locations for all four compressor stations as part of its site-selection process. Our analysis of alternative compressor sites was driven by comments discussing specific issues of concern with the sites and our independent consideration of the sites' impacts. As a result, we considered all the alternative sites evaluated by NEXUS and also considered our own alternative to one of the sites. Consideration of alternative sites concentrates on avoiding or minimizing impacts on forested land, wetlands, waterbodies, and noise sensitive areas (NSA). Additionally, evaluation of potential sites must consider presence of suitable access roads; availability of nearby ancillary facilities, such as electric distribution lines; and whether the parcel is available for purchase.

3.5.1.1 Hanoverton Compressor Station (CS 1, Columbiana County)

Three alternative sites were evaluated for the Hanoverton Compressor Station (see figure 3.5.1-1 and table 3.5.1-1). NEXUS considered two alternatives, while we added an additional alternative based on stakeholders' requests to place the compressor station adjacent to the existing cryogenic plant near the town of Hanoverton.

TABLE 3.5.1-1

Comparison of Alternatives for Hanoverton Compressor Station (CS1)

Property and Resources Evaluated	Alternative Site A	Alternative Site B	Alternative Site C (adjacent to existing cryogenic plant)	Proposed Site
Approximate Milepost	3.3	3.6	0.4	1.4
Property Size (acres)	37.0	54.5	68.9	93.3
Wetlands (acres)	0.0	0.0	3.9	0.0
Waterbodies (linear feet)	0	0	1,706	1,245
Agricultural Land (acres)	31.3	43.6	63.0	75.6
Forested Land (acres)	4.9	9.2	5.9	0.0
Open Land (acres)	0.8	1.7	0.0	16.0
Distance to Pipeline (feet)	200	75	0 (intersects)	0 (intersects)
Distance to Nearest NSA (feet)	350 [a]	180 [a]	423 [a]	1,040
Potentially Available for Purchase	Unknown	Yes	Unknown	Yes

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a Distance from the *property boundary* to the nearest NSA.

The proposed site for the Hanoverton Compressor Station encompasses 93.3 acres (see table 3.5.1-1). The primary advantages of the proposed site are that it is situated on top of the proposed pipeline route (i.e., it wouldn't require realigning the proposed route or building suction/discharge lines to the compressor station) and would not affect wetlands or forested land. The disadvantages of the proposed site are that it is the largest of all the sites and contains a waterbody within the site boundaries. According to NEXUS, the site would be developed without affecting forested land or wetlands; however, NEXUS did not indicated whether the site would be developed without affecting the waterbody.

As discussed in section 4.12.2.2, the sound contribution of operating the compressor station at the proposed site (including blowdowns) would remain below our 55 A-weighted decibels (dBA) day-night sound level (L_{dn}) criterion at the nearest NSAs (e.g., schools, hospitals, residences). The EPA has indicated that an L_{dn} of 55 dBA protects the public from indoor and outdoor activity interference. Our acoustical analysis of the proposed site in section 4.12.2.2 estimates an increase in noise at the nearest NSA of 5.9 dB. Although the increase in noise would be noticeable, it would not be significant.

Based on our review of the sites, we have concluded that we need more information from NEXUS on the proposed site and Alternative Site A. Regarding the proposed site, NEXUS did not indicate whether the site could be developed without permanently filling or altering the waterbody on site. Regarding Alternative Site A, the site is the smallest of the alternatives, but it is unknown whether the parcel is available for purchase, whether the site could be develop without forest clearing, and what impacts would be associated with realigning the proposed pipeline to the site or building suction/discharge lines to the pipeline. For these reasons, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period</u>, NEXUS should file with the Secretary an analysis indicating:**
  - **whether the proposed Hanoverton Compressor Station site at MP 1.4 could be developed without permanently filling or altering the waterbody on the site, and if not, the types of permanent waterbody impacts that would be required; and**
  - **whether Alternative Site A to the Hanoverton Compressor Station, as depicted on figure 3.5.1-1 of the draft EIS, could be purchased and developed without forest clearing, and what impacts would be associated with realigning the proposed pipeline to the site or building suction/discharge lines from the site to the proposed pipeline.**

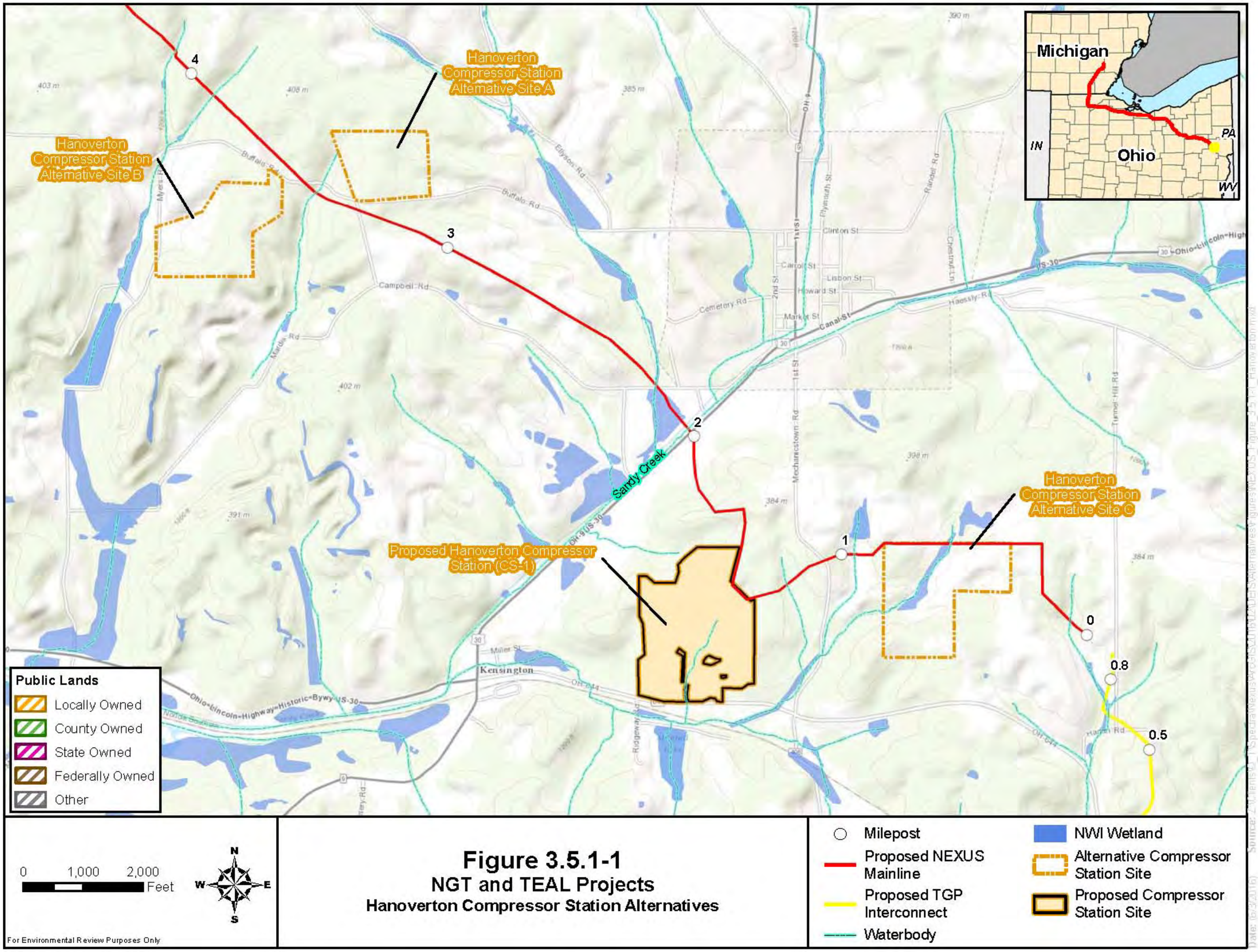

Figure 3.5.1-1
NGT and TEAL Projects
Hanoverton Compressor Station Alternatives

3.5.1.2 Wadsworth Compressor Station (CS 2, Medina County)

Two alternative sites were analyzed for the Wadsworth Compressor Station (see figure 3.5.1-2 and table 3.5.1-2). NEXUS was the originator of both alternatives. We received a number of comments suggesting that the Wadsworth Compressor Station should be relocated to a less populated area because of concerns about potential air and noise pollution caused by the facility. We also received a comment suggesting that the Wadsworth Compressor Station should be moved out of the Upper Chippewa Creek Watershed in accordance with the Upper Chippewa Creek Balanced Growth Plan. These concerns are discussed below.

TABLE 3.5.1-2

Comparison of Alternatives for Wadsworth Compressor Station (CS 2)

Property and Resources Evaluated	Alternative Site A	Alternative Site B	Proposed Site
Approximate Milepost	65.0	66.1	63.3
Property Size (acres)	60.1	42.8	63.8
Wetlands (acres)	1.2	1.9	0.0
Waterbodies (linear feet)	1,687	912	0
Agricultural Lansd (acres)	46.7	31.3	63.0
Forested Land (acres)	13.4	5.1	0.0
Open Land (acres)	0.0	5.0	0.3
Distance to Nearest NSA (feet)	112 [a]	615 [a]	1,800
Potentially Available for Purchase	Unknown	Unknown	Yes

---

a Distance from the *property boundary* to the nearest NSA.

The proposed site for the Wadsworth Compressor Station encompasses 63.8 acres. According to NEXUS, the site would be developed without affecting wetlands, waterbodies, or forested land. As discussed in section 4.12.1.3, potential impacts on air quality associated with construction and operation of the Wadsworth Compressor Station would be minimized by strict adherence to all applicable federal and state regulations that are designed to be protective of air quality. NEXUS' facilities would comply with the National Ambient Air Quality Standards (NAAQS) that were designed to protect human health, including sensitive populations, and the environment. The compressor station would be a minor source under all federal air quality permitting programs. Based on the analysis presented in section 4.12.1.3, the compressor station would not have a significant impact on regional air quality.

As discussed above and in section 4.12.2.2, the sound contribution of operating the compressor station would remain below our 55 dBA L_{dn} criterion at the nearest NSA, which protects the public from indoor and outdoor activity interference. Our acoustical analysis of the proposed site in section 4.12.2.2 estimates an increase in noise at the nearby NSAs of up to 1.9 dB. This increase would barely be perceivable. Based on the analysis presented in section 4.12.2.2, we conclude that the noise resulting from operation of the compressor station would not have a significant impact on the surrounding ambient noise environment.

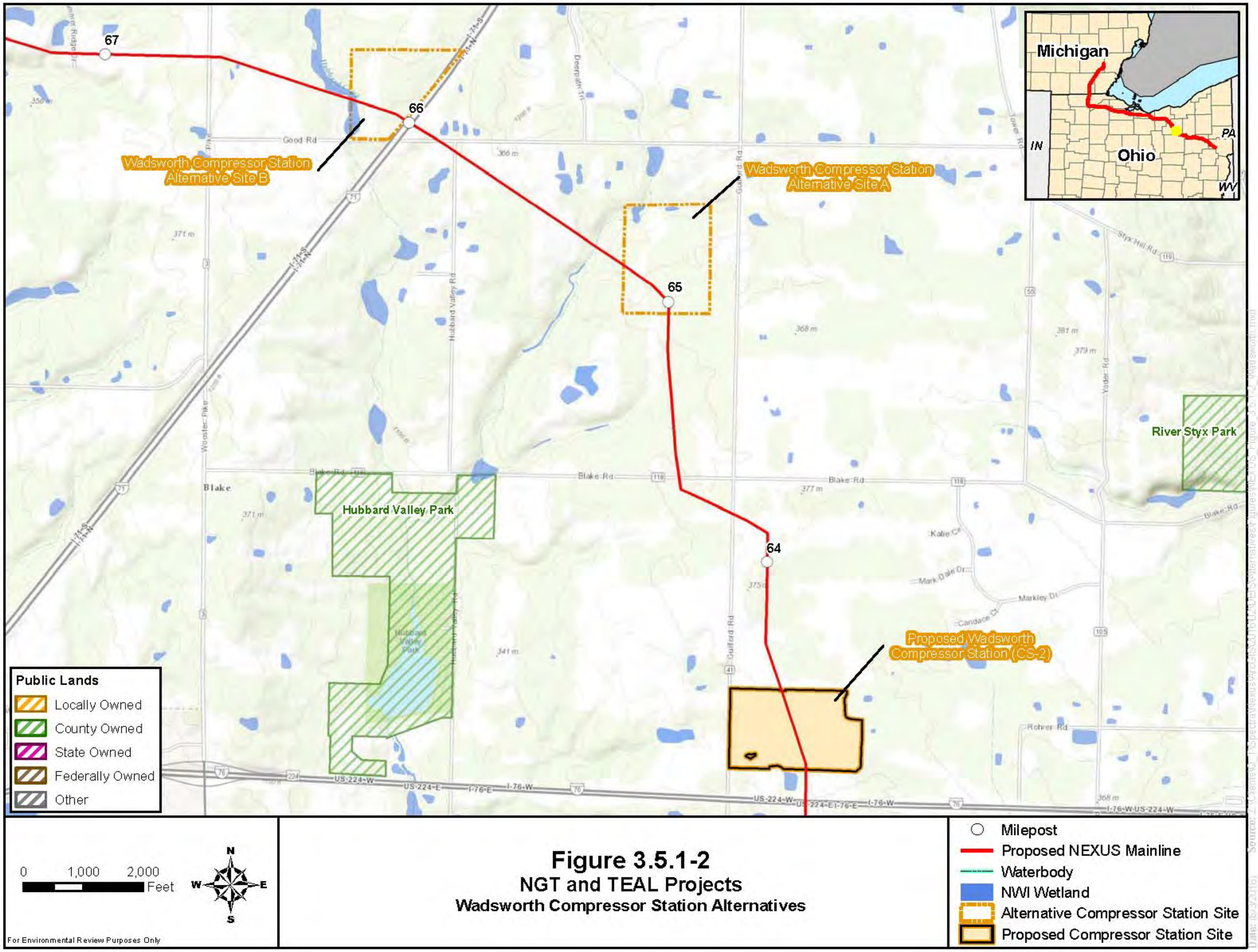

Figure 3.5.1-2
NGT and TEAL Projects
Wadsworth Compressor Station Alternatives

Regarding moving the compressor station out of the Upper Chippewa Creek Watershed in accordance with the Upper Chippewa Creek Balanced Growth Plan, the Ohio Balanced Growth Program is a program for watershed-based regional planning and water quality-oriented best local land use practices. The goal of the program is to protect and restore Lake Erie, the Ohio River, and Ohio's watersheds and drinking water source areas to assure long-term economic competitiveness, ecological health, and quality of life. The Chippewa Creek Watershed Balanced Growth Plan targets areas in the following categories: conservation, agricultural, and development. Some land falls into one or more of these categories; however, much of the land within the watershed does not fall into any category. In the case of the proposed Wadsworth Compressor Station, the site does not fall into any category: the land is not targeted for conservation, agriculture, or development. Therefore, we have concluded that the proposed compressor station site is not inconsistent with the Upper Chippewa Creek Balanced Growth Plan.

There do not appear to be substantial disadvantages to the proposed site as compared to the alternative sites; therefore, the alternative sites are not evaluated further.

3.5.1.3 Clyde Compressor Station (CS 3, Erie and Sandusky Counties)

Two alternative sites were analyzed for the Clyde Compressor Station (see figure 3.5.1-3 and table 3.5.1-3). NEXUS was the originator of both alternatives. We did not receive stakeholder comments specific to the location or siting of the Clyde Compressor Station.

TABLE 3.5.1-3

Comparison of Alternatives for Clyde Compressor Station (CS 3)

Property and Resources Evaluated	Alternative Site A	Alternative Site B	Proposed Site
Approximate Milepost	129.0	131.6	133.9
Property Size (acres)	58.7	71.9	59.4
Waterbodies (linear feet)	1,069	0	0
Agricultural Land (acres)	56.6	70.6	54.5
Open Land (acres)	1.0	0.5	4.8
Within Floodplain	Yes	Yes	No
Distance to Nearest NSA (feet)	0 [a]	40 [a]	810
Potentially Available for Purchase	Yes	No	Yes

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[a] Distance from the *property boundary* to the nearest NSA.

The proposed site for the Clyde Compressor Station encompasses 59.4 acres. According to NEXUS, the site would be developed without affecting wetlands, waterbodies, floodplains, or forested land. As with other proposed compressor station sites, the sound contribution of operating the compressor station would remain below our 55 dBA L_{dn} criterion at the nearest NSA. Our acoustical analysis of the proposed site in section 4.12.2.2 estimates an increase in noise at the nearby NSAs of up to 3.5 dB, which would be minor. There do not appear to be disadvantages to the proposed site as compared to the alternative sites; therefore, the alternative sites are not evaluated further.

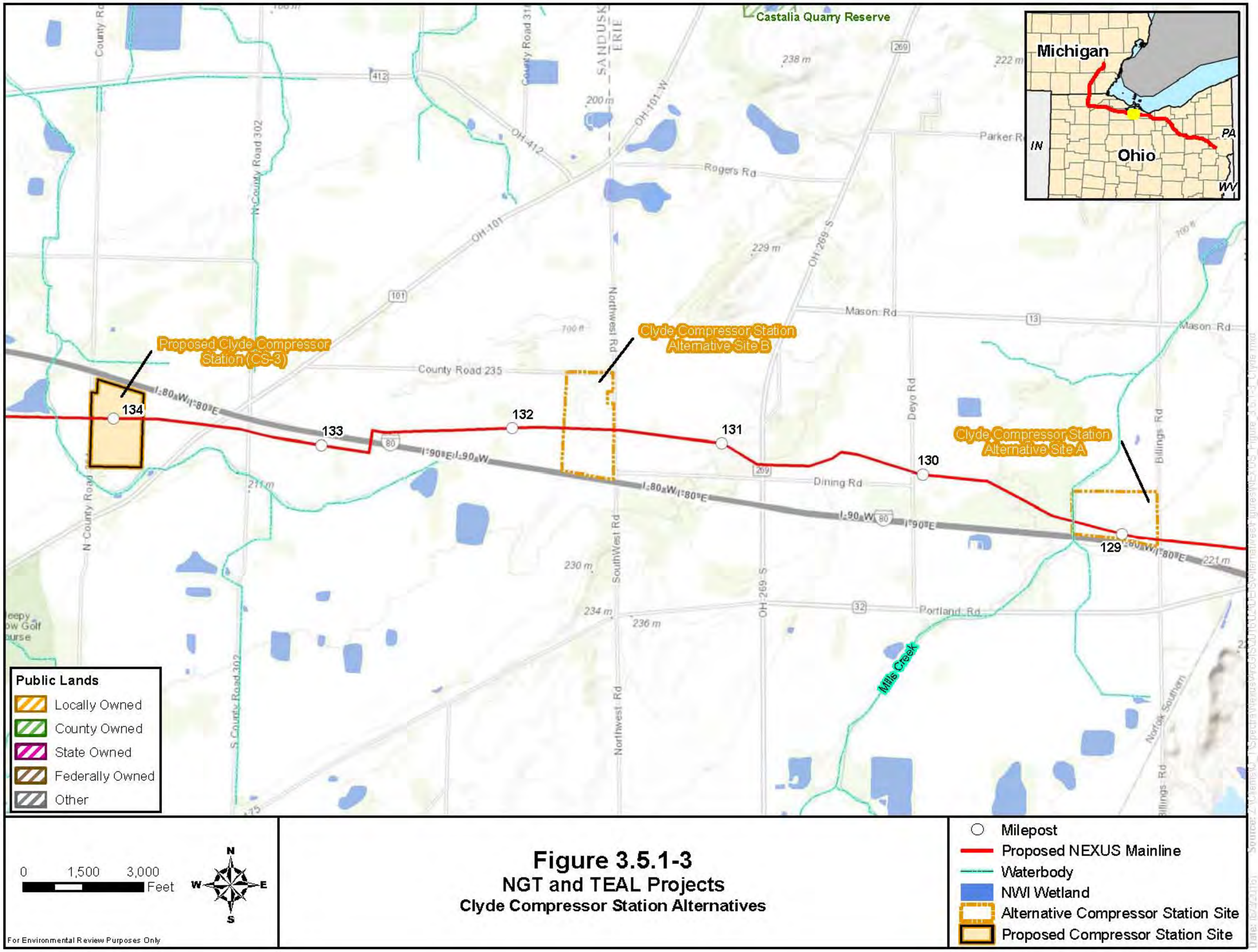

Figure 3.5.1-3
NGT and TEAL Projects
Clyde Compressor Station Alternatives

For Environmental Review Purposes Only

3.5.1.4 Waterville Compressor Station (CS 4, Lucas County)

Two alternative sites were analyzed for the Waterville Compressor Station (see figure 3.5.1-4 and table 3.5.1-4). NEXUS was the originator of both alternatives. We received a number of comments suggesting that the compressor station should be relocated to a less populated area because of concerns about potential air and noise pollution caused by the facility. These concerns are discussed below.

TABLE 3.5.1-4

Comparison of Alternatives for Waterville Compressor Station (CS 4)

Property and Resources Evaluated	Alternative Site A	Alternative Site B	Proposed Site
Approximate Milepost	183.4	186.6	183.5
Property Size (acres)	44.4	76.2	37.3
Wetlands (acres)	0.0	12.1	0.0
Waterbodies (linear feet)	1,735	1,810	0
Agricultural Land (acres)	44.1	62.8	37.3
Forested Land (acres)	0.0	11.8	0.0
Open Land (acres)	0.2	0.9	0.0
Distance to Nearest NSA (feet)	1,085 [a]	158 [a]	1,390
Within Floodplain	No	Yes	No
Potentially Available for Purchase	Yes	Yes	Yes

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[a] Distance from the *property boundary* to the nearest NSA.

The site proposed for the Waterville Compressor Station encompasses 37.3 acres. According to NEXUS, the site would be developed without affecting wetlands, waterbodies, floodplains, or forested land. The proposed site also has good access to public roads, water, electric lines, whereas the alternatives have limited access.

Regarding comments about relocating the compressor station to a less populated area because of concerns about potential air and noise pollution, we have concluded the compressor station would not have a significant impact on air quality or noise. As discussed in section 4.12.1.3, potential impacts on air quality associated with construction and operation of the Waterville Compressor Station would be minimized by strict adherence to all applicable federal and state regulations that are designed to be protective of air quality. NEXUS' facilities would comply with the NAAQS that were designed to protect human health, including sensitive populations, and the environment. The compressor station would be a minor source under all federal air quality permitting programs. Based on the analysis presented in section 4.12.1.3, the compressor station would not have a significant impact on regional air quality.

As discussed above and in section 4.12.2.2, the sound contribution of operating the compressor station would remain below our 55 dBA L_{dn} criterion at the nearest NSA, which protects the public from indoor and outdoor activity interference. Our acoustical analysis of the proposed site in section 4.12.2.2 estimates an increase in noise at the nearby NSAs of up to 1.3 dB. This increase would not be noticeable. Based on the analysis presented in section 4.12.2.2, we conclude that the noise resulting from operation of the compressor station would not have a significant impact on the surrounding ambient noise environment.

There do not appear to be any substantial disadvantages to the proposed site as comparted to the alternative sites; therefore, the alternative sites are not evaluated further.

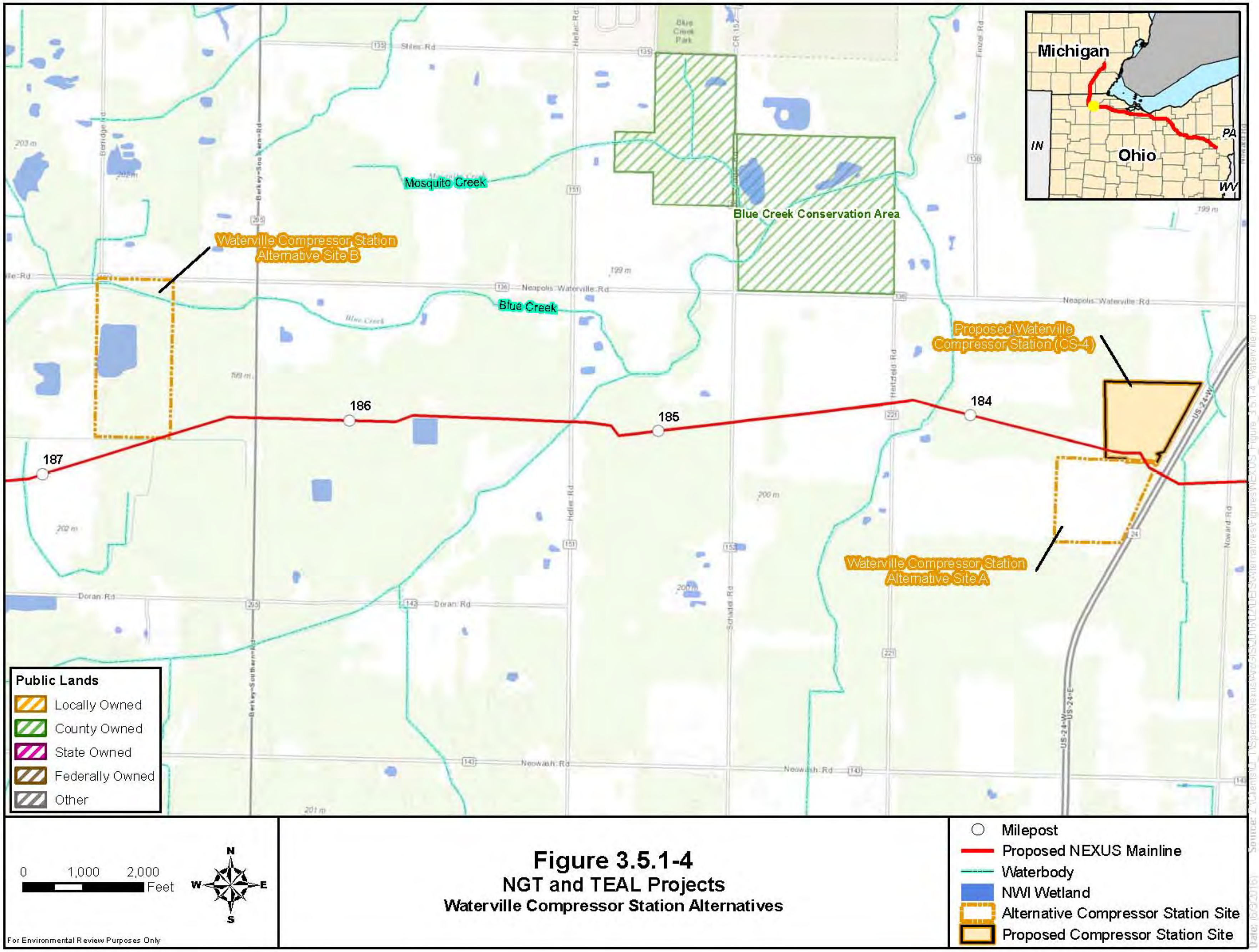

Figure 3.5.1-4
NGT and TEAL Projects
Waterville Compressor Station Alternatives

3.5.2 TEAL Compressor Station Alternatives

Four alternative sites were analyzed for the Salineville Compressor Station (see figure 3.5.2-1 and table 3.5.2-1). NEXUS was the originator of all the alternatives. We did not receive stakeholder comments specific to the location or siting of the Salineville Compressor Station.

TABLE 3.5.2-1

Comparison of Alternatives for Salineville Compressor Station

Property and Resources Evaluated	Alternative Site A	Alternative Site B	Alternative Site C	Alternative Site D	Proposed Alternative
Property Size (acres)	32.3	40.1	46.4	28.0	47.3
Wetlands (acres)	0.0	3.2	0.0	0.0	0.0
Waterbodies (linear feet)	0	1,235	357	0	0
Agricultural Land (acres)	30.3	34.8	30.1	24.3	44.7
Forested Land (acres)	0.3	5.1	15.0	2.9	0.0
Open Land (acres)	2.4	0.2	1.3	0.8	0.5
Cultural Resources Sites	1	0	0	2	2
Distance to Nearest NSA (feet)	80 [a]	95 [a]	50 [a]	0 [a]	1,490
Potentially Available for Purchase	Unknown	Unknown	Unknown	Unknown	Yes

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a Distance from the *property boundary* to the nearest NSA.

The proposed site for the Salineville Compressor Station encompasses 47.3 acres. According to Texas Eastern, the site would be developed without affecting wetlands, waterbodies, or forested land. Also, the cultural resources at the proposed site isolated finds are not eligible for listing on the National Register of Historic Properties. For these reasons, there do not appear to be any substantial disadvantages to the proposed site as comparted to the alternative sites; therefore, the alternative sites are not evaluated further.

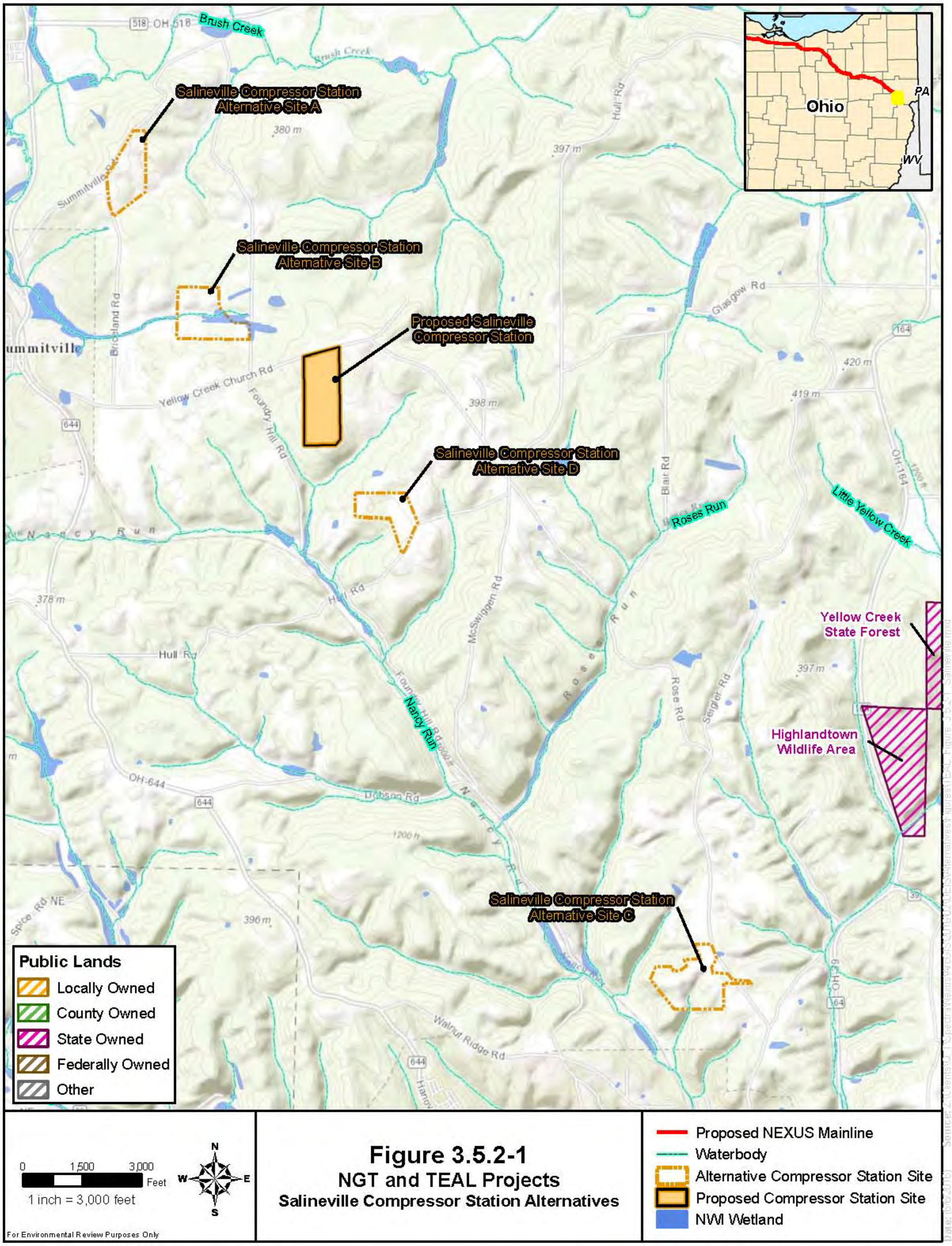

Figure 3.5.2-1
NGT and TEAL Projects
Salineville Compressor Station Alternatives

3.5.3 Electric Compressors

Because electric compressors have the ability to reduce air and noise impacts, we analyzed the feasibility of using electric motor-driven compressor units in lieu of the proposed natural gas-fired compressor units at the NGT and TEAL compressor stations. Although technically feasible, the use of electric units would require additional time to install and require electrical supply to each compressor station site as well as the greater capital and operating costs associated with electric units.

Electric power required to operate each compressor station would exceed local electric distribution grids' ability to meet the demand. The existing overhead single phase service would need to be converted to three phase service and other constructed electric transmission facilities could be necessary. A utility power system study would be needed in order to determine the capability of the existing transmission system. Any new facilities would likely result in additional environmental impacts and additional burdens on landowners. The proposed gas-driven compressor stations could be supported with the existing power lines located in proximity to the selected sites.

Finally, gas-driven turbines provide reliable, uninterrupted natural gas transmission because the fuel supply does not require a third-party for operation. Gas-driven emergency generators with capacity to power electric compressors would be infeasible and significantly larger than the proposed turbines. Gas turbines would not be affected by an electrical outage at the compressor station. For these reasons, we conclude that electric-driven compressor units at the proposed NGT and TEAL compressor stations would not offer a significant environmental advantage over the proposed gas-driven turbines.

4.0 ENVIRONMENTAL ANALYSIS

This section of the EIS primarily provides our analysis of impacts associated with construction and operation of the NGT and TEAL Projects. NEXUS is also seeking a Certificate to acquire capacity in lease from Texas Eastern in Pennsylvania, West Virginia, and Ohio; from DTE Gas in southeastern Michigan; and from Vector in southeastern Michigan. Outside the United States, NEXUS would use existing capacity on the Vector system in western Ontario, Canada to access the Dawn Hub. The capacity lease of capacity would require expansion of DTE Gas' system by adding compression at an existing compressor stations. It also would involve modification of Vector's system by modifying an existing meter station and constructing approximately 0.6 mile of 30-inch-diameter pipeline. Construction of DTE Gas' expansion capacity is subject to the jurisdiction of the Michigan Public Service Commission, not the FERC, because DTE Gas is a state-regulated gas utility providing limited interstate transportation service pursuant to Title 18 CFR Section 284.224. Modification of Vector's facilities are to be conducted under Vector's blanket Certificate, which was issued by the Commission in Docket No. CP98-135-000. Vector would provide notice of the modifications after construction is complete and the facilities are placed in-service. With regard to Vector's other facilities in Canada, this EIS is specific to the United States portion of the pipeline facilities. The use of facilities in Canada would require approval from the National Energy Board of Canada. An analysis of effects of proposed actions in Canada would be the responsibility of the Canadian government.

This section describes the affected environment as it currently exists and the environmental consequences of the Projects. The section is organized by the following major resource topics: geology; soils; water resources; wetlands; vegetation; wildlife and aquatic resources; special status species; land use, recreation, special interest areas, and visual resources; socioeconomics; cultural resources; air quality and noise; reliability and safety; and cumulative impacts.

The environmental consequences of constructing and operating the Projects would vary in duration and significance. Four levels of impact duration were considered: temporary, short-term, long-term, and permanent. Temporary impacts generally occur during construction with the resource returning to pre-construction condition almost immediately afterward. Short-term impacts could continue for up to 3 years following construction. Impacts were considered long-term if the resource would require more than 3 years to recover. A permanent impact could occur as a result of any activity that modifies a resource to the extent that it would not return to pre-construction conditions during the life of the Projects.

We considered an impact to be significant if it would result in a substantial adverse change in the physical environment. The applicants, as part of their proposals, developed certain mitigation measures to reduce the impact of the Projects. In some cases, we determined that additional mitigation measures could further reduce the Projects' impacts. Our additional mitigation measures appear as bulleted, boldfaced paragraphs in the text of this section and are also included in section 5.2. We will recommend to the Commission that these measures be included as specific conditions in any Certificate the Commission may issue to the applicants for these Projects.

The conclusions in the EIS are based on our analysis of the environmental impact and the following assumptions:

- the applicants would comply with all applicable laws and regulations;
- the proposed facilities would be constructed as described in section 2.0 of the EIS;
- the applicants would implement the mitigation measures included in their applications and supplemental submittals to the FERC and cooperating agencies, and in other applicable permits and approvals; and
- the applicants would comply with our recommended mitigation measures.

4.1 GEOLOGY

4.1.1 Existing Environment

4.1.1.1 Physiography and Topography

NGT Project

The NGT Project occurs in two physiographic provinces, or large areas with characteristic landforms and similar geology, including the Appalachian Plateau Province (MP 0.0 to MP 79.0) and the Central Lowland Province (MP 79.0 to MP 255.0) (Fenneman, 1928; Milstein, 1987; Brockman, 1998; and Nicholson, et al., 2005).

The Appalachian Plateau Province forms the northwestern flank of the Appalachian Mountains from western New York to northern Alabama and is characterized by elevated, planar sedimentary rocks with differing levels of stream dissection. The Appalachian Plateau Province in the area of the NGT Project is further comprised of two sections: the Kanawha Section and the Southern New York Section. The Kanawha Section (MP 0.0 to MP 15.0) is an unglaciated plateau with moderate to high relief (300 feet to 800 feet) and elevations ranging from 1,140 to 1,310 feet above mean sea level (AMSL) in the area of the NGT Project. The Southern New York Section (MP 15.0 to MP 79.0) is a glaciated plateau with low to moderate relief (20 feet to 300 feet) and elevations ranging from 950 to 1,300 feet AMSL in the area of the NGT Project.

The Central Lowland Province occupies relatively lower elevations of the eastern interior of the United States and is characterized as having generally low relief. The Central Lowland Province in the area of the NGT Project is further comprised of two sections: the Till Plains Section and the Eastern Lake Section. The Till Plains Section (MP 79.0 to MP 110.0) consists of glacial deposits forming broad plains with little relief (20 feet to 30 feet) and localized uplands with moderate relief (up to 250 feet). The elevation of the Till Plains Section in the area of the NGT Project ranges from 575 to 1,300 feet AMSL. The Eastern Lakes Section (MP 110.0 to MP 255.0) consists largely of lacustrine deposits with only 5 to 10 feet of local relief. The elevation of the Eastern Lake Section in the area of the NGT Project ranges from 750 to 970 feet AMSL.

TEAL Project

The TEAL Project occurs entirely within the Kanawha Section of the Appalachian Plateau Province, as described above. The elevation of the Kanawha Section in the area of the TEAL Project ranges from 540 to 1,400 feet AMSL.

4.1.1.2 Bedrock Geology

NGT Project

Bedrock geologic units underlying the NGT Project are predominantly Paleozoic sedimentary rock, including siltstone, shale, sandstone, dolostone, limestone, and evaporate (Brockman, 1998) (see appendix G-1). These bedrock units were deposited in warm shallow tropical to subtropical marine seas, tidal flats, large coal-forming coastal swamps, and near-shore deltas (Slucher et al., 2006). Bedrock occurs intermittently within 10 feet of the land surface beneath 38.2 miles (22 percent) of the pipeline route between MP 0.0 and MP 175.0 (see table 4.1.1-1).

TABLE 4.1.1-1

Surficial Geology of the NGT and TEAL Projects

Project, State, Component	Milepost (mile)	Thickness (feet)	Geology Age	Unit Name
NGT PROJECT				
Ohio				
TGP Interconnect	0 - 0.9	Discontinuous or patchy	Holocene to Tertiary	Colluvial[b] sediments, discontinuous
Mainline	0 - 4.6	<100	Holocene to Tertiary	Colluvial sediments, thin
	4.6 - 12.2	<100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly silty, thin
	12.2 - 15.7	<100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly clayey, thin
	15.7 - 18.5	>100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly clayey, thick
	18.5 - 19.2	>100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly silty, thick
	19.2 - 19.4	>100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly clayey, thick
	19.4 - 31.6	<100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly silty, thin
	31.6 - 33.5	<100	Late-Wisconsinan to Illinoian	Glaciofluvial[c] ice-contact sediments, mostly sand and gravel, thin
	33.5 - 34.5	<100	Late-Wisconsinan to pre-Illinoian	Proglacial[d] sediments, mostly coarse-grained, thin
	34.5 - 35.7	<100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly clayey, thin
	35.7 - 37.4	<100	Late-Wisconsinan to Illinoian	Glaciofluvial ice-contact sediments, mostly sand and gravel, thin
	37.4 - 41.7	>100	Late-Wisconsinan to Illinoian	Glaciofluvial ice-contact sediments, mostly sand and gravel, thick
	41.7 - 42.7	<100	Late-Wisconsinan to Illinoian	Glaciofluvial ice-contact sediments, mostly sand and gravel, thin
	42.7 - 44.4	<100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly clayey, thin
	44.4 - 44.7	<100	Late-Wisconsinan to Illinoian	Glaciofluvial ice-contact sediments, mostly sand and gravel, thin
	44.7 - 54.5	<100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly clayey, thin
	54.5 - 68.5	<100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly silty, thin
	68.5 - 69.5	<100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly clayey, thin
	69.5 - 70.8	>100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly fine grained, thick
	70.8 - 72	<100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly fine grained, thin
	72 - 91.9	<100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly clayey, thin
	91.9 - 93.6	>100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly clayey, thick
	93.6 - 99.2	<100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly clayey, thin
	99.2 - 99.9	>100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly clayey, thick
	99.9 - 113.6	<100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly clayey, thin
	113.6 - 113.9	<100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly fine grained, thin
	113.9 - 118.9	<100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly coarse-grained, thin
	118.9 - 120.7	<100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly fine grained, thin
	120.7 - 136.3	<100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly clayey, thin
	136.3 - 150.5	<100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly fine grained, thin
	150.5 - 181	<100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly clayey, thin
	181 - 181.8	<100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly fine grained, thin
	181.8 - 198.2	<100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly coarse-grained, thin
	198.2 - 207.9	>100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly coarse-grained, thick

TABLE 4.1.1-1 (continued)

Surficial Geology of the NGT and TEAL Projects

Project, State, Component	Milepost (mile)	Thickness (feet)	Geology Age	Unit Name
Mainline (cont'd)	207.9 – 208.3	>100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly fine grained, thick
Hanoverton Compressor Station (CS-1)	1.4	<100	Holocene to Tertiary	Colluvial sediments, thin
Wadsworth Compressor Station (CS-2)	63.5	<100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly silty, thin
Clyde Compressor Station (CS-3)	134.0	<100	Late-Wisconsinan to pre-Illinoian	Glacial till sediments, mostly clayey, thin
Waterville Compressor Station (CS-4)	183.5	<100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly coarse-grained, thin
Michigan				
Mainline	208.3 - 214.3	>100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly fine grained, thick
	214.3 - 221	>100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly coarse-grained, thick
	221 - 223.2	>100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly fine grained, thick
	223.2 - 231.1	<100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly fine grained, thin
	231.1 - 249.1	>100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly fine grained, thick
	249.1 - 255.2	>100	Late-Wisconsinan to pre-Illinoian	Proglacial sediments, mostly coarse-grained, thick
TEAL PROJECT [a]				
Ohio				
Pipeline Loop	0.0 - 4.4	Discontinuous, or patchy in distribution	Holocene to Tertiary	Colluvial sediments, discontinuous
Connecting Pipeline	0.0 - 0.3	Colluvial sediments, discontinuous	Holocene to Tertiary	Discontinuous, or patchy in distribution
Salineville Compressor Station	5.9	Discontinuous, or patchy in distribution	Holocene to Tertiary	Colluvial sediments, discontinuous
Colerain Compressor Station	49.9	Discontinuous, or patchy in distribution	Holocene to Tertiary	Colluvial sediments, discontinuous

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a Line 73 Pipeline milepost designations are used

b Colluvial: Loose deposits at base of slopes or cliffs, principally de .

c Glaciofluvial: Deposits produced by streams fed by melting glaciers.

d Proglacial: Deposits just beyond outer limits of glacier and formed by or derived from glacier ice.

Source: USGS, 2009

TEAL Project

Bedrock geologic units underlying the TEAL Project are predominantly Paleozoic sedimentary rocks, including siltstone, shale, and mudstone (Nicholson et al., 2005; Ohio Division of Geologic Survey [ODGS], 1998) (see appendix G-1). These bedrock units were deposited in warm shallow tropical to subtropical marine seas, tidal flats, large coal-forming coastal swamps, and near-shore deltas built from periods of glacial melt (ODGS, 2006). Bedrock occurs within 10 feet of the land surface beneath 4 miles (89 percent) of the pipeline route (see table 4.1.1-1).

Blasting

NEXUS and Texas Eastern would attempt to remove shallow bedrock during pipeline installation and construction of aboveground facilities using conventional backhoe excavation, ripping, or hammering followed by backhoe excavation. Blasting may be necessary where shallow, hard, non-rippable bedrock occurs. As discussed in section 4.1.5, blasting could pose a safety hazard to nearby personnel and residents, damage nearby structures and infrastructure, or trigger ground subsidence. NEXUS and Texas Eastern would mitigate potential blasting-related impacts by implementing specific measures detailed in their project-specific *Blasting Plans* (see section 4.1.5).

4.1.1.3 Surficial Geology

NGT Project

Unconsolidated sand, gravel, silt, and clay occur at the land surface in the NGT Project area. These geologic materials were deposited as ice sheet moraine and till deposits, and stratified glacial (streams and lakes) melt deposits during the Pleistocene with alluvium in floodplains and swamps (ODGS, 2005) (see table 4.1.1-1).

In north central Ohio and southern Michigan (MP 110.0 to MP 255.0), the surficial geologic materials were deposited in glacial lakes Maumee and Wayne, and their associated environments. These deposits are comprised of wave-planed clay, silt, and sand overlain by beach and eolian (wind-blown) sands that were deposited as the glacial lakes receded toward present-day Lake Erie (Kelley and Farrand, 1967). An area of the NGT Project of particular geologic interest is in the Oak Openings region (MP 186.6 to MP 196.3) where a unique ecosystem of sand dunes, swamp forest, and wet prairies exists where beach ridge sands overlie lacustrine clays. Oak Openings is further discussed in section 4.5.1.1.

TEAL Project

Unconsolidated surficial deposits in the TEAL Project area consist of colluvium derived from the weathering and breakdown of the underlying bedrock and parent material (ODGS, 2005) (see table 4.1.1-1).

4.1.2 Mineral Resources

Mineral resources found in the vicinity of the Projects include non-fuel and fuel mineral resources as outlined in the following sections. Non-fuel resources include sand and gravel, clay, crushed stone, salt, sandstone, and limestone in Ohio, as well as sand and gravel, limestone, and clay in Michigan. Fuel mineral resources include coal, oil, and natural gas.

Ohio has a long history of coal production and numerous commercial coal mining operations (surface and underground) have operated since the first reported state coal production in 1800. Approximately 3.7 billion tons of coal have been mined since 1800, with underground mining accounting for 2.3 billion tons and surface mining accounting for the remaining 1.4 billion tons (Crowell, 2005). Coal production peaked in Ohio in 1970 with 55 million tons produced that year. Since 1970, coal production in Ohio has been declining, with 25.1 million tons of coal produced in 2013 (U.S. Department of Energy [DOE], 2013). The majority of coal production has historically taken place in southeastern Ohio; however, as discussed below, coal mining has occurred in proximity to the Projects. Subsidence associated with underground mine workings poses a geologic hazard, as discussed in section 4.1.3.6.

Oil and gas have been produced from conventional and unconventional reservoirs in Ohio and Michigan. Conventional production typically involves drilling vertical wells into sandstone and limestone reservoirs, whereas unconventional production involves drilling horizontally into shale deposits and hydraulically fracturing the shale to stimulate production. Conventional drilling for oil and natural gas resources has occurred in the Projects area since the 1860s, and from 1895 to 1903 more oil was produced in Ohio than in any other state. Over the last 5 years, the use of horizontal drilling and hydraulic fracturing have resulted in oil and natural gas production from the Marcellus Shale and Utica Shale in eastern and north-central Ohio.

NGT Project

Five non-fuel mineral resource surface mines are located within 0.25 mile of the NGT Project facilities (table 4.1.2-1). As detailed below, four of these mines are active, and the remaining mine is no longer active and is undergoing restoration.

- The proposed pipeline would be 0.1 mile from the active area of the Johnson Stone Products facility near MP 99.0. In April 2016, NEXUS revised its proposed route to further avoid mining activities at this facility.

- The proposed pipeline would be 0.2 mile from the Hanson Aggregate Midwest facility near MP 127.0, but would be separated from the mine by the Ohio Turnpike and other commercial facilities.

- The proposed pipeline would be less than 0.1 mile from the Carmeuse Lime mine near MP 160.0, but would be on the opposite side of an existing right-of-way occupied by two pipelines owned by Dominion and Ohio East Gas Company.

- The proposed pipeline would be less than 0.1 mile from the former Sandco Sand & Topsoil facility near MP 192.0; however, mining activity has ceased and site restoration is underway at the facility.

- The proposed pipeline would be less than 0.1 mile from the J&T Aggregate facility near MP 248.9, but would be on the opposite side of an existing right-of-way occupied by a natural gas pipeline owned by Michcon Storage and Transportation.

TABLE 4.1.2-1

Non-fuel Mineral Resource Mines within 0.25 mile of the NGT Project

Project, State, Component	Milepost (mile) [a]	Distance from Project (mile)	Mine Type (Above Ground or Under Ground)	Resource Type	Status	Producer
OHIO						
Mainline	98.8 - 98.9	0.1	Above Ground	Limestone	Active	Johnson Stone Products
	127.3	0.1	Above Ground	Limestone	Active	Hanson Aggregates Midwest, LLC
	159.7 - 160.3	<0.1	Above Ground	Lime and Limestone	Active	Carmeuse Lime, Inc.
	192.0	<0.1	Above Ground	Sand and Gravel	Inactive	Sandco Sand and Topsoil Inc.
MICHIGAN						
Mainline	248.9	<0.1	Above Ground	Sand and Gravel	Active	J&T Aggregate, LLC

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a Line 73 Pipeline milepost designations are used.

Sources: Ohio Department of Natural Resources (ODNR), 2013a; Michigan Department of Environmental Quality (MDEQ), 2015

No non-fuel surface mineral mines are located within 0.25 mile of any aboveground facilities.

Table 4.1.2-2 summarizes the locations of known underground and surface fuel mineral mines within 0.25 mile of the NGT Project pipeline and aboveground facilities, all of which are either inactive or abandoned coal mines. No active, inactive, or abandoned fuel mineral mines are within 0.25 mile of aboveground facilities.

We received comments expressing concern that the NGT Project could cross the former underground coal mines including the Overholt Mine in Green County, Ohio, and the Myers, Theo, & Son Mine and Shotmacher Mine in the area of North Canton, Ohio. As indicated in table 4.1.2-2, the Overholt Mine is 0.2 mile from the proposed pipeline. Available data also indicates that the Myers, Theo, & Son Mine is more than 1 mile from the pipeline route, and the former Shotmacher Mine is 0.4 mile from the route. Thus, none of the proposed facilities would cross the abandoned mines raised by commenters.

Based on Ohio Department of Natural Resources (ODNR) and Michigan Department of Environmental Quality (MDEQ) data, 419 active and 480 inactive or abandoned oil and gas wells are located within 0.25 mile of the NGT Project, 765 (86 percent) of which occur between MP 0.0 and MP 100.0. A total of 11 active and 18 inactive or abandoned oil and gas wells occur within the NGT Project workspace (see appendix G-2). In addition to well pads, oil and gas facilities in the NGT Project area include gathering lines and other production facilities.

TEAL Project

No active or abandoned non-fuel mineral resource mines or active fuel mineral resource mines were identified within 0.25 mile of the TEAL Project.

TABLE 4.1.2-2

Inactive or Abandoned Fuel Mineral Resource Mines within 0.25 mile of the NGT Project and TEAL Project Pipelines and Aboveground Facilities

Project, State, Component	Milepost (mile) [a]	Distance from Project (mile)	Mine Type (Above Ground or Under Ground)	Resource Type	Status	Producer
NGT PROJECT						
Ohio						
Mainline	1.9	<0.1	Above Ground	Coal	Abandoned	John Glenn Mining Co
	2.5	0.2	Above Ground	Coal	Inactive	Blum Coal Co
	2.5	0.1	Above Ground	Coal	Inactive	General Mines Inc.
	7.9	<0.1	Under Ground	Coal	Abandoned	King & Perien
	7.9	0.1	Under Ground	Coal	Abandoned	Stone, J.S., Coal Co.
	35.5	0.1	Under Ground	Coal	Abandoned	R And T Coal Company
	35.7	0.2	Under Ground	Coal	Abandoned	Overholt Coal Company
	42.4	0.2	Under Ground	Coal	Abandoned	Massillon - Akron Coal Company
	44.7	0.1	Under Ground	Coal	Abandoned	Akron - Massillon Coal Company
	45.5	0.2	Under Ground	Coal	Abandoned	Massillon Coal Mining Company
	50.9	0.2	Under Ground	Coal	Abandoned	Jones, J.D. Coal Co.
	52.1	0.2	Under Ground	Coal	Abandoned	Loomis, H.E.
	53.7	<0.1	Under Ground	Coal	Abandoned	Ohio Salt Co./Wayne No. 2
TEAL PROJECT [b]						
Ohio						
Pipeline Loop	0.2	0.2	Above Ground	Coal	Inactive	Consolidation Coal Co
	0.5 - 2.4	Crosses	Under Ground	Coal	Abandoned	Quarto Mining Co
	2.5 - 4.4	Crosses	Under Ground	Coal	Abandoned	Quarto Mining Co
Colerain Compressor Station	49.9	0.1	Above Ground	Coal	Abandoned	Landers Coal Co
	49.9	Crosses	Above Ground	Coal	Inactive [b]	Marietta Coal Company
	49.9	0.1	Above Ground	Coal	Inactive	Mc Kim Coal Co
	49.9	Crosses	Above Ground	Coal	Inactive	Ohio Coal & Const Corp
	49.9	0.2	Above Ground	Coal	Inactive	R & F Coal Co
	49.9	Crosses	Under Ground	Coal	Abandoned	Y & O Coal Co
	49.9	0.1	Under Ground	Coal	Abandoned	Barton Mining Co

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a Line 73 Pipeline milepost designations are used.

b ODNR database lists the Marietta Coal Company mine as active, but field reconnaissance by Texas Eastern determined mining has been completed and the area has been restored.

Sources: ODNR, 2013a; MDEQ, 2015

Table 4.1.2-2 summarizes inactive and abandoned coal mines within 0.25 mile of the TEAL Project based on data obtained from the ODNR. According to the ODNR, the proposed pipeline facilities cross abandoned underground coal mines between MP 0.5 and MP 4.4, and aboveground and underground coal mining occurred at the Colerain Compressor Station site. ODNR data also indicates that all of the nearby coal mines are either abandoned or inactive with the exception of Marietta Coal Company mine, which is listed as an active aboveground mine that is located within the boundary of the Colerain Compressor Station; however, Texas Eastern constructed the Colerain Compressor Station in 2015 and stated that coal mining ceased and the site was previously restored. Texas Eastern also conducted a geotechnical investigation of the Colerain Compressor Station site and found mine tailings overlying bedrock, but no indication of underground mine workings.

A total of 26 known active and inactive oil and gas wells have been identified within 0.25 mile of the TEAL Project (see appendix G-2); however Texas Eastern indicates that none within the workspace. Oil and gas facilities in the TEAL Project area may include gathering lines and other production facilities.

4.1.3 Geologic Hazards

Geologic hazards are natural, physical conditions that can result in damage to land and structures or injury to people. Potential geologic hazards in the NGT and TEAL Projects area include earthquakes, surface faults, soil liquefaction, karst, landslides, ground subsidence associated with historic underground coal mining, and flash flooding. In general, the potential for geologic hazards to significantly affect construction or operation of the proposed NGT and TEAL Projects' facilities is low.

4.1.3.1 Earthquakes and Faults

The majority of significant earthquakes around the world are associated with tectonic subduction zones, where one crustal plate is overriding another (e.g., the Japanese islands), where tectonic plates are sliding past each other (e.g., California), or where tectonic plates are converging (e.g., the Indian Sub-continent). Unlike these highly active tectonic regions, the Midwest region of the United States occurs approximately in the middle of the North American tectonic plate, which is relatively quiet. While the Midwest of the United States is relatively seismically quiet, earthquakes do occur in the Projects area, largely due to trailing edge tectonics and residual stress released from past orogenic events. The largest recorded earthquake in Ohio was a magnitude 5.4 event that occurred on March 9, 1937 in the area of the town of Anna, approximately 75 miles south from the NGT Project. The largest recorded earthquake in Michigan was a magnitude 4.6 event that occurred on August 10, 1947 in the area of the town of Kalamazoo, approximately 60 miles west of the NGT Project. Both of these earthquakes resulted in cracked foundations, cracked plaster, broken windows, and toppled chimneys in the area of the epicenters.

Earthquakes have also been associated with the deep injection of brine and other fluids derived from oil and gas production activities, most notably in Oklahoma. In Ohio, one injection well in the area of a dormant fault zone in the area of Youngstown, Ohio may have caused up to 12 earthquakes in 2011, with a maximum magnitude of 4.0 (ODNR, 2012). The injection well was ordered to be shut down in 2012 by the ODNR and the State of Ohio has since changed its rules to prohibit the drilling of injection wells into Precambrian bedrock, where dormant faults may be located.

The shaking during an earthquake can be expressed in terms of the acceleration due to gravity (g). Seismic risk can be quantified by the motions experienced by the ground surface or structures during a given earthquake, expressed in terms of g. For reference, peak ground acceleration (PGA) of 10 percent of gravity (0.1 g) is generally considered the minimum threshold for damage to older structures or structures not made to resist earthquakes.

The U.S. Geological Survey (USGS) estimates there is a 2 percent chance for an earthquake to occur within the Projects area in the next 50 years (i.e., a recurrence interval of 2,500 years) that would result in a PGA between 0.05 g and 0.07 g on the NGT Project and PGA between 0.04 and 0.06 g on the TEAL Project (Petersen et al., 2015). The USGS also estimates there is a 10 percent chance for an earthquake to occur in the next 50 years (i.e., a recurrence interval of 475 years) that would result in a PGA of between 0.01 g and 0.02 g. in the Projects area. In addition, the USGS has assessed the potential for deep fluid injection to contribute to earthquake activity in the United States, and determined there is less than a 1 percent chance for a damaging earthquake with a PGA of 0.12 g to occur in the Projects area due to combined natural or induced causes within the next year (Petersen et al., 2016). The USGS will continue to monitor induced earthquake activity and revise its risk assessment annually.

Earthquakes can result in the displacement of bedrock along fault lines. For a fault to be considered active, displacement must have taken place in the last 10,000 years (USGS, 2008). Sub-surface or blind faults are considered to present generally less potential for displacement of bedrock during earthquakes, in contrast to surface faults.

NGT Project

The NGT Project would not intersect any known, mapped, or inferred active fault lines (USGS, 2006).

Several comments were received regarding faults in the NGT Project area, specifically the Bowling Green Fault, which, in Ohio, extends from the Michigan state line in the area of Toledo, southward into Hardin County. The NGT Project crosses the Bowling Green Fault at MP 180.8 near the Maumee River. The Bowling Green Fault is not visible in surficial geology and only identified in basement rock, which is approximately 2,200 to 2,300 feet below ground surface in the area (Baranoski, 2013). The Bowling Green Fault was active between 443 to 416 million years ago (USGS, 2006). No other faults in proximity to the NGT Project exhibit evidence of activity within the last 1.6 million years, and there is no clear association between faults and small earthquakes that occur in the region (Hansen, 2015).

TEAL Project

The TEAL Project would not intersect any known, mapped, or inferred active fault lines (USGS, 2006). Mapped faults in the area of the TEAL Project area include the Highlandtown Fault in southern Columbiana County and an unnamed fault in the area of the border of Jefferson and Belmont Counties. These faults are not visible in surface geology and only identified in basement rock, which is approximately 9,000 to 11,500 feet below ground surface in the area (Baranoski, 2013). No faults identified in Ohio exhibit evidence of activity within the last 1.6 million years, and there is no clear association between faults and small earthquakes that occur in the region (Hansen, 2015).

4.1.3.2 Soil Liquefaction

Soil liquefaction is a phenomenon that occurs when granular, saturated soils temporarily lose strength and liquefy (i.e., behave like a viscous liquid) when subject to strong and prolonged shaking as may occur during an earthquake. Areas susceptible to liquefaction may include soils that are generally sandy or silty and are generally located along rivers, streams, lakes, and shorelines, or in areas with shallow groundwater (University of Washington, 2000). Structures located on or within an area experiencing soil liquefaction could sustain damage due to loss of underlying soil strength.

Granular soils with a shallow water table are expected to be found in floodplains associated with medium to large streams along NGT Project area; however, the potential for soil liquefaction to occur is low based on the low seismicity of the region and no occurrences of soil liquefaction have been documented in the NGT Project area.

The potential for soil liquefaction to occur is low based on the low seismicity of the region and no occurrences of soil liquefaction have been documented in the TEAL Project area.

4.1.3.3 Landslides

A landslide is defined as the movement of a mass of rock, debris, or earth down a slope. Landslides can be initiated by heavy rainfall, earthquakes, changes in groundwater conditions (i.e., seasonal high water tables), and/or slope disturbance resulting from construction activity. Information on landslide incidence and susceptibility rate for the Projects was obtained from the USGS (Radbruch-Hall et al., 1982). The physiology of eastern Ohio is characterized by fine-grained clastic bedrock and high vertical relief, making the region more subject to landslides in the form of rotational slumps and earthflows (Hansen, 1995).

NGT Project

As indicated in table 4.1.3-1, the NGT Project crosses areas where geologic and topographic conditions result in low, moderate, or high susceptibility to landslides; however, the entire NGT Project is within an area where the actual incidence of landslide activity is low. The only NGT Project facilities located in an area characterized by a high susceptibility to landslides are between MP 0.0 and MP 9.0 of the proposed mainline, including the proposed Hanoverton Compressor Station, and the TGP Interconnect. Although the Hanoverton Compressor Station is within an area of high landslide susceptibility, the site of the compressor station is on open, cultivated land with approximately 50 feet of local relief. As discussed in section 4.1.5, NEXUS has committed to conducting geotechnical studies to further assess the potential for landslides to impact the proposed facilities and would implement site-specific measures to avoid or mitigate landslide risk.

TABLE 4.1.3-1

Landslide Susceptibility and Incidence for the NGT and TEAL Projects

Project, State, Component	Milepost (mile)	Susceptibility to Landslide	Incidence to Landslide [a]
NGT PROJECT			
TGP Interconnect	0 - 0.9	High	Low
Mainline	0 – 9.0	High	Low
	9.0 – 134.0	Low	Low
	134.0 – 148.0	Moderate	Low
	148..0 – 185.0	Low	Low
	185.0 – 193.0	Moderate	Low
	193.0 – 255.0	Low	Low
Hanoverton Compressor Station	1.4	High	Low
Wadsworth Compressor Station	63.5	Low	Low
Clyde Compressor Station	134	Low	Low
Waterville Compressor Station	183.5	Low	Low
TEAL PROJECT [b]			
Pipeline Loop	0.0 – 4.4	High	High
Connecting Pipeline	0.0 – 0.3	High	Low
Salineville Compressor Station	5.9	High	High
Colerain Compressor Station	49.9	High	High

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a Low means <1.5% area involved in landsliding; Moderate means 1.5 – 15% area involved in landsliding; High means >15% Area involved in landsliding.

b Line 73 Pipeline milepost designations are used

Source: Landslide Overview Map of the Conterminous United States (Radbruch-Hall et al., 1982)

TEAL Project

As indicated in table 4.1.3-1, the TEAL Project is located in an area characterized by high susceptibility and incidence of landslide activity. Although the Salineville and Colerain Compressor Stations are within areas of high landslide susceptibility and incidence, the Colerain Compressor Station is an existing facility situated on a generally level parcel, and the proposed Salinville Compressor Station site is on generally level, cultivated land. As discussed in section 4.1.5, Texas Eastern has committed to conducting geotechnical studies to further assess the potential for landslides to impact the proposed facilities and would implement site-specific measures to avoid or mitigate landslide risk.

4.1.3.4 Karst

Karst terraine and physiography result from the dissolution of soluble bedrock, such as limestone, dolomite, marble, or gypsum, through the circulation of groundwater that has become slightly acidic as a result of atmospheric carbon dioxide being dissolved in the water. Karst terraine is characterized by the presence of sinkholes, caverns, an irregular “pinnacled” bedrock surface, and springs. Any landscape that is underlain by soluble bedrock has the potential to develop karst landforms.

NGT Project

The density and type of karst features present in the NGT Project area are primarily related to the presence, thickness, and permeability of geologic units overlying the carbonate bedrock. Fracture systems within the bedrock are commonly manifested in the surface topography as lineaments. Additionally, since the flow of water through the fracture system network enhances the dissolution of soluble bedrock, karst features commonly occur in greater density along fracture and joint planes.

The most prominent type of karst features in the NGT Project area are dolines or sinkholes, which comprise the greatest potential geological hazard to any type of construction in karst terraine. Sinkholes fall into two broad categories: cover-subsidence sinkholes and vault-collapse sinkholes. The most common sinkhole type, a cover-subsidence sinkhole, forms from the migration of fine soil particles from upper soils into solution channels lower down in the bedrock. The resulting voids from this process are filled gradually over time with the surrounding soil materials (a process called piping) and form a noticeable depression on the land surface. Vault-collapse sinkholes form in areas where the overlying unconsolidated material is clay-rich. In this case, the voids are filled, but there is no subsidence, and the clay acts as a bridge or roof as the cavity migrates toward the surface until the unconsolidated clay can no longer support the span. Eventually, the bridge or roof fails, causing the rapid displacement of surface materials into the resulting void.

Sinkhole formation is slower in areas where the overlying unconsolidated material is thick or contains more clay. This natural process can be exacerbated by disturbances such as:

- an increase in water flow or redirection of overland surface water flow (e.g., due to surficial grading) or subsurface flow that could accelerate the raveling of soil fines;

- removal of vegetative cover and topsoil (e.g., stripping or grubbing), which can reduce the cohesive strength of soils; and

- sudden decrease in the water table elevation (e.g., due to drought, over-pumping of wells, or quarry dewatering), which decreases the natural buoyancy of the water supporting a soil plug in a conduit, and may result in rapid and catastrophic soil collapse.

Effects of glaciation also influence the development and preservation of karst features in the eastern and Midwestern United States. The surface expression of sinkholes is unlikely in areas where carbonate bedrock is covered by more than 50 feet of glacially derived sediments such as stratified drift and till (Weary and Doctor, 2014). Research performed in a portion of the NGT Project area concluded that sinkholes are commonly expressed when drift is less than 25 feet thick (Aden, 2013).

The USGS identifies two areas of karst terraine that would be traversed by the NGT Project (Weary and Doctor, 2014):

- Between MPs 124.0 and 202.0 in Erie, Sandusky, Wood, Lucas, and Henry Counties in Ohio. From MP 124.0 to MP 135.0 the NGT Project would cross an area referred to as the Bellevue-Castalia Karst Plain.
- Between MPs 224.0 and 248.0 in Lenawee, Monroe, and Washtenaw Counties in Michigan. Whereas the USGS identifies this area as karst terraine, the carbonate bedrock in the area of Michigan would be crossed by the NGT Project is covered by more than 50 feet of glacial sediment, and sinkholes are absent or likely absent (Monroe County, 2010; Albert et al., 2008).

Karst features within 1,500 feet of the NGT Project mainline within the Bellevue-Castalia Karst Plain are summarized in table 4.1.3-2 (Aden, 2013). As indicated in the table, the proposed pipeline would not cross any karst features. We also examined digital aerial photography of the proposed pipeline route across the Bellevue-Castalia Karst Plain and did not identify any obvious sinkholes along the pipeline alignment. Following the initial characterization of karst features via desktop analysis based on USGS and ODNR mapping (Weary and Doctor, 2014; Aden, 2013), NEXUS conducted an electromagnetic (EM) geophysical survey to identify areas of shallow bedrock between MP 124.0 and MP 202.0, including within the Bellevue-Castalia Karst Plain. These EM data are currently being analyzed to identify possible karst features along the alignment that might warrant further field investigation and engineering design.

TABLE 4.1.3-2

Karst Features within 1,500 feet of the NGT Project

Project, State, Component	Milepost (mile)	Distance to Project (feet)	Feature
OHIO			
Mainline	126.6	255	Field verified sinkhole
	127.9	260	Spring
	128.6	790	Field verified sinkhole
	130.3	800	Suspect sinkhole - field visited
	130.4	230	Field verified sinkhole
	130.7	1,475	Suspect sinkhole - field visited
	130.7	1,450	Suspect sinkhole - field visited
	130.8	980	Suspect sinkhole - field visited
	130.9	350	Suspect sinkhole - field visited
	130.9	460	Suspect sinkhole - field visited
	131.0	830	Field verified sinkhole
	131.0	460	Suspect sinkhole - field visited
	131.0	1,230	Suspect sinkhole - field visited
	131.2	990	Suspect sinkhole - field visited
	131.5	1,475	Suspect sinkhole - field visited
	131.5	1,175	Field verified sinkhole
	131.6	320	Suspect sinkhole - field visited
	131.6	1,425	Suspect sinkhole - field visited
	131.6	1,440	Suspect sinkhole - field visited
	132.2	75	Spring
Clyde Compressor Station	133.8	1,420	Spring

Source: Aden, 2013

NEXUS contacted county and state highway engineers from Erie County, Sandusky County, the Ohio Department of Transportation (ODOT), and the Ohio Turnpike Authority to determine if there have been any karst impacts on their road systems. None of these officials were aware of pavement distress within the area of the Bellevue-Castalia Karst Plain that could be attributed to karst impacts. The county engineers for Erie and Sandusky Counties, as well as the engineer for the Ohio Turnpike Authority, all reported no pavement distress within their systems attributable to karst activity. ODOT representatives reported road damage due to gypsum-related karst activity along the shore of Lake Erie in Sandusky County, at least 3 miles from the NGT Project, and in Ashland County, which is not crossed by the NGT Project.

The engineers of Sandusky and Erie Counties noted that surface flooding due to groundwater rising and flowing from karst springs is the only karst-related issue in the vicinity of the NGT Project. An example of this occurred in Bellevue, Ohio, approximately 5 miles south of the NGT Project (Pavey et al., 2012). Record high winter precipitation resulted in groundwater levels rising to a 30-year high and several flooding events occurred during the spring and summer of 2008, when groundwater welled up through several springs. This type of flooding has been recorded in the Bellevue area approximately six times since 1800 (Pavey et al., 2012). NEXUS is evaluating whether pipeline construction methods should include buoyancy control measures in closed depressions located in the Bellevue-Castalia Karst Plain and would install buoyancy control where appropriate. Current analyses indicate buoyancy control measures would only be required in situations where the trench is partially or fully water-filled during construction and would not be necessary as mitigation for flood events after construction.

TEAL Project

The bedrock beneath the TEAL Project consists of the Conemaugh, Dunkard, and Monogahela groups, which are mainly comprised of siltstone, shale, and mudstone, though individual units are locally calcareous (Nicholson et al., 2005). Thus, karst features would not be expected to have developed in the TEAL Project area. Furthermore, the TEAL Project occurs in an area not known to contain karst features (ODGS, 1999); therefore, karst geologic conditions would not be expected to impact the TEAL Project.

4.1.3.5 Surface Subsidence – Underground Mines

Underground coal mining has occurred in Ohio since the early 1800s, including in the NGT and TEAL Projects area, and is the most common method for coal extraction in Ohio today (ODGS, 2012). Ground surface subsidence over underground mine workings has been documented in Ohio, ranging from small, localized areas of collapse to broad, regional lowering of the land surface.

The two primary methods for the extraction of coal in underground mining operations are room-and-pillar mining and longwall mining. Room-and-pillar mining is the most common method used in Ohio and is one of the oldest underground mining techniques. Mine structural integrity is maintained by leaving pillars (including timbers) of the minable coal resource to provide ceiling support. The primary disadvantages of room-and-pillar mining are an increased danger of roof rock collapse and possible surface subsidence after mining ceases due to the deterioration of the supporting columns and timbers. Longwall mining is a more modern practice, results in a greater yield of the minable resource, and has become the predominant method for large-scale underground coal mines in Ohio. During active mining, a hydraulic system is used to support the roof of the mine. After coal extraction, the hydraulic system is removed, allowing the roof to collapse and potentially causing subsidence of the overlying ground surface.

The Ohio Emergency Management Agency (OEMA) estimates that there are over 7,000 underground mines across Ohio, with approximately 50 percent recorded in the ODNR database and no mapping completed for approximately 2,700 underground mines (OEMA, 2011). Therefore, it is anticipated there are additional older unidentified and unmapped underground coal mines in the eastern portion of the NGT Project area and the entire TEAL Project area where no accurate or official records exist. The older abandoned coal mines are expected to be small room-and-pillar mines, based on the mining methods used at the time.

NGT Project

No active underground coal mines are located within 0.25 mile of the NGT Project area. Ten (10) known abandoned underground coal mines were identified within 0.25 mile of the NGT Project area between MP 0.0 and MP 52.0 (see table 4.1.2-2), but the NGT Project does not cross any of these known abandoned underground mines.

TEAL Project

No active underground coal mines are located within 0.25 mile of the TEAL Project area. However, as indicated in table 4.1.2-2, the TEAL Project overlies known, abandoned underground coal mines as summarized below:

- The former Powhaton No. 4 longwall coal mine, which was last operated by Quatro Mining Company in 1999, underlies 3.9 miles (89 percent) of the proposed loop. Texas Eastern has stated that there has been no evidence of ground subsidence along the existing mainline pipeline, which was installed in 1943.

- The Colerain Compressor Station overlies the former Y&O Coal Company room and pillar coal mine, which was abandoned in 1960. Texas Eastern performed geotechnical borings at the compressor station site that extended to a depth of approximately 60 feet and encountered approximately 40 feet of mine tailings overlying bedrock, with no indication of underground mine workings; however, underground mining occurred approximately 280 feet below the land surface at the site.

No known underground mining has occurred at the Salineville Compressor Station site and geotechnical borings installed to a maximum depth of 30 feet by Texas Eastern did not identify any mine tailings or indication of underground mine workings. Thus, surface subsidence due to underground mines would not be expected in the area of the Salineville Compressor Station.

4.1.3.6 Flash Flooding

Flash flooding has the potential to occur in streams within the Projects area, particularly in areas with narrow river valleys steep slopes, and rock bottoms. Flash flooding can also increase the likelihood of landslides within the Projects area by scouring steep slopes and eroding bedrock. Past coal strip mining in the eastern end of the Projects, mainly in Columbiana County, Ohio, has resulted in the increase of anthropogenic impacts on flooding potential by slope over-steepening as well as overburden reduction and disturbance.

Appendix H-5 identifies Federal Emergency Management Agency (FEMA) 100-year flood zones crossed by the NGT Project. All proposed aboveground facilities have been sited outside of FEMA 100-year flood zones. Small portions of pipe/contractor yards 2-1 and 3-2, which would only be used as temporary workspace, are located within mapped flood zones.

All TEAL Project facilities would be located outside of the FEMA 100-year flood zone.

4.1.4 Paleontological Resources

Many geologic formations have the potential to contain paleontological resources; however, those containing vertebrate fossils are generally considered to be the most scientifically significant.

Potential paleontological resources along the NGT Project area include Paleozoic invertebrate fossils in sedimentary rock and Pleistocene bones in glacial sediments. Paleozoic invertebrate fossils are common and not considered significant. No Mesozoic age rocks are present in Ohio and southern Michigan (ODNR, 2014); therefore, large vertebrate fossils such as dinosaurs are not present in the area of the NGT Project route. Pleistocene vertebrate fossils, including mastodons, woolly mammoths, horses, birds, reptiles, deer, caribou, bison, elk, and others have been identified in counties within the NGT Project route; however, exact locations of the finds are not available (Hansen, 1992).

Potential paleontological resources along the TEAL Project are predominantly Paleozoic invertebrate fossils in sedimentary rock. Paleozoic invertebrate fossils are common and not considered significant. Pleistocene vertebrate fossils, including mastodons, woolly mammoths, horses, tapir, deer, and flat-headed peccary have been found in some of the counties within the TEAL Project area; however, exact locations of the finds are not available (Hansen, 1992). The TEAL Project is located beyond the southern edge of the Pleistocene ice margin; therefore, surficial geology is composed of colluvium derived from the breakdown and weathering of the underlying bedrock or parent material and is often not suitable for the preservation of fossils, further limiting the potential for significant fossils to be found.

4.1.5 Impacts and Mitigation

4.1.5.1 Geology/Bedrock Geology/Surface Geology

Construction and operation of the NGT and TEAL Projects would not materially alter existing geologic conditions in the area. In addition, the overall effect of the Projects on topography would be minor. The primary impact would be limited to construction activities and would include temporary disturbance of slopes within the rights-of-way resulting from grading and trenching operations. The applicants would minimize the impacts by returning contours to preconstruction conditions to the maximum extent practicable. Grading and filling may be required to permanently create a safe and stable land surface to support aboveground facilities; however, these impacts would be minor and localized to the immediate area of the aboveground facilities.

The removal of bedrock, including by the use of blasting, may also be required if encountered within the trench depth of the pipeline facilities or during construction of aboveground facilities. Impacts on bedrock units would be minor and limited to the immediate area of construction.

In addition to bedrock removal, blasting could potentially damage nearby pipelines and other structures and could initiate landslides, karst activity, or ground subsidence over underground mines. The applicants have prepared project-specific *Blasting Plans* (see appendices E-1 and E-2) to avoid and minimize the potential effects of blasting and would comply with all federal, state, and local regulations governing the use of explosives and fugitive dust control measures. The applicants would implement the following measures, among others, to avoid and minimize potential blasting-related impacts:

- Evaluate nearby areas to blasting to assess any potential hazard to people and damage to property.

- Contact the owners of pipelines, utilities, other infrastructure, and buildings within close proximity of the work area at least 24 hours prior to blasting. Verbal notice would be confirmed with written notice.

- Request authorization from landowners to inspect any aboveground structures within 150 feet of the right-of-way (or farther, if required by local or state regulations) before and after blasting.

- Design and control the blast to focus the energy of the blast to the rock within the trench and to limit ground accelerations outside the trench. The applicants would avoid blasting within 25 feet of an existing in-service pipeline except in the case where precise, pre-blasting measurements have been taken to ensure that blasting would not impact the pipeline.

- Monitor measure peak particle velocity and decibel readings at nearby structures during blasting, and protect them from potential fly rock by using blasting mats or soil padding on the right-of-way.

- Conduct post-blasting inspections and repair damages sustained through blasting and/or compensate the landowner.

Rock excavated from the trench may be used to backfill the trench only to the top of the existing bedrock profile, provided the pipe is padded to prevent damage where there is shallow or exposed bedrock in areas of steep slopes. Rock that is not returned to the trench would be considered construction debris, unless approved for use as rock barriers to act as a right-of-way use deterrent or for some other use on the construction work areas by the landowner or land-managing agency, and would be managed in accordance with the applicants' *E&SCPs*.

As previously stated, the applicants would first attempt to remove shallow bedrock using conventional backhoe excavation, ripping, or hammering followed by backhoe excavation; however, blasting may be necessary where shallow, hard, non-rippable bedrock occurs. In those cases, the applicants would conduct blasting in accordance with applicable state and federal protocols as well as their project-specific *Blasting Plans*. We have reviewed these *Blasting Plans* and find that implementation of the measures contained therein would adequately avoid or minimize potential blasting-related impacts on existing structures, karst features, unstable slopes, and underground mines in the area.

4.1.5.2 Mineral Resources

The NGT Project does not cross any active fuel or non-fuel mineral resource mines. As discussed in section 4.1.2, the NGT Project would be in close proximity to four active non-fuel mines but the proposed facilities are sited to avoid conflicts with mining operations by routing around the property or co-locating the pipeline along existing utility or highway corridors that already constrain the mine operation. NEXUS sited the proposed facilities to avoid oil and gas facilities where feasible; however, 11 active and 18 inactive or abandoned oil and gas wells occur with the proposed NGT Project workspace. NEXUS would consult with the well owners to revise construction workspace to avoid the well, or route around the well site by an agreed-upon buffering distance. Construction of the NGT Project would require shallow excavation, and as a result, no impact would occur on the relatively deep oil and gas resources or the associated wells.

The TEAL Project does not cross any active non-fuel or fuel mineral resource mines. Several oil and gas wells are identified within 0.25 mile of the TEAL Project, but none are located within the construction workspace. If any additional wells are located, Texas Eastern would consult with the well owner to revise construction workspace to avoid the well, or route around the well site by an agreed-upon buffering distance. Construction of the TEAL Project would require shallow excavation, and as a result, no impact would occur on the relatively deep oil and gas resources or the associated wells.

4.1.5.3 Seismic Hazards

Seismic activity, including earthquakes, surface faulting, and soil liquefaction, has the potential to damage the proposed NGT and TEAL Projects facilities, creating a possible safety hazard to nearby residents. Many comments were received concerning the safety of the pipelines during potential seismic events; however, as discussed in sections 4.1.3.1 and 4.1.3.2, the region of the Projects is relatively seismically inactive, no faults identified in Ohio or Michigan exhibit evidence of activity within the last 1.6 million years, and there is no clear correlation between faults, including the Bowling Green and Highlandtown faults, and small earthquakes that occur in the region (Hansen, 2015). In addition, the State of Ohio has prohibited the injection of drilling fluids in Precambrian rock, which had previously been associated with the occurrence of small earthquakes. The recorded magnitude of earthquakes in the NGT Project area is relatively low and the associated ground vibration would not pose a risk for a modern arc-welded steel pipeline. In a study after the Northbridge, California earthquake of January 17, 1994, which included 11 earthquakes with a magnitude of 5.8 or greater, it was found that modern, arc-welded steel pipelines did not experience breaks or leaks as a result of either traveling ground waves or permanent ground deformation (O’Rourke and Palmer, 1994). Although granular, saturated soils occur in the NGT and TEAL Projects area, the low potential for strong seismic activity indicates a low risk for soil liquefaction to occur.

Project facilities would be constructed to meet DOT’s Minimum Federal Standards outlined in 49 CFR 192, further reducing the potential for seismic-related damage to occur. These are the same regulations that govern the construction and operation of natural gas pipelines throughout the country, including areas with greater seismic hazards.

In conclusion, due to the low level of seismic activity in the region and construction of the proposed facilities using modern materials in accordance with current industry standards, the potential for seismic hazards to impact the NGT and TEAL Projects is low.

4.1.5.4 Landslides

As discussed in section 4.1.3.4, the NGT Project would be located in an area with a low incidence of landslide activity, whereas the TEAL Project occurs in an area with high susceptibility and incidence of landslides. A naturally occurring landslide could damage the proposed facilities and create a potential safety hazard to nearby residents. Pipeline construction on steep slopes could also initiate localized slope movement.

During the design phase, the applicants would conduct geotechnical investigations to identify and delineate areas of steep slopes and landslide risk. Based on these results, the applicants would implement measures outlined in their respective *E&SCPs* to ensure slope stability and minimize landslide risk, such as the use of slope breakers, temporary and permanent trench plugs, matting, rip rap, and other methods to control surface water runoff. To further reduce the risk of slope failure in areas of steep slopes, the upslope side of the construction right-of-way would be cut during grading and used to fill the downslope side of the right-of-way, thereby providing a safe and level surface on which to operate heavy construction equipment. During grade restoration, the spoil would be placed back in the cut, compacted to restore original contours, and reseeded. Once grade and drainage patterns have been reestablished, permanent erosion controls (e.g. slope breakers) would be installed as needed.

The construction contractor's field supervisory personnel as well as the applicants' supervisory personnel, including the Chief Inspector, Craft Inspectors, and EIs, would be trained to identify potential landslide conditions that could develop during construction. The applicants' Geotechnical Engineer(s) would be notified when potential landslide conditions are discovered and would develop appropriate measures to mitigate the risk.

Further, the proposed facilities would be constructed of modern materials in accordance with the DOT's Minimum Federal Standards presented in 49 CFR 192, which are designed to provide adequate protection from washouts, floods, unstable soils, or landslides. Pipeline installation techniques, especially padding and use of rock-free backfill, effectively insulate the pipe from minor earth movements.

We conclude that construction of the proposed facilities in accordance with applicable regulations, and implementation of the measures described previously would adequately reduce the potential for construction-related activities to trigger landslides or other slope instability.

4.1.5.5 Karst

In karst sensitive areas, the primary impact that could affect the NGT Project pipeline and aboveground facilities is the sudden development of a sinkhole that damages the facilities and poses a safety risk. In addition, flooding within closed depressions and other karst features could pose a buoyancy concern to the pipeline facilities. Other subsidence features could develop more gradually over time, but would not pose an immediate risk to the proposed facilities. Karst features could be initiated by the physical disturbance associated with trenching, grading, or HDD activity, or by diverting or discharging Project-related water into otherwise stable karst features.

NEXUS has routed the NGT Project pipeline to avoid known sinkholes. Additionally, during construction, NEXUS would implement awareness-level training for supervisory staff and all inspectors. The purpose of the training would be to understand the potential for, and consequences of, construction activities to initiate sinkhole formation, and to train staff to recognize the signs of sinkhole formation. If previously unidentified solution cavities or sinkholes are encountered during trenching, NEXUS would implement a minor reroute if possible to avoid the feature, or mitigate the feature using common practices, including first cleaning the void of unconsolidated material and backfilling to fill the void to prevent further sinkhole development.

Regarding the potential for karst activity to damage NGT Project facilities during operation and create a potential safety hazard, the NGT Project pipeline and aboveground facilities would be designed, constructed, monitored, and maintained in accordance with DOT Pipeline and Hazardous Materials Safety Administration (PHMSA) and industry standards that are protective of public safety, which would reduce the potential for karst conditions to adversely impact the facilities. Specifically, in the NGT Project area, the largest sinkhole located during field reconnaissance within the Bellevue-Castalia Karst Plain has a maximum width of 30 to 35 feet. NEXUS calculated the proposed pipeline (36-inch-diameter, grade X70 steel with a 0.5-inch wall thickness) could span approximately 125 feet unsupported while covered with 3 feet of soil without potentially compromising the integrity of the pipeline. Based on the size of sinkholes in the NGT Project area, this span strength would further reduce the potential for a serious pipeline incident under most sinkhole development scenarios. During operations, NEXUS would conduct route surveillance of installed pipeline facilities, in accordance with 49 CFR Part 192.613. Surveillance personnel would be trained to monitor the right-of-way for indications of sinkhole formation, which could include subsidence, surface cracks, and/or depressions. The NGT Project Geotechnical Engineer would be notified if these conditions are observed, and appropriate measures would be implemented to achieve stress-free conditions.

Based on NEXUS routing to avoid known sinkholes and the relatively low density of sinkholes in the area, the overall risk for karst activity to impact the NGT Project is low. The potential risk posed by karst activity would be further reduced by constructing and operating the facilities with modern materials and in accordance with applicable regulations, and by monitoring the facilities during operation as proposed by NEXUS. Thus, we conclude the potential for karst activity to damage the NGT Project has been adequately minimized.

4.1.5.6 Surface Subsidence – Underground Mines

Subsidence or collapse of underground mines could threaten the integrity of the proposed NGT and TEAL Projects' facilities, creating a potential safety hazard. NEXUS and Texas Eastern have routed the proposed pipeline and sited the aboveground facilities to avoid known underground mines; however, the locations of all underground mines have not been fully documented. NEXUS and Texas Eastern would implement the following measures in the event of the discovery of a previously undocumented abandoned underground mine during construction:

- Conduct a geophysical survey (potentially combined with geotechnical borings) to identify the mine footprint, depth to mine roof, and depth to mine floor.

- Reroute the pipeline to completely avoid the mine footprint, or bore/HDD beneath the mine. If either are impractical, the pipeline would be rerouted where sufficient cover is present over the mine roof so that the calculated vertical stress on the mine roof would not increase the current calculated vertical stress by more than 10 percent.

- If rerouting is infeasible, NEXUS and/or Texas Eastern would perform detailed studies to characterize and assess the mine in accordance with the *Manual for Abandoned Underground Mine Inventory and Risk Assessment (FHWA IF-99-007)* (ODOT, 1998). Following these studies, mine remediation would be completed in accordance with ODOT, 1998.

Most of the TEAL Project's 36-inch-diameter mainline pipeline loop would be located over the former Powhaton No. 4 longwall coal mine that last operated in 1999. As a longwall mine, roof support systems would have been removed as mining was completed, allowing for potential collapse to occur, and Texas Eastern has stated that there has been no evidence that the existing pipeline system has been affected by ground subsidence. According to ODNR, longwall mining typically causes surface subsidence simultaneously with active mining, and does not factor into future subsidence issues (ODNR, 2009). The Colerain Compressor Station would be located over the former Y&O Coal Company room and pillar mine that was abandoned in 1960. Given the absence of near surface mine workings in the geotechnical borings and the known depth of former mine operation (280 feet below land surface), surface subsidence due to underground mines in the area of the Colerain Compressor Station would not be expected.

In summary, the NGT Project is in the area of, but does not cross, any known underground mines, whereas the TEAL Project would cross known underground mines at the same locations of its existing facilities, which have been unaffected by mine subsidence. NEXUS and/or Texas Eastern would also implement additional investigation and mitigation measures in the event that a previously undocumented underground mine is discovered prior to or during construction, and both companies would design, construct, and monitor the facilities in accordance with applicable industry standards and PHMSA regulations that are protective of public safety. Therefore, we conclude that the potential for underground mine collapse to damage the proposed facilities has been adequately avoided and minimized.

4.1.5.7 Flash Flooding

Seasonal and flash flooding hazards are a potential concern where the pipelines would cross or be located in the area of major streams and small watersheds. Additional discussion regarding flooding and flash floods is also provided in section 4.1.3.7. Although flooding itself does not generally present a risk to pipeline facilities, bank erosion, and/or scour could expose the pipeline or cause sections of pipe to become unsupported. All pipeline facilities are required to be designed and constructed in accordance with DOT's regulations in 49 CFR 192. These regulations include specifications for installing the pipeline at a sufficient depth to avoid possible scour at waterbody crossings.

In addition, NEXUS would implement several mitigation measures within floodplains to minimize potential impacts from flood events. These measures include:

- clearing only the vegetation needed for safe construction of the pipeline;
- installing and maintaining erosion and sediment control structures;
- restoring floodplain contours and waterbody banks to their pre-construction condition; and
- conducting post-construction monitoring to ensure successful revegetation.

By implementing these measures, we conclude that the potential for flash floods to damage the proposed pipeline facilities or aboveground facilities has been adequately minimized.

4.1.5.8 Paleontological Resources

Potential impacts on fossil resources could include direct impacts such as damage to, or destruction of, fossils resulting from construction activities, including excavation, trenching, or grading. Indirect effects on fossil beds could result from erosion caused by slope regrading, vegetation clearing, and/or unauthorized collection. No specific sites containing significant paleontological resources were identified in the NGT and TEAL Projects area. The applicants noted the slight potential for Pleistocene fossils to be discovered during construction and have developed project-specific *Unanticipated Discovery Plans* that outline the procedures for handling vertebrate remains. We have reviewed these plans and find that significant paleontological resources would be adequately protected, if encountered.

4.1.5.9 Conclusion

We conclude that constructing and operating the NGT and TEAL Projects in accordance with the applicants' proposed plans would not result in a significant impact on existing geologic conditions and resources, or result in a significant risk to public safety due to the presence of geologic hazards.

4.2 SOILS

4.2.1 Existing Environment

The types and characteristics of soils impacted by the NGT and TEAL Projects were identified using the U.S. Department of Agriculture (USDA) NRCS Soil Surveys and Soil Survey Geographic (SSURGO) databases for each county affected by the Projects. SSURGO data provides the most detailed level of information of soil mapping available from the NRCS and was designed primarily for farm and ranch landowner/user, township, county, or parish natural resource planning and management.

Based on information contained in the SSURGO database, the NGT Project would cross about 494 individual soil map units consisting of one major soil type or complexes of 2 or more soil types that can contain a minor percentage (generally not more than 10 percent) of dissimilar soils. The TEAL Project would cross about 43 individual soil map units. Our analysis focused on the major soil characteristics for the dominant soils within the map unit.

Soils in the region possess characteristics that could impact construction and restoration of the NGT and TEAL Projects, including soils that are susceptible to water and wind erosion; prime farmland; hydric soils; compaction prone soils; soils that are stony, rocky, or underlain by shallow bedrock; droughty soils; and soils with poor revegetation potential. Tables 4.2.1-1 and 4.2.1-2 identify the characteristics of soils that would be impacted by construction and operation of the Projects, respectively.

4.2.1.1 Erosion Potential

Erosion is a natural process where surface soils are worn away, generally resulting from water and wind forces that can be accelerated by human disturbance. Factors that influence the magnitude of erosion include soil texture, soil structure, length and percent of slope, existing vegetative cover, and rainfall. The most erosion-prone soils are generally bare or sparsely vegetated, non-cohesive, fine textured, and situated on moderate to steep slopes. Soils on steep, long slopes are much more susceptible to water erosion than those on short slopes because the steeper slopes accelerate the flow of surface runoff. Soils more resistant to erosion include those that are well-vegetated, well-structured with high percolation rates, and situated on flat to nearly level terrain.

Approximately 604.8 acres (12 percent) of the soils that would be crossed by the NGT Project are highly susceptible to water erosion, and 390.4 acres (8 percent) are highly susceptible to wind erosion (see table 4.2.1-1). Permanent access roads, cathodic protection sites, and aboveground facilities would permanently impact 28.5 acres of soils susceptible to water erosion and 3.4 acres of soils susceptible to wind erosion (see table 4.2.1-2).

Approximately 169.6 acres (80 percent) of the soils that would be crossed by the TEAL Project are highly susceptible to water erosion, and none of the soils are highly susceptible to wind erosion (see table 4.2.1-1). Permanent access roads, cathodic protection sites, and aboveground facilities would permanently impact 8.4 acres of soils susceptible to water erosion. There would not be any permanent impacts on soils susceptible to wind erosion (see table 4.2.1-2).

4.2.1.1 Prime Farmland

According to the NRCS, prime farmland soils consist of soils classified as those best suited for production of food, feed, forage, fiber, and oilseed crops. These soils generate the highest yields with the least amount of expenditure. Prime farmland soils generally meet the following criteria: they have an adequate water supply, either from precipitation or irrigation; contain few or no rocks; are permeable to water and air; are not excessively erodible or saturated for long time periods; and either do not flood frequently or are protected from flooding.

The NRCS also recognizes unique farmlands and farmlands of statewide importance. Unique farmlands are defined as lands other than prime farmland that are used for production of specific high-value food and fiber crops (e.g., citrus, tree nuts, olives, fruits, and vegetables). Unique farmlands have the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods. Farmland of statewide importance is similar to prime farmland but with minor shortcomings such as greater slopes or lesser ability to store soil moisture.

TABLE 4.2.1-1

Summary of Soil Characteristics Affected by Construction of the NGT and TEAL Projects (in acres) [a]

Project, State, Component	Total Acreage	Highly Erodible		Farmland Classifications		Hydric [f]	Compaction Prone [g]	Stony/Rocky [h]	Shallow Bedrock [i]	Revegetation Concern [j]
		Water [b]	Wind [c]	Prime Farmland [d]	Unique Farmland [e]					
NGT PROJECT										
Ohio										
Mainline	3,518.3	469.1	251.7	2718.2	193.9	1,151.3	1,775.0	65.6	241.9	294.0
TGP Interconnect	15.6	13.2	0.0	2.5	0.0	0.1	1.3	11.1	14.4	5.9
Staging Areas	208.2	20.0	44.9	177.9	3.3	100.1	92.6	2.9	4.5	4.0
Access Roads [k]	59.7	11.3	0.7	45.4	2.2	15.0	24.8	1.3	6.2	4.6
Aboveground Facilities [l]	292.9	90.6	4.3	198.0	2.9	61.6	61.2	26.1	62.6	51.8
Ohio Total	**4,094.7**	**604.3**	**301.6**	**3,142.0**	**202.3**	**1,328.0**	**1,954.9**	**107.1**	**329.5**	**360.4**
Michigan										
Mainline	831.1	0.5	71.4	593.6	191.6	400.6	334.5	0.0	0.0	7.9
Staging Areas	74.5	0.0	16.1	48.8	24.8	49.5	46.6	0.0	0.0	0.0
Access Roads [k]	9.2	0.0	1.3	4.8	3.4	3.2	2.3	0.0	0.0	0.0
Aboveground Facilities [l]	1.1	0.0	0.0	0.1	1.0	0.1	0.1	0.0	0.0	0.0
Michigan Total	**915.9**	**0.5**	**88.8**	**647.3**	**220.8**	**453.3**	**383.5**	**0.0**	**0.0**	**7.9**
NGT Project Total	**5,010.6**	**604.8**	**390.4**	**3,789.3**	**423.1**	**1,781.3**	**2,338.4**	**107.1**	**329.5**	**368.3**
TEAL PROJECT										
Pipeline Loop	80.3	78.8	0.0	1.5	0.0	0.0	0.4	53.0	72.1	73.9
Connecting Pipeline to NGT	14.2	13.5	0.0	0.7	0.0	0.0	0.7	7.2	13.5	7.1
Access Roads [k]	4.9	4.5	0.0	0.4	0.0	0.0	0.2	3.4	4.3	4.4
Aboveground Facilities [l]	113.7	72.8	0.0	40.9	0.0	0.0	0.4	22.6	111.0	17.7
TEAL Project Total	**213.0**	**169.6**	**0.0**	**43.4**	**0.0**	**0.0**	**1.8**	**86.3**	**200.8**	**103.0**
NGT and TEAL Projects Total	**5223.6**	**774.4**	**390.4**	**3832.8**	**423.1**	**1781.3**	**2340.2**	**193.3**	**530.3**	**471.4**

TABLE 4.2.1-1 (continued)

Summary of Soil Characteristics Affected by Construction of the NGT and TEAL Projects (in acres) a

Project, State, Component	Total Acreage	Highly Erodible: Water [b]	Highly Erodible: Wind [c]	Farmland Classifications: Prime Farmland [d]	Farmland Classifications: Unique Farmland [e]	Hydric [f]	Compaction Prone [g]	Stony/Rocky [h]	Shallow Bedrock [i]	Revegetation Concern [j]

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a Soil map units analyzed have multiple characteristics. As a result, the sum of the rows will not equal the total acreages presented in this table.

b Includes soils with a non-irrigated land capability classification of 4e through 8e or a slope class of >8-15% or greater

c Includes soils in wind erodibility groups 1 and 2

d Includes soils classified in the SSURGO database as prime farmland, or prime farmland if a limiting factor is mitigated

e Includes soils classified in the SSURGO database as farmland of local importance or farmland of unique importance

f Includes soils that are classified in the SSURGO database as hydric

g Includes soils that have a clay loam or finer surface texture and somewhat poor, poor, or very poor drainage class

h Includes soils with a cobbley, stony, bouldery, shaly, channery, very gravelly, or extremely gravelly modifier to the textural class of the surface layer and/or that have a surface layer that contains greater than 5 percent by weight rock fragments larger than 3 inches

i Includes soils that have lithic or paralithic bedrock within 60 inches of the soil surface

j Includes soils with a land capability classification of 4 or greater

k Includes temporary and permanent access roads

l Aboveground facilities include compressor stations and meter stations

Note: Sum of addends may not equal total due to rounding.

TABLE 4.2.1-2

Summary of Soil Characteristics Affected by Operation of the NGT and TEAL Projects (in acres) [a]

Project, State, Component	Total Acreage	Highly Erodible: Water [b]	Highly Erodible: Wind [c]	Farmland Classifications: Prime Farmland [d]	Farmland Classifications: Unique Farmland [e]	Hydric [f]	Compaction Prone [g]	Stony/Rocky [h]	Shallow Bedrock [i]	Revegetation Concern [j]
NGT PROJECT										
Ohio										
Mainline	6.7	1.0	0.5	5.2	0.7	1.7	3.6	0.0	0.1	0.6
TGP Interconnect	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Staging Areas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access Roads [k]	3.7	0.3	0.5	3.0	0.1	1.1	1.8	0.1	0.9	0.1
Aboveground Facilities [l]	131.7	27.1	2.4	103.0	0.1	32.6	20.9	7.3	18.5	12.4
Ohio Total	**142.2**	**28.5**	**3.4**	**111.1**	**1.0**	**35.4**	**26.3**	**7.5**	**19.5**	**13.1**
Michigan										
Mainline	1.2	0.0	0.0	0.8	0.4	0.3	0.3	0.0	0.0	0.0
Staging Areas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4.2.1-2 (cont'd)

Summary of Soil Characteristics Affected by Operation of the NGT and TEAL Projects (in acres) [a]

		Highly Erodible		Farmland Classifications						
Project, State, Component	Total Acreage	Water [b]	Wind [c]	Prime Farmland [d]	Unique Farmland [e]	Hydric [f]	Compaction Prone [g]	Stony/Rocky [h]	Shallow Bedrock [i]	Revegetation Concern [j]
Access Roads [k]	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
Aboveground Facilities [l]	0.8	0.0	0.0	0.1	0.7	0.1	0.1	0.0	0.0	0.0
Michigan Total	**2.3**	**0.0**	**0.0**	**0.9**	**1.4**	**0.3**	**0.3**	**0.0**	**0.0**	**0.0**
NGT Project Total	**144.5**	**28.5**	**3.4**	**112.0**	**2.4**	**35.7**	**26.6**	**7.5**	**19.5**	**13.1**
TEAL PROJECT										
Pipeline Loop	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Connecting Pipeline to NGT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access Roads [k]	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.8
Aboveground Facilities [l]	16.2	7.4	0.0	8.7	0.0	0.0	0.0	3.3	15.0	4.1
TEAL Project Total	**17.1**	**8.4**	**0.0**	**8.7**	**0.0**	**0.0**	**0.0**	**3.8**	**15.5**	**4.9**
NGT and TEAL Projects Total	**161.6**	**36.9**	**3.4**	**120.8**	**2.4**	**35.7**	**26.6**	**11.3**	**35.0**	**18.0**

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a Soil map units analyzed have multiple characteristics. As a result, the sum of the rows will not equal the total acreages presented in this table.

b Includes soils with a non-irrigated land capability classification of 4e through 8e or a slope class of >8-15% or greater

c Includes soils in wind erodibility groups 1 and 2

d Includes soils classified in the SSURGO database as prime farmland, or prime farmland if a limiting factor is mitigated

e Includes soils classified in the SSURGO database as farmland of local importance or farmland of unique importance

f Includes soils that are classified in the SSURGO database as hydric

g Includes soils that have a clay loam or finer surface texture and somewhat poor, poor or very poor drainage class

h Includes soils with a cobbley, stony, bouldery, shaly, channery, very gravelly, or extremely gravelly modifier to the textural class of the surface layer and/or that have a surface layer that contains greater than 5 percent by weight rock fragments larger than 3 inches

i Includes soils that have lithic or paralithic bedrock within 60 inches of the soil surface

j Includes soils with a land capability classification of 4 or greater

k Includes permanent access roads

l Aboveground facilities include compressor stations and meter stations

Note: Sum of addends may not equal total due to rounding.

The NRCS also recognizes unique farmlands and farmlands of statewide importance. Unique farmlands are defined as lands other than prime farmland that are used for production of specific high-value food and fiber crops (e.g., citrus, tree nuts, olives, fruits, and vegetables). Unique farmlands have the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods. Farmland of statewide importance is similar to prime farmland but with minor shortcomings such as greater slopes or lesser ability to store soil moisture.

The NGT Project would cross approximately 3,789.3 acres (76 percent) of soils classified as prime farmland, or prime farmland if a limiting factor is mitigated. An additional 423.1 acres (8 percent) of the soils that would be crossed are classified as local or unique farmland. There are no soils classified as farmland of statewide importance along the proposed NGT Project route (see table 4.2.1-1). Permanent access roads, cathodic protection sites, and aboveground facilities would permanently impact 112.0 acres of soils classified as prime farmland and 2.4 acres of soils classified as local or unique farmland (see table 4.2.1-2).

The TEAL Project would cross approximately 43.4 acres (20 percent) of soils classified as prime farmland, or prime farmland if a limiting factor is mitigated. None of the soils that would be crossed are classified as local or unique farmland or farmland of statewide importance (see table 4.2.1-1). Permanent access roads, cathodic protection sites, and aboveground facilities would permanently impact 8.7 acres of soils classified as prime farmland (see table 4.2.1-2).

4.2.1.2 Hydric Soils

Hydric soils are soils that are formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (NRCS, 1994). Also, soils in which the hydrology has been artificially modified are hydric if the soil, in an unaltered state, was hydric. Some soils designated as hydric have phases that are not hydric depending on water table, flooding, and ponding characteristics. A combination of hydric soil, hydrophytic vegetation, and hydrologic properties define wetlands as described in the *National Food Security Act Manual* (Soil Conservation Service, 1994).

The NGT Project would cross approximately 1,781.3 acres (36 percent) of soils that are considered hydric (see table 4.2.1-1). Permanent access roads, cathodic protection sites, and aboveground facilities would permanently impact 35.7 acres of hydric soils (see table 4.2.1-2).

The TEAL Project would not cross any soils that are considered hydric (see tables 4.2.1-1 and 4.2.1-2).

4.2.1.3 Compaction-prone Soils

Soil compaction is the compression of soil particles and the reduction of a soil’s total pore space. Similarly, rutting is caused by the plastic deformation of soil when subject to an external load. The potential for soils to become compacted in the NGT and TEAL Projects area was evaluated based on SSURGO data using texture and drainage class data. Soils that are prone to compaction include sandy loams and finer soils that are classified as very poorly drained, poorly drained, and somewhat poorly drained. In general, compaction and rutting become more pronounced when soils are wet.

The NGT Project would cross approximately 2,338.4 acres (47 percent) of soils that are considered compaction prone (see table 4.2.1-1). Permanent access roads, cathodic protection sites, and aboveground facilities would permanently impact 26.6 acres of compaction prone soils (see table 4.2.1-2).

The TEAL Project would cross approximately 1.8 acres (1 percent) of soils that are considered compaction prone (see table 4.2.1-1). There would not be any permanent impacts on compaction-prone soils (see table 4.2.1-2).

4.2.1.4 Stony/Rocky Soils and Shallow Bedrock Soils

Soils considered stony/rocky include soils with a cobbley, stony, bouldery, shaly, channery, very gravelly, or extremely gravelly modifier to the textural class of the surface layer and/or those with a surface layer that contains greater than 5 percent by weight rock fragments larger than 3 inches. Shallow bedrock is considered prevalent where the depth to bedrock is less than 5 feet below the ground surface.

The NGT Project would cross approximately 107.1 acres (2 percent) of the soils that are classified as stony/rocky and approximately 329.5 acres (7 percent) of soils that have shallow depth to bedrock (see table 4.2.1-1). Permanent access roads, cathodic protection sites, and aboveground facilities would permanently impact 7.5 acres of stony/rocky soils and 19.5 acres of soils underlain by shallow bedrock (see table 4.2.1-2).

The TEAL Project would cross approximately 86.3 acres (41 percent) of soils that are classified as stony/rocky and approximately 200.8 acres (94 percent) of soils that have shallow depth to bedrock (see table 4.2.1-1). Permanent access roads, cathodic protection sites, and aboveground facilities would permanently impact 3.8 acres of stony/rocky soils and 15.5 acres of soils underlain by shallow bedrock (see table 4.2.1-2).

4.2.1.5 Poor Revegetation Potential

The vegetation potential of soils is based on several characteristics, including topsoil thickness, soil texture, available water capacity, wetness, susceptibility to flooding, soil temperature, and slope. Some soils have characteristics that cause a high seed mortality. Areas with soils that have poor revegetation potential may be difficult to revegetate and need additional management.

The NGT Project would cross approximately 368.3 acres (7 percent) of soils that are considered to have poor revegetation potential (see table 4.2.1-1). Permanent access roads, cathodic protection sites, and aboveground facilities would permanently impact 13.1 acres of soils with poor revegetation potential (see table 4.2.1-2).

The TEAL Project would cross approximately 103.0 acres (48 percent) of soils that are considered to have poor revegetation potential (see table 4.2.1-1). Permanent access roads, cathodic protection sites, and aboveground facilities would permanently impact 4.9 acres of soils with poor revegetation potential (see table 4.2.1-2).

4.2.1.6 Topsoil

Topsoil is the uppermost layer of soil and typically has the highest concentration of organic materials with generally greater biological productivity than subsurface soils. Microorganisms and other biological material found in topsoil, in addition to inorganic soil components, provide the bulk of the necessary nutrients to vegetation. Topsoil also has the highest concentration of plant roots and seeds. Topsoil preservation is important especially for restoration of natural vegetation and cropland as well as range or pasture lands, especially in areas where topsoil is limited in extent or depth.

The NGT Project would cross approximately 4,918.5 acres (98 percent) of soils that have topsoil depths greater than 12 inches, while only 52.7 acres (1 percent) of the soils crossed have topsoil depths less than 6 inches (see table 4.2.1-3).

The TEAL Project would cross approximately 195.5 acres (92 percent) of soils that have topsoil depths greater than 12 inches while only 12.3 acres (6 percent) of the soils have topsoil depths less than 6 inches (see table 4.2.1-3).

TABLE 4.2.1-3

Summary of Topsoil Depths within the NGT and TEAL Project Construction Footprints (in acres)

Project, State, Component	Total Acreage	0-6 inches	>6-12 inches	>12-18 inches	>18 inches
NGT PROJECT					
Ohio					
Mainline	3,518.3	39.2	25.5	691.2	2,762.3
TGP Interconnect	15.6	0.0	0.6	10.6	4.4
Staging Areas	208.2	0.2	2.6	24.0	181.4
Access Roads	59.7	0.7	0.4	11.2	47.3
Aboveground Facilities [a]	292.9	0.2	10.1	13.7	268.9
Ohio Total	**4,094.7**	**40.2**	**39.4**	**750.8**	**3,264.3**
Michigan					
Mainline	831.1	12.5	0.0	39.4	779.2
Staging Areas	74.5	0.0	0.0	0.3	74.2
Access Roads	9.2	0.0	0.0	0.3	8.9
Aboveground Facilities [a]	1.1	0.0	0.0	0.0	1.1
Michigan Total	**915.9**	**12.5**	**0.0**	**40.0**	**863.4**
NGT Project Total	**5,010.6**	**52.7**	**39.4**	**790.8**	**4,127.7**
TEAL PROJECT					
Pipeline Loop	80.3	12.3	0.0	7.5	60.5
Connecting Pipeline to NGT	14.2	0.0	0.0	7.2	6.9
Access Roads	4.9	0.5	0.0	1.1	3.3
Aboveground Facilities [a]	113.7	0.0	5.3	60.3	48.1
TEAL Project Total	**213.0**	**12.8**	**5.3**	**76.1**	**118.8**
NGT and TEAL Projects Total	**5,223.6**	**65.5**	**44.6**	**866.9**	**4,246.5**

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a Aboveground facilities include compressor stations and meter stations.

Note: Sum of addends may not equal total due to rounding.

4.2.2 General Impacts and Mitigation

Constructing pipelines and aboveground facilities could impact soil resources. Potential impacts include soil erosion, soil compaction, reduction of soil fertility, and changes to other soil characteristics. The majority of these impacts are temporary and related to construction activities; however, as previously noted in this document and by commenters, there would be permanent impacts at certain access roads, cathodic protection sites, and aboveground facilities. These permanent impacts comprise approximately 161.6 acres (3 percent) of the total footprint for the NGT and TEAL Projects.

Clearing and grading removes protective vegetation cover and exposes the soil to the effects of wind and rain, resulting in an increased potential for erosion within the workspace and deposition/ sedimentation into nearby sensitive areas such as wetlands and waterbodies. The clearing and grading of soils with poor revegetation potential could result in a lack of adequate vegetation following construction and restoration of the right-of-way, which could lead to increased erosion and sedimentation, a reduction in wildlife habitat, and adverse visual impacts. The movement of equipment on the right-of-way also can accelerate the erosion process. Additionally, the loss of topsoil due to erosion reduces soil fertility, potentially inhibiting revegetation of the right-of-way and reducing agricultural yields. Soils on moderate to steep slopes would be more prone to water-related erosion. Dry, coarse textured soils in open areas, including trench spoil stockpiles, would be more prone to wind erosion and the creation of dust.

Construction activities such as grading, trenching, and backfilling can also cause mixing of soil horizons. Mixing of topsoil with subsoil, particularly in agricultural lands, dilutes the chemical and physical properties of the topsoil, lowers soil fertility, and decreases the ability of disturbed soils to revegetate successfully. Soil fertility could also be affected by fuel or other hazardous material spills during construction or operations at aboveground facilities where hazardous materials are stored and used, or when constructing in areas of pre-existing soil contamination.

Rock fragments at the surface and in the surface layer may be encountered during grading, trenching, and backfilling. Trenching or blasting of stony or shallow-depth-to-bedrock soils can bring stones or rock fragments to the surface that could interfere with agricultural practices and further reduce soil fertility. Introducing stones and other rock fragments to surface soil layers may reduce soil moisture holding capacity, resulting in a reduction of soil productivity. Agricultural equipment could also be damaged by contact with large rocks and stones.

Construction activities such as grading, spoil storage, and heavy equipment traffic can compact soil, reducing porosity and percolation rates while increasing runoff potential. Operating heavy equipment under wet soil conditions could cause deep soil compaction and topsoil/subsoil mixing in agricultural areas. Hydric soils and soils that have been recently wet from precipitation would be more prone to compaction and rutting. Compaction can impede plant root establishment, thereby inhibiting revegetation of the right-of-way or reducing crop yields.

We received comments regarding potential soil impacts related to agricultural production. Commenters expressed concern that construction of the Projects could damage soil structure and lead to compression and compaction of soils, soil subsidence, mixing of subsoil with topsoil, and increased erosion potential, which could in turn lead to decreased agricultural production.

In general, the applicants would reduce impacts on soils by limiting the area of disturbance to the area needed for safe construction of the proposed facilities, co-locating the workspace with previously disturbed areas where possible, initiating restoration as soon as reasonably possible after final grading, and utilizing existing roads for temporary and permanent access to the extent possible. The applicants would further minimize impacts on soil resources by constructing and operating the NGT and TEAL Projects in accordance with the applicants' *E&SCPs* discussed throughout this EIS. The measures applicable to soils include, but are not limited to:

- Removing topsoil from either the full work area or from the trench and subsoil storage area in cultivated or rotated cropland and managed pastures, residential areas, hayfields, or other areas at the landowner's or land managing agency's request. At least 12 inches of topsoil would be removed in areas of deep topsoil and every effort would be made to segregate the entire topsoil layer in soils with less than 12 inches of topsoil. Topsoil piles would be segregated from subsoil throughout construction activities and would be stabilized with sediment barriers, mulch, temporary seeding, tackifiers, and functional equivalents, where necessary.

- Segregating the top 12 inches of topsoil from the area of the trench in wetlands, except where standing water is present or soils are saturated.

- In general, trenching deep enough (approximately 7 feet) to provide a minimum of 3 feet of cover over the pipelines and comply with the requirements of 49 CFR Part 192 of the DOT’s regulations.

- Installing temporary erosion control devices within the trench and workspace immediately after initial disturbance of the soil and maintaining the devices throughout construction until replacement by permanent controls or completion of restoration. Temporary and permanent controls may include slope breakers, trench plugs, sediment barriers, and mulch.

- Controlling rock removed during blasting operations.

- Using excavated rock to backfill the trench only to the top of the existing bedrock profile. Excess rock would be considered construction debris unless approved for use on the right-of-way by the landowner or managing agency. Excess rock would also be removed from the top 12 inches of soil in all cultivated or rotated cropland, managed pastures, hayfields, residential areas, and other areas at landowner request. The size, density, and distribution of rock within the restored right-of-way would be similar to adjacent areas.

- Testing topsoil and subsoil for compaction at regular intervals in agricultural and residential areas. Severely compacted soils in agricultural areas would be plowed with a paraplow or other deep tillage equipment; the subsoil would be plowed in areas where topsoil has been segregated prior to topsoil replacement. Appropriate soil compaction mitigation would also be conducted in severely compacted residential areas.

- Implementing a post-construction monitoring program to identify and correct instances of soil subsidence.

- Implementing a post-construction vegetation monitoring program to identify and correct revegetation issues.

- Conducting trench dewatering in a manner that does not cause erosion.

We received comments expressing concern that construction of the NGT and TEAL Projects would damage existing drain tile systems and lead to decreased agricultural productivity. Drain tile is installed in agricultural areas to help improve drainage in soils with high groundwater and/or poor drainage. NEXUS developed a *Drain Tile Mitigation Plan*, which is provided in appendix E-3. Project-specific impacts on and proposed mitigation measures related to drain tile systems can be found in section 4.9.3.5 and include, but are not limited to:

- Contacting affected landowners in advance of construction activities to gain an understanding and knowledge of existing and planned drainage systems traversed by the proposed Projects.

- Repairing drain tile damages that result from construction-related activities so that they are at least equivalent to their pre-construction condition, using materials comparable to those currently in place.

- After the replacement of topsoil in the right-of-way, monitoring drain tile repaired and replaced within the right-of-way for 3 years, or until restoration is considered successful, to assess any drain tile settling, crop production, and drainage issues.

We received comments expressing concern that freeze/thaw cycles could cause the ground to heave and expose the buried pipeline over time. Ground heaving is the uplifting of soil, typically based on the development and growth of ice lenses underneath the upper soil layer. Ground heaving or frost heaving is based on soil saturation, soil characteristics, and freezing temperatures. The maximum depth of frost penetration within the area of the NGT and TEAL Projects does not exceed 5 feet and in most years it is approximately 4 feet or less (National Oceanic and Atmospheric Administration [NOAA], 1978). The pipeline would have a typical bottom depth of 7 feet and the likelihood of frost affecting soils completely surrounding the buried pipeline is low. Additionally, the ground surrounding the buried pipeline would be warmed by natural gas flow in the winter. Based on these circumstances, the risk of ground heaving and associated potential impacts on or from a pipeline due to freeze/thaw action is low.

We received comments expressing concern that construction and operation of the NGT and TEAL Projects would result in contamination of the soil and pollution of agricultural lands, including areas designated as organic farms. The applicants would limit the potential for contamination through implementation of their *SPCC Plans*. In general, the applicants would manage fuel and other hazardous materials in accordance with applicable regulations designed to prevent inadvertent spills and by implementing specific measures to limit and cleanup any spills that occur as well as manage pre-existing soil contamination, if encountered. The *SPCC Plans* are described in more detail in section 4.3.1.2.

We received several comments regarding possible impacts on certified organic farms. See section 4.9.3.2 for a discussion of certified organic farms, potential impacts, and mitigation methods.

4.2.1.2 Conclusions

Construction activities associated with the NGT and TEAL Projects could adversely affect soil resources by causing erosion, compaction, and introduction of excess rock or fill material to the surface, which could hinder restoration. However, the applicants would implement the mitigation measures contained in their respective *E&SCPs* to control erosion, enhance successful revegetation, and minimize any potential adverse impacts on soil resources.

Impacts to soils caused by the NGT and TEAL Projects during post-construction operations are expected to be minimal. Permanent impacts from the Projects would occur as a result of the conversion of non-industrial land use to industrial land use at aboveground facilities for operational purposes; however, as no additional ground would be excavated during operation of the aboveground facilities, no impacts are expected during operations.

In conclusion, construction and operation of the NGT and TEAL Projects would have some impacts on soil resources, most of which would be temporary. Soil impacts would be mitigated through measures such as topsoil segregation, temporary and permanent erosion controls, and post-construction restoration and revegetation of construction work areas. Additionally, the applicants would implement their *SPCC Plans* during construction and operation to prevent and contain, and if necessary clean up, accidental spills of any material that may contaminate soils. Based on the overall soil conditions present in the area of the NGT and TEAL Projects and the applicants' proposed construction and operation methods, we conclude that construction and operation of the Projects would not significantly alter the soils of the region.

4.3 WATER RESOURCES

4.3.1 Groundwater resources

4.3.1.1 Existing Environment

Hydrogeologic Setting

NGT Project

Groundwater is an important resource in Ohio, where 42 percent of the population relies on groundwater for its water source (ODNR, 2016a), and in Michigan, where 50 percent of the population relies on groundwater (USGS, 1995b). The principal aquifers crossed by the NGT Project are comprised either of unconsolidated surficial sediments derived primarily from glacial, lacustrine, and alluvial deposits or consolidated and partially consolidated bedrock units confined by siltstone, shale, sandstone, limestone, and dolomite bedrock (Farrand and Bell, 1982; USGS, 1995a; USGS, 1995b).

The uppermost surficial aquifers along the NGT Project occur in glacial sediments deposited during the advance and retreat of continental ice sheets, or in lacustrine sediments. The glacial deposits are comprised of till, end moraine, and glacio-fluvial deposits and range in thickness from less than 100 to 600 feet in Ohio (USGS, 1995a) and 50 to 400 feet in Michigan (USGS, 1995b). Aquifers typically occur in sand and gravel deposited under glacio-fluvial conditions during periods of glacial retreat and melting. The lacustrine deposits consist of clay, silt, sand, and gravel derived from ancestral Lake Erie. Additionally, alluvial aquifers can occur in the valleys and floodplains of present-day rivers and streams. Although the surficial aquifers tend to be numerous and can locally serve as important aquifers, they tend to limited in areal extent (ODNR, 2016b). The most productive sand and gravel aquifers typically occur in alluvial deposits within buried bedrock valleys. Sand and gravel aquifers can yield well discharges ranging from 500 to 1,000 gallons per minute (gpm) where deposits are thickest, but lower yielding sand gravel aquifers are typically more common (Ohio Environmental Protection Agency [OEPA], 2014a). As discussed in section 4.3.1.2, an important surficial aquifer is located in the Oak Opening beach ridge sand deposits (approximate MP 181.0 to 191.0) formed by ancestral Lake Erie.

Figure 4.3.1-1 illustrates the principal bedrock aquifers crossed by the NGT Project (USGS, 2013). The predominant aquifers of eastern Ohio are comprised of confined Mississippian and Pennsylvanian sandstone units containing numerous siltstone and sandstone beds that vary in thickness and are typically separated by layers of shale and minor amounts of limestone, clay, and coal. Although some of the thicker sandstone and conglomerate aquifers can yield up to 50 to 100 gpm, 25 gpm is more typical of the well yields in the higher yielding sandstone aquifers.

Carbonate bedrock units, typically Silurian and Devonian limestone and dolomite, comprise the dominant aquifer type in western Ohio. These units have a total thickness of 300 to 600 feet. Although these aquifers can yield from 100 to over 500 gpm, where crossed by the NGT Project, they yield between 0 to 100 gpm. Higher well yields are commonly associated with the development of karst features that have increased secondary porosity created by fractures and dissolution features as described in section 4.1.3.4. However, some karst aquifers are more susceptible to contamination from the ground surface and, consequently, can produce water that is of poor quality that is not used for drinking water.

Bedrock confining layers comprise the first bedrock beneath the majority of the NGT Project route in Michigan where they are relatively impermeable and are not considered significant aquifers. Between MP 225.0 and MP 245.0, the NGT Project traverses the Silurian-Devonian bedrock aquifer, consisting mostly of dolomite and limestone approximately 300 to 400 feet thick with yields typically less than 50 gpm. Portions of the aquifer are unconfined and are overlain by surficial aquifers. At these locations the Silurian-Devonian aquifer tends to be more susceptible to contamination originating from the land surface than the portions that are overlain by confining units.

TEAL Project

The TEAL Project is underlain by Pennsylvanian sandstone bedrock aquifers that are typically confined and interbedded with siltstones and shales (OEPA, 2014a) (see figure 4.3.1-1). Wells in these aquifers typically yield 25 gpm but can range up to 50 to 100 gpm in areas where the aquifer is thicker. Well yields are typically less than 5 gpm where the aquifer contains thin bedded shales, limestones, sandstones, clays, and coal deposits.

Sole Source Aquifers

The EPA defines a sole source aquifer (SSA) or principal source aquifer area as one that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer, where contamination of the aquifer could create a significant hazard to public health, and where there are no alternative water sources that could reasonably be expected to replace the water supplied by the aquifer (EPA, 2015a). The NGT Project would not cross any designated SSAs (EPA, 2015b). On February 20, 2014, the Tuscarawas River Buried Valley Watershed Council petitioned the EPA to list the Tuscarawas River Buried Aquifer in Stark, Tuscarawas, and Wayne Counties as an SSA. The TEAL Project does not traverse any EPA-designated SSAs (EPA, 2015b).

Wellhead and Aquifer Protection Areas

Under the Safe Drinking Water Act (SDWA), each state is required to develop and implement a Wellhead Protection Program in order to identify the land and recharge areas contributing to public supply wells and prevent the contamination of drinking water supplies. The SDWA was updated in 1996 with an amendment requiring the development of a broader-based Source Water Assessment Program (SWAP), which includes the assessment of potential contamination to both groundwater and surface water through a watershed approach. A Wellhead Protection Area (WHPA) encompasses the area around a drinking water well where contaminants could enter and pollute the well.

In Ohio, the OEPA’s Division of Drinking and Ground Water (DDAGW) mandates public groundwater and surface water supply systems to establish a Source Water Assessment and Protection Program (SWAPP), which includes defining the well recharge area, identifying and managing potential sources of pollution, conducting groundwater monitoring, and developing a contingency plan.

In Michigan, the MDEQ Wellhead Protection Program (WHPP) is a voluntary program in which communities may choose to develop an approved local WHPP according to the guidelines established by the state, including delineation of WHPAs (MDEQ, 2012).

WHPAs crossed by the NGT Project in Ohio were identified using GIS data from the OEPA (2016) and are summarized in table 4.3.1-1. The NGT Project mainline would cross 15 WHPAs at 25 locations in Ohio. Four (4) of the WHPAs crossed are for non-community wells, and the remaining 12 are for community wells. None of the proposed compressor stations would be within a designated WHPA. The NGT Project would cross one WHPA in Monroe and Washtenaw Counties in Michigan (MDEQ, 2016).

The TEAL Project would not traverse any WHPAs.

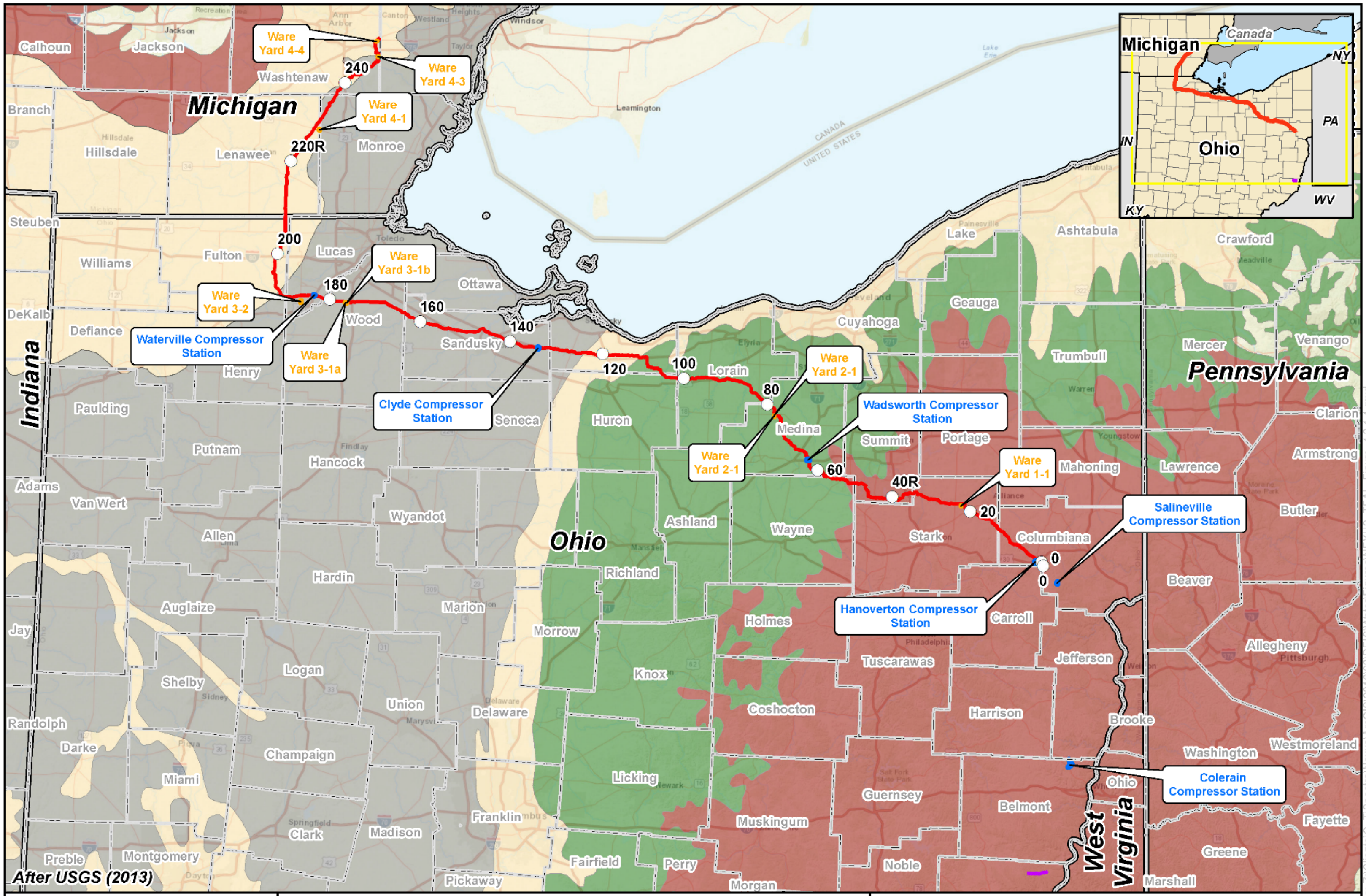

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Figure 4.3.1-1
NGT and TEAL Projects
Bedrock Aquifers

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Date: (4/21/2016)

TABLE 4.3.1-1

Wellhead Protection Areas Crossed by the NGT Project Mainline

State/County	From MP	To MP	Crossing Length (feet)	Water Supply Type	Name
Summit, OH	37.2	37.4	1,076	Community	Country View South Apartments
Summit, OH	37.4	37.6	1,435	Community	Greentree Place 4900 PWS[a]
Wayne, OH	57.4	57.7	1,297	Community	Rittman City PWS[a]
Wayne, OH	57.6	57.7	606	Community	Rittman City PWS[a]
Medina, OH	57.7	59.1	7,337	Community	Rittman City PWS[a]
Medina, OH	57.7	59.1	7,381	Community	Rittman City PWS[a]
Medina, OH	68.7	69.2	2,922	Community	Medina Co/Southern Water District PWS[a]
Medina, OH	68.9	69.2	1,799	Community	Medina Co/Southern Water District PWS[a]
Erie, OH	116.7	117.3	2,972	Community	Riverview Manor Apartments
Erie, OH	125.5	131.5	31,831	Community	Bloomville Village PWS[a]
Erie, OH	125.5	131.5	31,831	Community	Flat Rock Care Center
Erie, OH	125.5	131.5	31,831	Community	Republic Village
Erie, OH	125.5	131.5	31,831	Noncommunity	Ebenezer United Methodist Church
Erie, OH	125.5	131.5	31,831	Noncommunity	Melmore United Methodist Church
Sandusky, OH	131.5	133.4	10,072	Community	Bloomville Village PWS[a]
Sandusky, OH	131.5	133.4	10,072	Community	Flat Rock Care Center
Sandusky, OH	131.5	133.4	10,072	Community	Republic Village
Sandusky, OH	131.5	133.4	10,072	Noncommunity	Ebenezer United Methodist Church
Sandusky, OH	131.5	133.4	10,072	Noncommunity	Melmore United Methodist Church
Sandusky, OH	153.4	155.2	9,649	Community	Lindsey Village Water
Sandusky, OH	154.6	160.2	29,568	Community	Gibsonburg Village PWS[a]
Sandusky, OH	160.2	163.5	17,161	Community	Woodville Village
Wood, OH	164.8	164.9	538	Noncommunity	Sycamore Grove Bar
Wood, OH	173.0	173.5	2,596	Noncommunity	Tanglewood Golf Club
Monroe and Washtenaw, MI	236.3	238.8	12,830	Unknown	Milan

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[a] Public Water System

Sources: OEPA (2016); USGS and MDEQ (2002).

Water Supply Wells and Springs

GIS data from the OEPA (2016), ODNR (2016c), MDEQ (2016), and Michigan Department of Technology, Management, & Budget (2016), as well as preliminary field survey results from NEXUS and Texas Eastern, were used to identify public and private water supply wells and springs within 150 feet of construction workspaces (see appendix H-1). NEXUS and Texas Eastern would continue to identify nearby water supply sources through ongoing surveys and landowner communications.

NGT Project

As indicated in appendix H-1, 156 wells and 3 springs have been identified to date within 150 feet of the NGT Project mainline construction workspace in Ohio. The three springs are likely used for agricultural purposes. There are 43 wells within 150 feet of access roads and another 18 wells are within 150 feet of aboveground facilities, staging areas, or pipe/contractor yards.

In Michigan, 21 wells have been identified to date within 150 feet of the NGT Project mainline construction workspace. Additionally, as indicated in appendix H-1, one well is within 150 feet of the Willow Run M&R Station, three wells are within 150 feet of Ware Yard 4-1, and two wells are in the vicinity of access roads. No springs or seeps used for drinking water or agricultural purposes were identified near the NGT Project in Michigan.

TEAL Project

One private well and three springs have been identified within 150 feet of the TEAL Project construction workspace to date. The springs are likely being used by cattle.

Contaminated Groundwater

We accessed federal, state, and local government databases to identify facilities with potential and/or actual existing sources of contamination that may affect groundwater quality near the NGT and TEAL Projects. As discussed in section 4.9.6, numerous sites with known or suspected soil and groundwater contamination were identified within 0.25 mile of the NGT Project. Based on distance, regulatory status, and other information, the majority of these sites are unlikely to impact groundwater quality beneath the NGT Project. In section 4.9.6, we recommend that NEXUS further assess the potential for 11 of the sites to impact groundwater quality beneath the NGT Project and to provide site-specific contamination management plans for those sites determined to pose a risk to groundwater quality beneath the Project. One of these sites recommended for further review is a crude oil spill approximately 50 feet from the NGT Project at MP 37.4., which is in proximity to the WHPA for the Greentree Place 4900 Public Water System (MP 37.4 to 37.6). No known, contaminated sites with the potential to impact groundwater quality were identified within 0.25 mile of the TEAL Project.

Groundwater Use

Construction of the NGT and TEAL Projects would require approximately 70.1 million gallons of water for hydrostatic testing, HDD installations, and construction of aboveground facilities (see table 4.3.2-5). As discussed in section 4.3.2.1, approximately 67.0 million gallons (96 percent) of construction-related water would be obtained from surface water sources. The sources of the remaining 3.1 million gallons (4 percent) necessary for construction have not been identified to date, but could include groundwater resources. Operational groundwater requirements at existing or modified aboveground facilities would be minimal as none of the facility operations would require significant water use.

4.3.1.2 Impacts and Mitigation

Construction of the NGT and TEAL Projects would occur mostly above the water table; however, where the water table is within trench or grading depth, the elevation and flow characteristics of shallow groundwater resources could be affected by dewatering. Excavation could also increase turbidity within the resource. These impacts would be temporary, minor, and localized to the area near to construction, and would be further reduced by restoring surface contours to pre-construction conditions and implementing the applicants' *E&SCPs*, which include measures to avoid or minimize soil erosion in the trench and on the right-of-way, control the discharge of water in nearby uplands, and encourage revegetation after construction. After construction activities are complete, the applicants would restore the ground surface as closely as practicable to original contours and revegetate any previously vegetated, exposed soils to restore pre-construction overland flow patterns as well as groundwater recharge. Therefore, groundwater recharge is not expected to be impacted. Additionally, any impacts to groundwater flow resulting from the trench intersecting the water table would be minor and localized, and would not be expected to discernably impact the groundwater flow regime, or the quantity or quality of groundwater that is used for residential potable water supply. Since residential wells are screened at depths greater than the bottom of the pipeline trench, impacts to well yields are not anticipated even if the trench penetrates below the water table. In areas where backfill materials are more permeable than the substrate, trench breakers would be installed to eliminate preferential flow paths for shallow groundwater within the pipeline trench. As indicated in section 4.3.1.1, a crude oil release near a WHPA at MP 37.4 may have potential for contaminating groundwater near the NGT Project. Although not anticipated, if contaminated soil or groundwater is encountered during construction, the applicable agencies and FERC will be notified, and NEXUS would implement its *SPCC Plan* to manage and minimize the potential effects on groundwater from any existing contaminated sites and potential spills during construction. Additionally, if contaminated groundwater would occur within the backfilled trench, the trench breakers would mitigate its spread to uncontaminated portions of the surficial aquifer.

Construction of the NGT and TEAL Projects could increase turbidity and reduce capacity in nearby water supply wells. The applicants have identified wells within 150 feet of the construction workspaces and would verify well locations through final civil surveys and landowner communication. Blasting would be conducted in accordance with the Projects' *Blasting Plans* (see appendices E-1 and E-2) and specific plans designed to avoid damage to nearby structures including wells. The applicants would offer to conduct pre- and post-construction testing of water quality and yield in all wells within 150 feet of the construction workspace, and would repair or replace any wells that are damaged, or otherwise compensate the well owner. The applicants would file a report with the Secretary within 30 days of placing the facilities in service, discussing whether any complaints were received concerning well yield or water quality and how each was resolved. Fueling would be prohibited within 200 feet of a private well and within 400 feet of a public well. We anticipate that any increased turbidity or capacity reduction in wells would be minor and temporary, and conclude that the applicants' well identification, testing, and mitigation procedures would avoid or adequately address any impacts on wells.

An inadvertent release of fuel, lubricants, and other substances could impact groundwater quality. The degree of impact would depend on the type, amount, and duration of material released; the type of soil or geologic material at the land surface; the depth to groundwater; and the characteristics of the underlying aquifer. The potential for a release to impact groundwater is greater in areas of shallow groundwater, such as where the NGT Project would cross the Oak Openings area of western Ohio. To minimize and mitigate impacts, the applicants provided Project-specific *SPCC Plans* that specify contractor training, the use of environmental inspectors, procedures for the safe storage and use of hazardous materials, and remedial actions that would be taken to address a spill. We have reviewed these plans and find that they would sufficiently protect groundwater resources during construction of the NGT and TEAL Projects.

As indicated in table 2.3.2-1, NEXUS would use the HDD method to install its pipeline facilities at 18 locations; Texas Eastern would not utilize the HDD method. The HDD method is commonly used throughout the U.S. and involves the use of drilling mud to remove drill cuttings, lubricate the drill bit, and maintain the borehole. Drilling mud is comprised of water containing less than 2 percent high yield bentonite by volume. Bentonite is a naturally occurring, non-toxic, and non-hazardous clay mineral that is commonly used in the installation of potable water wells. Other additives may be incorporated into the drilling mud, including viscosifiers that are typically comprised of polymers.

Under normal conditions, drilling mud is recirculated and reused throughout the HDD process, with a small amount being retained in the immediate area of the borehole. If the drill bit encounters highly coarse materials, large fractures, or other large voids, drilling mud can be lost in the subsurface environment and potentially return to the land surface or wetlands and waterbodies along the drill path (referred to as inadvertent returns). The primary impact that lost drilling mud would have on groundwater quality would be increased turbidity. In general, the magnitude and duration of increased turbidity would depend on the volume of mud lost, and would diminish with distance and time from the point of loss. Water supply wells located downgradient from the point of loss could also experience increased turbidity and reduced capacity. NEXUS determined in its *HDD Design Report* (see appendix E-4) that the HDDs at the Sandusky, Portage, and Maumee Rivers would penetrate carbonate bedrock formations, where the potential for lost drilling mud would increase if large fractures or voids in the formation are encountered.

NEXUS has conducted geotechnical investigations at 15 of the 18 proposed HDD crossing locations to date and will complete geotechnical review of the remaining locations. Based on these geotechnical studies, site-specific HDD engineering plans were developed for each location and selected the drill path to minimize the potential for inadvertent returns, as presented in its *HDD Design Report*. NEXUS also developed a Project-specific *HDD Monitoring and Inadvertent Return Contingency Plan*, which details the measures that NEXUS would implement to monitor drilling progress and minimize the potential for inadvertent returns to occur. These measures would include:

- sizing the hole frequently by advancing and retracting the drill string in order to keep the annulus clean and unobstructed;
- when drilling mud flow has been suspended, establishing circulation slowly before advancing;
- operating at low annular pressures by minimizing density and flow losses. Viscosity should be minimized, consistent with hole cleaning and stabilization requirements;
- minimizing gel strength;
- controlling penetration rates, travel speeds, and balling of material on bits, reaming tools, and pipe in order to prevent a plunger effect from occurring;
- sealing a zone of lost circulation using a high viscosity bentonite plug or lost circulation materials, such as wood fibers, cotton seed husks, ground walnut, or special polymers; and
- suspending drilling activities for a period of 6 to 8 hours.

We have reviewed the site-specific HDD designs in the *HDD Design Report* and the *HDD Monitoring and Inadvertent Return Contingency Plan* prepared by NEXUS based on the current geotechnical evaluations and find that implementation of these plans would adequately protect groundwater resources in the NGT Project area. However, we are recommending in section 4.3.2.2 that NEXUS file the results of the outstanding geotechnical feasibility evaluations for our review and written approval, prior to beginning HDD construction at those locations.

Comments were received concerning potential impacts that construction of the NGT Project could have on public water supply systems for the City of Wadsworth, Ohio; the Village of Chippewa Lake, Ohio; and Sandusky County, Ohio. The City of Wadsworth is concerned that possible blasting during installation of the NGT Project mainline could adversely impact nearby municipal wells. Based on well data obtained from the ODNR, the nearest Wadsworth municipal well would be approximately 2 miles (near MP 56.1) from the NGT Project mainline; therefore, blasting would not be expected to impact the Wadsworth municipal well system.

The proposed mainline of NGT Project would traverse the Medina County Southern Water District Public Water Supply WHPA, which provides the water supply for Chippewa Lake, Ohio. For this and other reasons, we recommend in section 3.4.11 that the Chippewa Lake C Route Variation be used instead, which falls outside of that WHPA. Additionally, as noted previously, NEXUS would implement measures within its *E&SCP* and *SPCC Plan* to avoid or minimize impacts on groundwater resources. By following these mitigation measures and our recommendation for an alternative route, construction and operation of the NGT Project would not be expected to impact the Chippewa Lake water supply system.

Sandusky County raised concerns with the original routing of the NGT Project across the WHPA of two of its wells. In response to these concerns, NEXUS adopted a reroute that avoids the Sandusky County WHPAs, and states that the reroute is acceptable to Sandusky County. NEXUS would also implement measures in its *E&SCP* and *SPCC Plan* to avoid or minimize impacts on groundwater resources. Therefore, construction and operation of the NGT Project would not be expected to impact the Sandusky County water supply system.

In section 4.9.6, we recommend that NEXUS further assess whether 11 contaminated sites in the vicinity of the NGT Project could include contaminated groundwater and to develop site-specific plans to properly manage any contaminated groundwater, if necessary. Upon our review and approval of this additional information, any pre-existing contaminated groundwater that would be encountered would be properly managed or avoided.

Construction of the NGT and TEAL Projects could require the use of up to 3.1 million gallons of groundwater. This relatively small water withdrawal would be obtained from multiple sources throughout the Projects area and at various times during construction and, therefore, would not be expected to impact groundwater availability or the performance of existing wells in the area. In addition, water used during construction would be discharged in the area where it is used, further minimizing any effects on groundwater availability.

We received comments concerning the potential impact of a natural gas release from the proposed pipeline facilities on groundwater resources. The NGT and TEAL Projects would transport natural gas, not a liquid. Unlike a spill from a pipeline that conveys a liquid such as oil or gasoline, a leak of natural gas from a pipeline would dissipate quickly upwards to the atmosphere and not contaminate surrounding media.

Operational groundwater requirements at existing or modified aboveground facilities would be minimal because none of the facility operations involve process water. In addition, hazardous materials storage and use at aboveground facilities during construction and operation would be conducted in accordance with applicable regulations, which would include specifically designed containers and secondary containment structures, where necessary. Therefore, aboveground facilities operation is not expected to impact the availability of groundwater resources in the area nor pose a significant risk to groundwater quality.

4.3.1.3 Conclusions

In conclusion, construction and operation of the NGT and TEAL Projects could impact groundwater resources; however, as discussed previously, these impacts are expected to be minor, localized, and temporary, and would be avoided, minimized, or mitigated by implementation of the applicants' proposed construction and restoration plans and our additional recommendations, which are included in sections 3.4.11, 4.3.2.2, and 4.9.6. Therefore, construction and operation of the Projects is not expected to result in any significant impacts on groundwater resources.

4.3.2 Surface Water Resources

4.3.2.1 Existing Surface Water Resources

Surface water resources were identified using USGS topographic maps and verified by field surveys. Surface water resources documented in the NGT and TEAL Projects area include major rivers, streams, ponds, and tributaries. This section describes the surface water resources in the vicinity of the Projects.

The United States is divided and subdivided into successively smaller watershed units that are identified by the USGS using the Hydrologic Unit Code (HUC). Each hydrologic unit is identified by a unique HUC number consisting of 2 to 12 digits based on these 6 levels of classification: 2-digit HUC first-level (region), 4-digit HUC second-level (subregion), 6-digit HUC third-level (accounting unit or basin), and 8-digit HUC fourth-level (cataloguing unit), which are used herein to define watersheds for the NGT and TEAL Projects (USGS, 2014).

We define a waterbody as any natural or artificial stream, river, or drainage with perceptible flow at the time of crossing, and other permanent waterbodies such as ponds and lakes. Waterbodies include streams with perennial, intermittent, or ephemeral flow. Perennial streams flow year-round. Typically, intermittent streams flow continuously during wet seasons, but may be dry for a portion of the year. Ephemeral streams flow only for a short period following major rainfall events. Intermittent and ephemeral streams may be dry at the time of construction, depending on the time of year and precipitation conditions. We also define waterbodies as major, intermediate, and minor based on the width of the water crossing at the time of construction. Major waterbodies are those that are greater than 100 feet wide, intermediate waterbodies are greater than 10 feet wide but less than or equal to 100 feet wide, and minor waterbodies are those that are less than or equal to 10 feet wide.

NGT Project

The NGT Project facilities are located within the Ohio River and Great Lakes regional drainage basins, and are further subdivided into HUC-8 watersheds as illustrated in figure 4.3.2-1 and presented in table 4.3.2-1, which provides the beginning and end MP for each watershed crossed by the pipeline facilities.

Approximately 90 percent of the NGT Project facilities were surveyed for the presence of waterbodies along the route during the 2014 and 2015 field seasons. Field surveys for the remaining 10 percent would be conducted pending survey access and weather conditions. NEXUS used publically available USGS topographic quadrangles, 2-foot contour LIDAR mapping data, and aerial photography to approximate waterbody boundaries where field surveys have not yet been conducted. The waterbodies crossed by the pipeline facilities are listed in appendix H-2, including approximate MP, waterbody widths, flow classifications, crossings methods, and other state and federal designations.

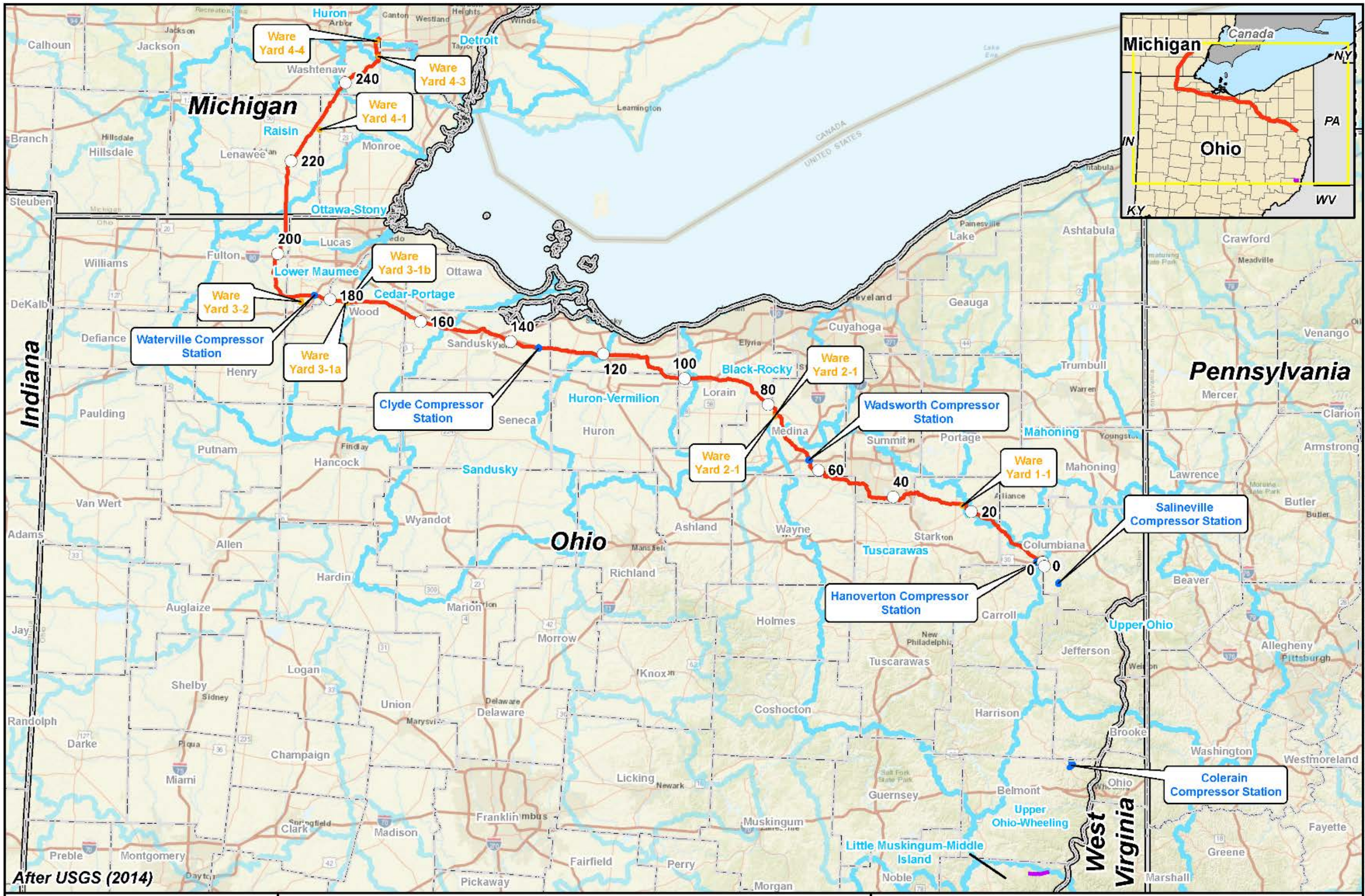

Figure 4.3.2-1
NGT and TEAL Projects Watersheds

TABLE 4.3.2-1

Watersheds Crossed by the NGT and TEAL Projects

State, Project, Facility	From MP	To MP	Crossing Length (mi)	HUC 8 Identifier	Watershed (HUC 8) Name
OHIO					
NGT Project					
TGP Interconnect	0.0	0.9	0.9	05030100	Upper Ohio
Mainline	0.0	0.3	0.3	05030101	Upper Ohio
	0.3	7.0	6.7	05040001	Tuscarawas
	7.0	7.1	0.1	05030103	Mahoning
	7.1	7.6	0.5	05040001	Tuscarawas
	7.6	8.6	1.0	05030103	Mahoning
	8.6	8.7	0.1	05040001	Tuscarawas
	8.7	8.8	0.1	05030103	Mahoning
	8.8	14.3	5.4	05040001	Tuscarawas
	14.3	14.3	0.1	05030103	Mahoning
	14.3	14.3	0.0	05040001	Tuscarawas
	14.3	21.2	6.9	05030103	Mahoning
	21.2	72.7	51.4	05040001	Tuscarawas
	72.7	97.7	25.0	04110001	Black-Rocky
	97.7	119.8	22.1	04100012	Huron-Vermilion
	119.8	154.8	35.0	04100011	Sandusky
	154.8	176.6	21.8	04100010	Cedar-Portage
	176.6	203.5	26.9	04100009	Lower Maumee
	203.5	208.3	4.8	04100001	Ottawa-Stony
TEAL Project					
Proposed Pipeline Loop	0.0	0.4	0.4	05030201	Little Muskingum-Middle Island
Connecting Pipeline	N/A	N/A	0.3	05030100	Upper Ohio
MICHIGAN					
NGT Project					
Mainline	208.3	209.4	1.1	04100001	Ottawa-Stony
	209.4	237.9	28.4	04100002	Raisin
	237.9	249.2	11.3	04100001	Ottawa-Stony
	249.2	253.7	4.5	04090005	Huron
	253.7	255.0	1.3	04090004	Detroit

N/A = Not applicable
Source: USGS, 2014

The NGT pipeline would cross a total of 107 different waterbodies and/or their tributaries (at 360 locations) in Ohio and 40 different waterbodies and/or their tributaries (at 90 locations) in Michigan. Of the 450 waterbody crossings, 198 are perennial, 151 are intermittent, 90 are ephemeral, five are classified as ponds, one is a reservoir, and five are unclassified. The NGT Project would cross a total of eight major waterbodies (at 10 locations): Huron River in Ohio, Sandusky River, tributary to Sandusky (classified as a pond), Portage River, Maumee River, Huron River in Michigan, Willow Run (classified as a pond) and a Tributary to Willow Run (classified as a pond).

As indicated in appendix H-2, 10 waterbodies would be crossed by temporary access roads and none by permanent access roads. No waterbodies were identified within the compressor station sites, M&R stations, MLV sites, or pipe/contractor yards.

TEAL Project

The TEAL Project facilities are located within the Upper Ohio-Beaver and Upper Ohio-Little Kanawha drainage basins (see figure 4.3.1-1) and cross three watersheds (8-digit HUC) as indicated in table 4.3.2-1.

Appendix H-2 lists 4 waterbodies and/or their tributaries (at 15 locations) that would be crossed by the TEAL pipeline facilities which include 10 perennial and 5 intermittent waterbodies. Twelve (12) of the 15 waterbodies crossed by the TEAL pipelines are classified as minor waterbodies and 3 are intermediate; none are major waterbodies. None of the TEAL aboveground facilities or access roads would impact waterbodies.

Surface Water Supplies and Surface Water Protection Areas

NGT Project

Public surface water intakes located within 3 miles downstream of the NGT Project mainline are summarized in table 4.3.2-2. Four surface water intakes in Ohio and one in Michigan would be located within 3 miles downstream of the NGT Project crossings.

TABLE 4.3.2-2

Surface Water Intakes within 3 Miles Downstream of NGT Project Crossings

County	Nearest MP	Municipality	Waterbody Intake
Lorain County, OH	91.4	Oberlin Water Department	West Branch Black River
Lorain County, OH	92.9	Oberlin Water Department	West Branch Black River
Fulton County, OH	197.2	Swanton Village	Swan Creek
Fulton County, OH	197.2	Swanton Village	Swanton Reservoir
Lenawee County, MI	215.6	Blissfield	River Raisin

Sources: Ohio: OEPA, 2016
Michigan: USGS and MDEQ, 2002

The NGT Project is located approximately 20.5 miles from the nearest Ohio River surface water intake (East Liverpool, Columbiana County, Ohio). Additionally, the NGT Project is located approximately 7 miles from the nearest Mahoning River surface water intake (Alliance, Stark County, Ohio).

Surface water protection areas crossed by the NGT Project are presented in appendix H-3. Surface public water systems are regulated by OEPA’s DDAGW. The OEPA requires that a SWAPP be established for all public surface water supply systems. Public watershed areas in Ohio include municipal watersheds and associated reservoirs as well as state and locally designated surface water protection areas. Based on OEPA GIS data (OEPA, 2016), the NGT Project crosses surface water protection areas located within the greater Ohio River SWAPPs, Mahoning River SWAPPs, West Branch Black River SWAPP, and Swanton Reservoir SWAPP.

Surface water protection areas for intakes in Michigan, determined by identifying the watershed upstream from a surface water intake, are defined as a critical assessment zone (CAZ). A 3,000-foot radius is applied to a CAZ for river intakes and a 1,000- to 3,000-foot radius is applied to lake intakes (USGS and MDEQ, 2002).

No public surface water intakes are located within 3 miles downstream of the TEAL Project waterbody crossing locations. As listed in appendix H-3, one surface water protection area would be crossed within the greater Ohio River SWAPP between MP 0.0 to 0.3. No aboveground facilities are located within surface water protection areas.

Water Classifications

Water quality classifications established by the states of Ohio and Michigan are also presented in appendix H-2 for the waterbodies crossed by the Projects. Water use designations for aquatic life habitat in Ohio include:

- Warmwater Habitat (WWH): waters that are capable of supporting and maintaining a balanced, integrated, adaptive community of warmwater aquatic organisms having a species composition, diversity, and functional organization comparable to the 25th percentile of the identified reference sites within each of the following ecoregions: the interior plateau ecoregion, the Erie/Ontario lake plains ecoregion, the western Allegheny plateau ecoregion, and the eastern corn belt plains ecoregion. For the Huron/Erie lake plains ecoregion, the comparable species composition, diversity, and functional organization are based upon the 90th percentile of all sites within the region.

- Modified Warmwater Habitat (MWH): applies to extensively modified habitats that are capable of supporting the semblance of a warmwater biological community, but fall short of attaining WWH because of functional and structural deficiencies due primarily to altered macrohabitats.

The water use quality designations for aquatic life habitat in the state of Michigan includes WWH, defined there as all surface waters of the state that are designated and protected for warm water fisheries. Although there are specific rivers and inland lakes that are designated and protected for cold water fisheries, none are crossed by the NGT Project in Michigan.

The states of Michigan and Ohio assume that all streams support agricultural and industrial water supply uses. The only water supply designation types that are crossed by the NGT Project are:

- Agricultural Water Supply (AWS): waters suitable for irrigation and livestock watering without treatment.

- Industrial Water Supply (IWS): waters suitable for commercial and industrial uses, with or without treatment. Criteria for the support of the industrial water supply use designation will vary with the type of industry involved.

Designations for state recreation classification in Ohio are only in effect during the recreation season, which is the period from May 1 to October 31. Primary Contact Classes A, B, and Secondary Contact recreational uses are crossed by the NGT Project. Primary Contact waters, during the recreation season, are suitable for one or more full-body contact recreation activities such as, but not limited to, wading, swimming, boating, water skiing, canoeing, kayaking, and scuba diving. Three classes of Primary Contact Recreation use are defined to reflect differences in the observed and potential frequency and intensity of usage. State recreation classifications are identified in rules 3745-1-08 to 3745-1-30 of the Ohio Administrative Code (OAC) and defined as follows:

- Primary Contact A: These are waters that support, or potentially support, frequent primary contact recreation activities. These streams and rivers are popular paddling streams with public access points developed, maintained, and publicized by governmental entities.

- Primary Contact B: These are waters that support, or potentially support, occasional primary contact recreation activities. All surface waters of the state are designated as Class B Primary Contact Recreation (unless otherwise designated as bathing waters), Class A Primary Contact Recreation, Class C Primary Contact Recreation, or Secondary Contact Recreation.

- Secondary Contact: These are waters that result in minimal exposure potential to water-borne pathogens because the waters are rarely used for water-based recreation (e.g., wading); are situated in remote, sparsely populated areas; have restricted access points; and have insufficient depth to provide full body immersion, thereby greatly limiting the potential for water-based recreation activities.

At a minimum, all surface waters in Michigan are designated and protected by the MDEQ for the partial-body contact recreation and total-body contact recreation designations. Partial body contact recreation is designated throughout the year and total-body recreation is designated from May 1 through October 1. Most designations have two or more types of assessment that may be used to determine support. These types of assessment include biological, physical/chemical, toxicological, pathogen, other public health, and other aquatic health indicators. These designations are defined as follows:

- Partial Body Contact: These are waters that support, or potentially support, occasional partial body contact recreation activities. Partial body recreation activities include, but are not limited to, paddling, canoeing, and kayaking, and are protected in all surface waters year-round in Michigan.

- Total Body Contact: These are waters that support, or potentially support, occasional total-body contact recreation activities. Total body contact recreation activities include activities such as swimming, and all surface waters in Michigan are protected from May 1 through October 1 for such activities.

Sensitive Surface Waters

Sensitive surface waters include waterbodies that have been designated for intensive water quality management, waters containing federally or state-listed threatened or endangered species and/or critical habitats, any waters afforded national or state designated status, and Section 10 Navigable Waterways. Table 4.3.2-3 summarizes the sensitive surface waters crossed by the NGT and TEAL Projects by milepost and applicable designated categories. NEXUS and Texas Eastern have indicated that all of these waterbodies would be crossed by the HDD method except for the East Fork Vermillion River, which would be crossed using the dry cut method.

The FWS, ODNR, and Michigan Department of Natural Resources (MDNR) identified that the NGT and TEAL Projects are located within the range of federal- and state-listed species. Survey work for federal and state listed species is ongoing for waterbodies located along the NGT Project route. Information regarding federal and state listed species that may be associated with waterbodies crossed by the NGT and TEAL Projects is presented in section 4.8.

TABLE 4.3.2-3

Sensitive Waters Crossed by the NGT Project Pipeline Facilities

State, Facility	County	Milepost	Waterbody ID	Waterbody Name	NRI ORV [a]	State Designation [b]	Crossing Method
OHIO							
Mainline	Lorain	86.7	A14-50-S1	East Branch Black River	S, R, H	N/A	HDD
	Lorain	92.4	C15-8-S4	West Branch Black River	S, G, W, H	N/A	HDD
	Lorain	99.3	C15-66-S1	East Fork Vermillion River	S, F, R	N/A	Dry Cut
	Huron	104.4	C15-56-S4	Vermillion River	S, F, R	OSW-E	HDD
	Erie	116.9	A14-186-S1/AS-ER-19 [c]	Huron River	N/A	N/A	HDD
	Sandusky	145.9	AS-SA-699 [c]	Sandusky River	R, H	N/A	HDD
	Wood/Lucas	181.5	E14-55-S1 [c]	Maumee River	N/A	OSW-R	HDD
MICHIGAN							
TGP Interconnecting Pipeline	Washtenaw	250.9	D15-21-S1	Huron River	R, F, H	N/A	HDD

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[a] NRI ORV Definitions

Scenery (S): The landscape elements of landform, vegetation, water, color, and related factors result in notable or exemplary visual features and/or attractions. When analyzing scenic values, additional factors—such as seasonal variations in vegetation, scale of cultural modifications, and the length of time negative intrusions are viewed—may be considered. Scenery and visual attractions may be highly diverse over the majority of the river or river segment.

Recreation (R): Recreational opportunities are, or have the potential to be, popular enough to attract visitors from throughout or beyond the region of comparison or are unique or rare within the region. Visitors are willing to travel long distances to use the river resources for recreational purposes. River-related opportunities could include, but are not limited to, sightseeing, wildlife observation, camping, photography, hiking, fishing, and boating.

Geology (G): The river, or the area within the river corridor, contains one or more example of a geologic feature, process, or phenomenon that is unique or rare within the region of comparison. The feature(s) may be in an unusually active stage of development, represent a "textbook" example, and/or represent a unique or rare combination of geologic features (erosional, volcanic, glacial, or other geologic structures).

Fish (F): Fish values may be judged on the relative merits of either fish populations, habitat, or a combination of these river-related conditions.

Wildlife (W): Wildlife values may be judged on the relative merits of either terrestrial or aquatic wildlife populations, habitat, or a combination of these conditions.

History (H): The river or area within the river corridor contains a site(s) or feature(s) associated with a significant event, an important person, or a cultural activity of the past that was rare or one-of-a-kind in the region. Many such sites are listed on the National Register of Historic Places. A historic site(s) and/or features(s) is 50 years old or older in most cases.

[b] State Designations are based on the OEPA Antidegradation Rule definitions.

Ohio Special Waters (OSW)-E: Waters that have special significance for the state because of their exceptional ecological values.

OSW-R: Waters that have special significance for the state because of their exceptional recreational values.

[c] Waterbodies designated as Navigable under USACE Section 10 of the Rivers and Harbors Act.

NRI = National Rivers Inventory

ORV = Outstandingly remarkable value

USACE = U.S. Army Corps of Engineers

Sources: NPS, 2011; National Wild and Scenic Rivers System; 2014 (unless otherwise noted)

NGT Project

We reviewed, the National Rivers Inventory (NRI) (National Park Service [NPS], 2011), National Wild and Scenic River System (2014) maps, and available state regulations and mapping to identify federal and state exceptional quality waters crossed by the NGT Project. The NRI is an inventory of over 3,400 free-flowing river segments in the U.S. designated as having outstandingly remarkable values (ORV) due to the presence of cultural or natural resources considered to be more than local or regional in their significance. Federal agencies are required to avoid or mitigate actions that would adversely affect one or more NRI segments (NPS, 2011). Table 4.3.2-3 identifies the six NRI river segments that the NGT Project would cross, as well as their ORV characteristics.

A review of the National Wild and Scenic River list (National Wild and Scenic Rivers System, 2014) determined that there are no federally designated Wild and Scenic Rivers crossed by the NGT Project in Ohio.

The OEPA Antidegradation Rule 3745-1-05 of the OAC identifies stream segments that have exceptional water quality, special ecological significance, or recreational value. The NGT Project crosses two stream segments of exceptional value: the Vermillion and Maumee Rivers (see table 4.3.2-3).

We also reviewed MDNR's list of designated natural streams (MDNR, 2015) as well as National Wild and Scenic Rivers System (2014) listings, and determined that the NGT Project does not cross any waterbodies designated as such.

The NGT Project crosses three navigable waterbodies in Ohio as defined in Section 10 Rivers and Harbors Act of 1899: the Huron River (MP 116.9), Sandusky River (MP 145.9), and Maumee River (MP 181.6). There are no navigable waters crossed in Michigan.

TEAL Project

The TEAL Project does not cross any designated NRI outstandingly remarkable waterbodies; waters designated by the state of Ohio as having exceptional water quality, special ecological significance, or recreational value; National Wild and Scenic Rivers; or navigable waters.

Impaired Surface Waters

Waters that do not meet state water quality standards are considered impaired. Section 303(c) of the Clean Water Act requires states to develop and maintain lists of waters that are impaired and do not meet water quality requirements. Appendix H-4 lists the Ohio (OEPA, 2014b) and Michigan 2014 Section 303(d) lists of impaired streams that would be crossed by the NGT and TEAL Projects, including the cause of impairment for each. We identified a total of 317 impaired stream crossings in Ohio along the NGT Project mainline pipeline, 2 of which are attributable to the TGP Interconnect pipeline and some which may represent more than 1 crossing of the same stream. The NGT Project would cross 32 impaired waterbodies in Michigan. The TEAL Project would cross only one impaired stream in Ohio.

Federal Emergency Management Agency Flood Zones

Federal digital flood data was reviewed to identify where the Projects facilities would be located in areas subject to flooding, as defined by the FEMA according to varying levels of flood risk and type of flooding. These zones are depicted on the FEMA's Flood Insurance Rate Maps or Flood Hazard Boundary Maps as Special Flood Hazard Areas that have a 1-percent-annual chance of flooding (FEMA, 2016). Appendix H-5 identifies FEMA Flood Zones crossed by the NGT pipeline facilities, by MP range, and includes 122 locations. All of the aboveground facilities would be sited outside of FEMA flood zones. No TEAL Project facilities would be located within a flood zone.

4.3.2.2 Impacts and Mitigation

Construction

Pipeline construction across rivers and streams or adjacent to surface waters can result in temporary and long-term adverse environmental impacts if not properly completed. Construction activities including clearing and grading of adjacent land, in-stream trenching, trench dewatering, and backfilling would temporarily increase sedimentation and turbidity rates, decrease dissolved oxygen concentrations, result in the loss and modification of aquatic habitat, and increase the potential for the introduction of fuels and oils from accidental spills. Indirect or secondary impacts could occur to fisheries and other aquatic organisms that utilize the water resources. However, proper construction techniques and timing can ensure that any such effects are both temporary and minor.

The applicants would use one of three general methods to install the proposed pipeline across waterbodies, including the open-cut wet method, dry crossing method (flumed and dam and pump), and boring methods, which could be either the conventional bore or the HDD method. The proposed crossing method for each waterbody crossed is identified in appendix H-2.

The wet open-cut method uses conventional construction techniques with no temporary diversion structures (e.g., flume pipes, cofferdams) during construction of the crossing. Wet open-cut would be used to cross waterbodies that are dry during the time of the crossing and that have no discernible or anticipated flow regardless of the crossing method listed in appendix H-2.

Dry open-cut waterbody crossings are conducted by installing a flume pipe(s) and/or a dam and pump prior to trenching to divert the stream flow to the downstream side of the crossing during construction, creating drier conditions by isolating the construction area from the stream flow, as detailed in the Projects' *E&SCPs*. The pipe string would be prefabricated into one continuous section on one bank and either pulled across the stream bottom to the opposite bank, floated across the isolated portion of the stream, or carried into place and lowered into the trench. Diversion devices would be left in place during pipeline installation until final cleanup of the streambed is complete.

Impacts of the open-cut construction method would generally be localized, short-term, and minor. The degree of impact would depend, in part, on the flow volume during construction and the waterbody substrate that would be affected by the crossing. If construction occurs during a dry period, most of the impacts on streams would be avoided.

Waterbodies would be crossed as quickly and safely as possible to minimize potential impacts on surface waters. With the exception of the initial clearing equipment, only equipment necessary for in-stream excavation and backfilling would be allowed in a stream channel. All other equipment would cross waterbodies on temporary equipment bridges that would be constructed in accordance with the applicants' construction plans. In addition, where access roads would be in close proximity to a waterbody, the applicants would install silt fence along the edge of the access road to avoid impacts on the waterbody and minimize sedimentation.

As indicated in appendix H-2, the conventional bore method is proposed for crossing 69 waterbodies of the NGT Project, but not proposed for any of the waterbodies crossed by the TEAL Project. The bore method employs specialized boring equipment to advance a borehole in which the pipe would be installed and requires that bore pits be excavated on each side of the waterbody to allow installation of the pipeline beneath the waterbody.

Although the majority of the waterbodies along the NGT Project would be crossed with either dry or wet open-cut construction methods, 30 waterbodies would be crossed using the HDD method at 16 locations, as addressed in section 2.3.2.1 and summarized in table 4.3.2-4. The *HDD Design Report* (see appendix E-4) provides further details specific to each HDD crossing, including crossing diagrams.

TABLE 4.3.2-4

Summary of Waterbodies Crossed by NGT Project HDDs

State, Waterbody ID	Waterbody Name	HDD Name	Milepost
OHIO			
AS-SU-200	Nimisila Reservoir	Nimisila Reservoir	41.1
C15-28-S1	Tuscarawas River	Tuscarawas River	48.1
C15-44-S1	Unnamed	Wetland	71.1
A14-46-S2	Unnamed	Wetland	71.3
A14-46-S1	Unnamed	Wetland	71.4
A14-50-S1	East Branch Black River	East Branch Black River	86.7
C15-8-S2	Tributary to West Branch Black River	West Branch Black River	92.3
C15-8-S3	Tributary to West Branch Black River	West Branch Black River	92.3
C15-8-S4	West Branch Black River	West Branch Black River	92.4
C15-56-S1	Vermilion River	Vermilion River	104.2
C15-56-S4	Vermilion River	Vermilion River	104.4
C15-56-S4B	Vermilion River	Vermilion River	104.4
C15-56-S4A	Vermilion River	Vermilion River	104.5
B15-115-S1	Unnamed	Interstate 80	110.3
AS-ER-19	Huron River	Huron River	116.9
A14-186-S1	Huron River	Huron River	116.9
AS-ER-20A	Unnamed Tributary to Huron River	Huron River	117.0
AS-ER-20	Unnamed Tributary to Huron River	Huron River	117.1
AS-SA-699	Sandusky River	Sandusky River	145.9
AP-SA-700	Unnamed Tributary to Sandusky River	Sandusky River	146.0
D15-26-S1	Portage River	Portage River	162.5
E15-8-S1	Unnamed	Findlay Road	179.9
D15-101-S1	Unnamed	Findlay Road	180.0
D15-99-S1	Unnamed	Findlay Road	180.1
E14-55-S1	Maumee River	Maumee River	181.6
D15-48-S1	Maumee River	Maumee River	181.9
MICHIGAN			
E14-140-S1	River Raisin	River Raisin	215.2
E14-157-S1	Saline River	Saline River	237.3
D15-21-S1	Huron River	Hydro Park	250.9
AS-WA-401	Unnamed	Highway 12/RACER Property	254.3

Waterbody crossings completed using the HDD method generally avoid and significantly minimize surface water impacts resulting from erosion, sedimentation, and/or excess turbidity by limiting the surface disturbance in and immediately adjacent to the waterbody. Bentonite drilling mud is circulated in the borehole during drilling to lubricate the drill bit, stabilize the borehole, and remove the cuttings. There is potential for the HDD method to result in an inadvertent release of drilling mud to the ground surface or waterbody. Accidental releases of drilling mud can result in negative impacts on waterbodies. When drilling mud is released into a waterbody, it may settle out and disperse downstream by the current depending on the nature of the waterbody (e.g., stream size and flow rate). The effects of releasing drilling mud to a waterbody could range from localized turbidity and sedimentation, which could be quickly diluted by the waterbody's flow, to significant turbidity and sedimentation, which could be carried farther downstream. Small or slow moving waterbodies may exhibit minimal dispersal of drilling mud, and thus increased sedimentation at the release point. Large-scale drilling mud releases could be capable of killing fish, altering water chemistry, changing water temperature, and altering habitat.

To avoid or minimize impacts, NEXUS has developed a site-specific *HDD Design Report* (see appendix E-4) that outlines specific procedures and methods for each HDD crossing, including measures that NEXUS would implement to monitor drilling progress and minimize the potential for inadvertent returns to occur. These measures are further described in sections 2.3.2.1 and 4.3.1.2. NEXUS would obtain the necessary USACE and state permits, and would conduct drilling in accordance with permit conditions. Additionally, NEXUS would follow the monitoring and response action protocols of the *HDD Monitoring and Inadvertent Return Contingency Plan* (see appendix E-4) during all HDD drilling operations. According to the *HDD Design Report*, none of the sites have subsurface conditions that are expected to prevent installation by HDD, based on the subsurface data collected to date, though some HDDs have a higher risk of experiencing difficulty during installation. NEXUS was not able to adequately characterize risk at four of the proposed HDD sites, including the Nimisila Reservoir (MP 41.1), Tuscarawas River (MP 48.1), West Branch of the Black River (MP 92.4), and the U.S. Highway 12/RACER site (MP 254.3). Therefore, **we recommend that:**

- **Prior to the end of draft EIS comment period, NEXUS should file with the Secretary geotechnical feasibility studies for the Nimisila Reservoir (MP 41.1), Tuscarawas River (MP 48.1), West Branch of the Black River (MP 92.4), and the U.S. Highway 12/RACER site (MP 254.3).**

NEXUS would implement measures detailed in its Project-specific *HDD Monitoring and Inadvertent Return Contingency Plan* to avoid or minimize the inadvertent release of drilling mud. This includes general procedures for the containment and cleanup of drilling mud should a release occur at one or more of the HDD sites. We have reviewed this plan and find it acceptable. In the event that an HDD were to fail at a particular location, NEXUS would abandon the drill hole, relocate the HDD operation to an adjacent area within the approved workspace, and commence drilling a new hole. If that is unsuccessful, a different crossing method, such as wet trench construction, would be required.

NEXUS characterized three HDD sites as high risk of experiencing difficulty during construction, including the Sandusky River (MP 145.9), Maumee River (MP 181.6), and Huron River (MP 250.9). Each of these rivers is designated as senisitive for fish, recreation, and/or historic values. Because these waterbodies are sensitive and the sites are high risk, **we recommend that:**

- **Prior to the end of the draft EIS comment period, NEXUS should file with the Secretary an assessment of why HDD is the preferred crossing method for the Sandusky River (MP 145.9), Maumee River (MP 181.6), and Huron River (MP 250.9), as opposed to an alternative crossing method, such as winter wet trench construction or direct pipe installation.**

NEXUS indicated in its *E&SCP* that it would prepare a contingency crossing plan for each HDD of a waterbody or wetland in the event HDD is unsuccessful. To date, NEXUS has not submitted any alternative contingency crossing plans to the FERC. Therefore, **we recommend that:**

- **In the event of an unsuccessful directional drill, NEXUS should file with the Secretary a plan for the crossing of the waterbody. This should be a site-specific plan that includes scaled drawings identifying all areas that would be disturbed by construction. NEXUS should file this plan concurrent with submission of its**

application to the USACE for a permit to construct using this plan. The Director of OEP must review and approve this plan in writing before construction of the crossing.

Geotechnical drilling would be conducted near the stream banks to identify the need for drilling or blasting. If the presence of rock indicates the need for blasting, the ditch crew would prepare the trench line. If in-water blasting is determined to be necessary, the applicants would follow mitigation measures provided in the Projects' *Blasting Plans* (appendices E-1 and E-2, respectively) to avoid or minimize impacts on surface waters.

Spills of gas, lubricants, and other materials during construction have the potential to impact surface water quality and aquatic organisms. As previously described, the applicants have prepared Project-specific *SPCC Plans* detailing procedures for fueling, storage, containment, and cleanup of hazardous materials to minimize the potential for a release into a waterbody. Measures prescribed in these *SPCC Plans* include storing any hazardous materials, chemicals, lubricating oils, solvents, or fuels used during construction in upland areas at least 100 feet from wetlands and waterbodies. Additionally, refueling or lubricating of vehicles or equipment would be prohibited within 100 feet of a waterbody except where absolutely necessary.

Sedimentation of waterbodies would be minimized by placing trench spoil excavated from streambeds and banks at least 10 feet from the top of the waterbody bank or within the ATWS located 50 feet from the water's edge, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land. Additionally, silt fences and other best management practices (BMP) would be implemented at the edges of the spoil piles to prevent sediment from entering the waterbody.

Following placement of the pipeline across the waterbody, the stockpiled spoil material would be placed back in the trench, and the stream banks and streambed would be restored as close to their pre-construction contours as feasible. Stream banks and riparian areas would be revegetated in compliance with the Projects' *E&SCPs*, as well as with any permit and agency requirements. If the open trench accumulates water from either precipitation or groundwater discharge, the trench would be dewatered periodically to allow for proper and safe construction. Any necessary trench dewatering would be monitored and the water would be discharged into appropriate receiving structures for filtration prior to release and directed into well vegetated areas and allowed to infiltrate. Additionally, as previously indicated, HDD would be used to cross major waterbodies and specially designated surface waters to avoid in-stream disturbance and to minimize tree clearing at the stream banks.

Adherence to the measures described previously, as well as the Projects' *E&SCPs* and permit and agency regulatory requirements, would adequately reduce potential impacts on waterbodies by minimizing streamside vegetation clearing, requiring installation and maintenance of temporary and permanent erosion controls, and minimizing the duration of in-stream construction. Disruption to water flow would be limited to only that necessary to construct the crossing and would reduce the suspension and deposition of sediments downstream of the crossing location. Adequate flow rates would be maintained in streams to limit the potential impacts on aquatic life. Temporary equipment crossing bridges would be installed to allow equipment access across waterbodies.

Implementation of the NGT Project *E&SCP*, crossing methods, and distance between waterbody crossings and surface water intakes are mitigating factors for protecting water quality at public surface water intakes downstream of waterbody crossings. Using the *Michigan's Source-Water Assessment Program- Surface-Water Assessments Leading to Protection Initiatives* 2002 report, it was determined that, although the Blissfield surface water intake along the River Raisin (MP 215.2) is located within 3 miles of the NGT Project pipeline facilities, its CAZ intake is located outside of the NGT Project crossing. In addition, NEXUS is proposing to use the HDD method for crossing of the River Raisin to avoid impacts on the river or the Blissfield surface water intake and water supply. There are no other identified public surface water intakes within 3 miles of the NGT Project. HDD would also be used to cross the West Branch Black, and conventional bore techniques would be used to cross Swan Creek, avoiding direct impacts on these public source water streams. Although Swanton Reservoir is downstream and lies within 3 miles of two waterbody crossings, the actual distance downstream following the channel centerline is approximately 3.5 miles. Because of this distance, we conclude that the waterbody crossings would not impact water quality at the intake in Swanton Reservoir.

Following installation and backfilling of the pipeline, suspended sediments and turbidity within waterbodies would decline to pre-construction levels. Waterbody banks would be stabilized within 24 hours of backfilling in accordance with the Projects' *E&SCPs*, weather and soil conditions permitting. Permanent erosion control structures would be installed in accordance with the applicants' construction plans. Stabilization, restoration, and revegetation of the pipeline rights-of-way and extra workspaces would also be completed in accordance with these measures and state stormwater discharge permits. During operation of the facilities, a 25-foot-wide riparian strip adjacent to waterbodies would be allowed to revegetate with native plant species within the construction right-of-way, and a 10-foot-wide corridor above the pipeline may be maintained to allow pipeline corrosion/leak surveys. No in-water work would be expected during maintenance and operation of the Projects' facilities.

Seasonal and flash flooding hazards are a potential concern where the pipeline would cross or be near major streams and small watersheds. As noted in section 4.3.2.1, the NGT Project traverses flood zones as defined by FEMA, which are listed in appendix H-5. Impacts and mitigation pertaining to flooding and flash floods are addressed in section 4.1.5.7.

ATWS would be required adjacent to waterbody crossings to facilitate pipeline construction techniques used for crossing these resource areas. Typically, ATWS is used for staging equipment, assembly and fabrication of the pipe section(s), or for spoil storage. The FERC Procedures require that ATWS be setback at least 50 feet from the edge of waterbodies; however, in some instances those setback distances may not be met due to site-specific conditions (e.g., topographic conditions, proximity to other features such as roadways). The applicants have requested approval for specific modifications to the requirements of our *Procedures* in regard to 53 specific instances for the NGT Project and 16 instances for the TEAL Project of placing ATWS within 50 feet of waterbodies where the adjacent upland does not consist of cultivated or rotated cropland or other disturbed land.

The Projects' *E&SCPs* specify that extra workspace should not be within 50 feet of waterbodies on previously undisturbed land except where an alternative measure has been requested by NEXUS or Texas Eastern and approved by the FERC. Areas where NEXUS or Texas Eastern have requested extra workspace and stated that a 50-foot setback from waterbodies is infeasible (including its justification) are identified in appendix H-6. We have reviewed the justifications and deem them acceptable for the NGT Project due to site-specific conditions such as topographic conditions, proximity to other features such as roadways, foreign utility crossings, existing building structures, and other justifications provided in appendix H-6. To date, Texas Eastern has not fully justified its request to locate ATWS within 50 feet from a total of seven workspaces. Therefore, in order to determine whether the ATWS is necessary, **we recommend that:**

- **Prior to the end of the draft EIS comment period, Texas Eastern should file with the Secretary additional justification for ATWS-13, 14, 18, 19, 35, 36, and 37 or move those workspaces to a distance of 50 feet or greater from wetlands and waterbodies.**

4.3.2.3 Water Withdrawal

Constructing the Projects would require the use of water for hydrostatic testing, dust control, and the HDD construction method. The DOT requires hydrostatic testing to be completed on pipeline segments before they are placed in service under 49 CFR Part 192. Hydrostatic testing involves the use of water that is pressurized within pipeline segments to determine that the installed pipeline is free from leakage and possesses the strength to safely operate at the proposed maximum allowable operating pressure. Water withdrawal would also be required for dust control and for mixing the bentonite slurry used as drilling mud for the HDD construction method. Each state administers programs to regulate the withdrawal and discharge of water used for hydrostatic testing under the federal NPDES.

Surface waterbody withdrawals would be conducted by using pumps placed adjacent to the waterbody with hoses placed into the waterbody. Intake structures would be floated so they are not laying on the streambed, and would be screened to prevent the uptake of aquatic organisms and fish. Water withdrawals would be conducted in compliance with all necessary permits required for surface water extraction. In order to minimize impacts associated from water uses, low flow conditions would be avoided. Efforts would be made to reuse water between test segments to decrease water withdrawal volumes. After the testing is complete, the discharges would be directed to dewatering structures located in well-vegetated upland areas and within the same watershed as the source. No significant water quality impacts are anticipated as a result of discharge from hydrostatic testing. The new pipeline installed as part of the Projects would consist of new steel pipe that would be free of chemicals or lubricant and no additives would be used. Moreover, the applicants do not anticipate using chemicals for testing or for drying the pipelines following hydrostatic testing. Potential impacts resulting from the discharge of water to upland areas would generally be limited to erosion of soils, which would be minimized by adhering to the measures contained in the Projects' *E&SCPs*. Mitigation measures would include discharging test water to a well-vegetated and stabilized area, maintaining at least a 50-foot vegetated buffer from adjacent waterbody/wetland areas, using sediment barriers or similar erosion control measures, regulating discharge rate, and using energy dissipating device(s).

The source waters would be located in proximity to the construction areas and required test sections, and based on their ability to supply a sufficient volume of water for the testing process without compromising normal waterbody dynamics and ecology. Table 4.3.2-5 presents approximate MPs, estimated withdrawals, and water sources for the proposed hydrostatic test waters for pipeline segments, aboveground facilities, and HDD segments for the Projects. In total, the Projects would require approximately 67.5 million gallons of water for hydrostatic testing of the pipeline facilities, 0.8 million gallons for testing the aboveground facilities, and 1.8 million gallons for HDD crossings. Test sections are selected based on several factors, including pipe parameters, the elevation changes within the alignment, the target design pressure, and the class locations of the pipeline facilities.

NGT Project

To the extent practicable, NEXUS would transfer hydrostatic test water from one test segment to the next, which would reduce the volume of test water required.

NEXUS' preliminary evaluations have identified municipal water sources and nine different waterbodies as potential hydrostatic test water sources for the NGT Project pipeline facilities. Hydrostatic test waters used for the proposed compressor and M&R stations likely would be obtained from municipal water sources. NEXUS is investigating the option of installing on-site water wells at the Wadsworth and Clyde Compressor Stations that would provide the source water for hydrostatic testing. For the NGT Project HDDs, water would be obtained from the waterbody being crossed or trucked in from an approved Project source. NEXUS would obtain the appropriate NPDES general permit from the OEPA and MDEQ for discharge of the hydrostatic test water following the hydrostatic testing.

TABLE 4.3.2-5

Potential Sources of HDD and Hydrostatic Test Water for NGT and TEAL Projects

State, Project, Facility	Approximate MP/Facility Name	Potential Source(s) [a, b]	Estimated Volume Uptake (gallons) [c]
NGT PROJECT			
OHIO			
Mainline	MP 25.2	Unnamed Lake	13,841,520
	MP 92.3	Tributary to West Branch Black River	10,846,130
	MP 86.7	East Branch of Black River	Unknown
	MP 116.9	Huron River	9,644,494
	MP 123.4	Unnamed Lake	Unknown
	MP 145.9	Sandusky River	8,421,233
	MP 181.6	Maumee River	11,137,999
	MP 162.5	Portage River	Unknown
Interconnect Pipeline to TGP	MP N/A	Water Truck	232,848
Compressor Stations	Hanoverton	Water Truck	154,211 [d]
	Wadsworth	Water Truck	85,545 [d]
	Clyde	Water Truck	129,552 [d]
	Waterville	Water Truck	104,407 [d]
M&R Stations	MR01	Water Truck	27,056 [e]
	MR02	Water Truck	31,497 [e]
	MR03	Water Truck	32,257 [e]
	MR04	Water Truck	44,669 [e]
	MR05	Water Truck	27,056 [e]
HDDs	MP 7.7 Category III Wetland (MP 8.4)	Water Truck	149,341
	Nimisila Reservoir (MP 41.1)	Water Truck	77,875
	RR and Tuscarawas River (MP 48.1)	Water Truck	166,753
	MP 70.4 Category III Wetland (MP 71.2)	Water Truck	82,266
	East Branch of Black River (MP 86.7)	East Branch of Black River	94,985
	West Branch of Black River (MP 92.4)	West Branch of Black River	84,840
	Vermillion River (MP 104.4)	Water Truck	153,580
	Interstate 80 (MP 110.3)	Water Truck	72,626
	Huron River (MP 116.9)	Huron River	122,995
	Sandusky River (MP 145.9)	Sandusky River	109,621
	Portage River (MP 162.5)	Portage River	91,149
	Findley Road/State Hwy 64 (MP 180.1)	Maumee River	77,219
	Maumee River (MP 181.6)	Maumee River	202,788
		Ohio NGT Project Total	**56,246,512**
Michigan			
Mainline	MP 237.5	Saline River	9,280,849
	MP 251.1	Ford Lake	2,830,950
	MP 215.2	River Raisin	Unknown
HDDs	River Raisin (MP 215.2)	River Raisin	74,948
	Saline River (MP 237.5)	Saline River	66,620
	Hydro Park (MP 250.9)	Ford Lake	115,627
	I-94 (MP 251.7)	Water Truck	72,475
	U.S. Hwy 12 (MP 254.4)	Unknown	Unknown
		Michigan NGT Project Total	**12,441,469**
		NGT Project Total	**68,687,981**
TEAL PROJECT			
Michigan			
Mainline	Entire Pipeline	Ohio River or municipal source	1,200,000
Connecting Pipeline	Entire Pipeline	Ohio River or municipal source	80,000

TABLE 4.3.2-5 (cont'd)

Potential Sources of HDD and Hydrostatic Test Water for NGT and TEAL Projects

State, Project, Facility	Approximate MP/Facility Name	Potential Source(s) [a, b]	Estimated Volume Uptake (gallons) [c]
Compressor Stations	Colerain	Water Truck	45,000
	Salineville	Water Truck	90,000
		TEAL Project Total	**1,415,000**
		NGT and TEAL Projects Grand Total	**70,102,981**

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a The NGT Project may use additional waterbodies to those included in the above table depending on conditions encountered during construction. All waterbodies used as sources would be registered and permitted as required for withdrawal of hydrostatic test water. Known alternative water sources have been identified for Project use and are included in this table.

b Water would be trucked in from a municipal or other approved Project source.

c Volumes of potential water sources may vary from this table depending on Project use of alternative water sources and conditions encountered during construction.

d Assume 30 percent water re-use for NGT Project compressor stations.

e Volumes for Meter Stations do not include skid piping. This piping is tested during initial fabrication prior to arriving at the Project site. Testing as part of the Project installation is not anticipated.

TEAL Project

Texas Eastern would use the Ohio River or a municipal source as a potential source of water for hydrostatic testing and dust control for the TEAL Project facilities. Texas Eastern would obtain permits required through the state of Ohio for water appropriations. As indicated in table 4.3.2-5, hydrostatic test water would be required for the mainline and connecting pipeline and the two compressor stations. Additionally, Texas Eastern would obtain the appropriate NPDES general permit from the OEPA for discharge of the hydrostatic test water following the hydrostatic testing.

4.3.2.4 Conclusions

Minor long-term effects associated with pipeline operations and maintenance would largely be restricted to periodic clearing of vegetation within the permanent right-of-way up to 25 feet from waterbody crossings as described earlier in this section. These maintenance activities would be consistent with the FERC *Procedures*, which have been integrated into the *E&SCPs* for the Projects.

Surface water sources and surface water protection areas can be impacted by activities with potential to adversely affect water quality. As discussed previously, these impacts would be avoided or minimized by implementing the BMPs detailed in the Projects' *SPCC Plans*, *E&SCPs*, and *Blasting Plans*, if needed. To avoid and minimize direct impacts on surface waters and intakes downstream of the NGT Project crossings, NEXUS would adhere to its *E&SCP* along the entire NGT Project and would use HDD and conventional bore crossing methods for several stream crossings, as indicated in appendix H-2. Because of this, as well as the significant distance from the NGT Project from the SWAPPs and associated intakes, the NGT Project is not expected to impact water supplies within the Ohio River SWAPPs. Additionally, NEXUS would use an HDD crossing at the West Branch Black River and a conventional bore crossing method for the Swan Creek crossing (intake for Swanton Reservoir) to avoid direct impacts on these public source water streams.

NEXUS is proposing to use the HDD crossing method for all of the NRI designated streams, streams designated by OEPA as outstanding and superior water quality, and navigable waters crossed by the NGT Project (waterbody crossing methods are summarized in appendix H-2). The *HDD Design Report* provides further details regarding each HDD crossing. NEXUS would implement monitoring and mitigation protocols specified in the *HDD Monitoring and Inadvertent Return Contingency Plan* as previously discussed. Successful implementation of HDD for these crossings would avoid impacts on these sensitive water resources. If an inadvertent return or loss of drilling mud circulation occurs during drilling, NEXUS would follow the protocols established in the *HDD Monitoring and Inadvertent Return Contingency Plan* to minimize environmental impacts on waterbodies.

Because the applicants have located all compressor station sites, M&R stations, MLV sites, and pipe/contractor yards to avoid impacts on surface waters, no direct or indirect impacts on waterbodies associated with the construction or operation of these facilities are anticipated.

By conducting all proposed waterbody crossings in compliance with the BMPs described above, potential impacts on impaired waterbodies from construction would be mitigated and the current status of the impaired waters crossed is not expected to be impacted.

The NGT Project pipeline facilities would be buried underground so they are not expected to have any permanent impact on the flood zones. Because the portions of the NGT Project pipe/contractor yards 2-1 and 3-2 would only be used as temporary workspace, there would be no permanent change to the flood storage capacity and mitigation would not be required. TEAL Project facilities lie outside of the 100-year flood zone; therefore, no mitigation would be required.

In summary, the applicants would implement a variety of measures to minimize impacts on aquatic habitats and water quality, including the use of dry-crossing methods to ensure that aquatic species are not directly affected by construction, HDD crossings to avoid disruption of habitat, restoration of disturbed habitat to preconstruction conditions to the extent practicable, minimization of vegetation clearing along waterbodies, setbacks from waterbodies for storage and use of potentially hazardous materials, and implementation of erosion and sediment control measures to avoid sedimentation. Further, as discussed previously, NEXUS would implement the measures in its *HDD Monitoring and Inadvertent Return Contingency Plan* to avoid or minimize the risk of drilling mud release, as well as procedures that would be followed if an inadvertent release does occur. Therefore, through implementation of these measures and compliance with all applicable water quality permits, we conclude that impacts on aquatic and riparian habitats, and water quality would be acceptably mitigated.

4.4 WETLANDS

Wetlands are defined as areas inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and in normal conditions do support, a prevalence of vegetation adapted for life in saturated soil conditions (Environmental Laboratory, 1987). Wetlands serve a multitude of functions and values, including, but not limited to, groundwater recharge/discharge, flood flow alteration, sediment and toxicant retention, nutrient storage and removal, promoting floral biodiversity and interspersion, and serving as habitat for fish, shellfish, and wildlife (USACE, 1999).

Wetlands impacted by the NGT and TEAL Projects are federally and state-regulated. On the federal level, USACE regulates wetlands under Section 404 of the CWA and Section 10 of the Rivers and Harbor Act (RHA), and the EPA shares responsibility to administer and enforce the Section 404 program. Wetland activities under Section 401 of the CWA are delegated to the appropriate state agencies: the OEPA in Ohio and MDEQ in Michigan.

4.4.1 Existing Wetland Resources

The applicants conducted wetland surveys during the 2014 and 2015 growing seasons, as landowner permissions allowed, to identify and determine the extent of wetlands crossed along the pipeline routes, temporary access roads, permanent access roads, ATWS, aboveground facility sites (i.e., compressor stations, MLV sites, and M&R stations), and pipe/contractor yards. Surveyed areas consist generally of a

300-foot-wide corridor along the proposed pipeline route that includes the construction and permanent rights-of-way, temporary workspaces for aboveground facilities, and a 50-foot-wide corridor along proposed access roads. In areas where field survey was not possible due to lack of landowner permission, NWI data, USGS topographic maps, SSURGO data, project-specific LIDAR topographic mapping, and high resolution photography were used to approximate the locations and boundaries of wetlands within the NGT and TEAL Projects area.

Wetlands were delineated per the methods set forth in the USACE *1987 Wetland Delineation Manual* (Environmental Laboratory, 1987), applicable Regional Supplements: *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: North Central and Northeast Region (Version 2.0)* (USACE, 2012), and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest (Version 2.0)* (USACE, 2010). Wetlands were classified according to *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al., 1979). Additionally, the functionality of wetlands in Ohio was assessed and quantified in accordance with OEPA's Ohio Rapid Assessment Method (ORAM) for Wetlands V.5.0 (Mack, 2011).

The NGT and TEAL Projects predominantly would cross five wetland types, as described by Cowardin et al. (1979). These include palustrine emergent (PEM), agricultural PEM (AG-PEM), palustrine unconsolidated bottom (PUB), palustrine scrub-shrub (PSS), and palustrine forested (PFO) wetlands, which are described in the following subsection.

4.4.1.1 Wetland Types

Five wetland types would be impacted by construction and operation of the NGT and TEAL Projects in Ohio and Michigan. PFO and PEM wetlands are respectively the most common types of wetlands that would be impacted by construction of the NGT and TEAL Projects. Many of the PEM wetlands that would be impacted occur in conjunction with other wetland types (PSS or PFO) and along open water or streams/rivers. In addition, many of these PEM wetlands occur within active agricultural fields and therefore have evidence of altered hydrology, soils, and/or stunted or stressed vegetation.

Palustrine Emergent Wetlands

PEM wetlands are generally dominated by erect, rooted, herbaceous, perennial hydrophytic vegetation and are located within the utility corridors throughout the NGT and TEAL Projects area. This wetland type has a variety of species that occupy it, and the following list of species are the most common species observed in PEM wetlands throughout Ohio and Michigan: jewel weed (*Impatiens capensis*), deer tongue grass (*Dichanthelium clandestinum*), tearthumb (*Polygonum* spp.), Joe pye weed (*Eupatorium purpureum*), reed canary grass (*Phalaris arundinacae*), rice cut grass (*Leersia oryzoides*), white cutgrass (*Leersia oryzoides*), common rush (*Juncus effusus*), fowl mannagrass (*Glyceria striata*), woolgrass (*Scirpus cyperinus*), Canada goldenrod, (*Solidago canadensis*), gray goldenrod (*S. nemoralis*), sensitive fern (*Onoclea sensibilis*), narrow-leaf cattail (*Typha angustifolia*), bluejoint grass (*Calamagrostis canadensis*), gray's sedge (*Carex grayii*), fox sedge (*Carex vulpinoidea*), poison ivy (*Toxidendron radicans*), Frank's sedge (*Carex frankii*), green bulrush (*Scirpus atrovirens*), and common reed (*Phragmites australis*). The PEM wetlands delineated throughout the NGT and TEAL Projects area vary in terms of functionality, as they were identified in disturbed areas such as agricultural fields and roadside wetlands, but were also delineated in diverse wooded and grassland habitat areas.

AG-PEM wetlands are dominated by stunted and stressed row crops and various hydrophytic grass species that exist within active agricultural fields. The characteristics of an AG-PEM wetland tend to be of lower functionality and often consist of disturbed settings, including presence of soils that are disturbed on a regular basis due to plowing and field maintenance, evidence that the hydrology has been altered by tile drains or ditches, and evidence of stressed vegetation (e.g., stunted plants or failed row crops). Common species observed in AG-PEM wetlands throughout Ohio and Michigan include barnyard grass (*Echinochloa* spp.), yellow foxtail grass (*Setaria pumila*), fall panic grass (*Panicum dichotomiflorum*), cattails (*Typha* spp.), reed canary grass (*P. arundinacea*), as well as stressed corn (*Zea mays*) and soybean (*Glycine max*) row crops.

Palustrine Unconsolidated Bottom Wetlands

PUB wetlands are generally sparsely vegetated and may consist of species including submerged aquatic vegetation, algae, and submerged mosses. A small number of PUB wetlands were identified along the route and include small, shallow depressional areas that are seasonally to permanently flooded. PUB wetlands are generally anthropogenic in origin and are the result of mining activity, railroad or road construction excavations, and agricultural activities. PUB wetlands generally exhibit lower functionality due to hydrological modifications, point and non-point source pollutants (e.g., fertilizer, pesticides, manure leachate), and livestock disturbance.

PUB areas are dominated by mineral soils with a small percentage of the soil surface covered by vegetation. Generally the edges of the PUB components are vegetated with black willow (*Salix nigra*), ash-leaf maple (*Viburnum acernifolium*), American sycamore (*Platanus occidentalis*), honeysuckle (*Lonicera tatarica*), black cherry (*Prunus serotina*), black raspberry (*Rubus occidentalis*), reed canary grass, asters (*Aster spp.*), green bulrush, field horsetail (*Equisetum arvense*), grass species, narrow-leaf cattail, Fuller's teasel (*Dipsacus fullonum*), watercress (*Nasturtium officinale*), jewel weed, common boneset (*Eupatorium perfoliatum*), and fringed willowherb (*Epilobium ciliatum*).

Palustrine Scrub-shrub Wetlands

PSS wetlands are dominated by woody vegetation that is less than 20 feet tall, including tree shrubs, young trees, and trees or shrubs that are small due to environmental conditions, and are often found along riverine systems or adjacent to forested habitats (Cowardin et al., 1979). Vegetation communities for PSS wetlands in Ohio and Michigan typically consist of the following species: steeple bush (*Spiraea latifolia*), buttonbush (*Cephalanthus occidentalis*), redoiser dogwood (*Cornus sericea*), gray dogwood (*Cornus racemosa*), silky dogwood (*Cornus amomum*), green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), black raspberry (*Rubus occidentalis*), red raspberry (*Rubus idaeus*), multiflora rose (*Rosa multiflora*), and various species of willow (*Salix* spp.). PSS communities within the NGT and TEAL Projects area also vary in functional quality, as PSS wetlands were identified adjacent to roads and agricultural fields, but were also delineated in higher-quality areas such as woodland habitats.

Palustrine Forested Wetlands

PFO wetlands are dominated by woody vegetation that is equal to or greater than 20 feet tall, and are typically found along floodplains and poorly drained basins (depressions). Generally, these wetlands have seasonally flooded inorganic, poorly drained mineral soils. The trees often associated with PFO wetland communities in Ohio and Michigan are typically broad-leaved deciduous species, including red maple, slippery elm (*Ulmus rubra*), American elm (*Ulmus americana*) green ash, black willow, eastern cottonwood (*Populus deltoides*), pin oak (*Quercus palustris*), shagbark hickory (*Carya ovata*), silver maple (*Acer sacharinum*), and box elder (*Acer negundo*).

Shrub species observed in PFO wetlands can consist of spice bush (*Lindera benzoin*), multiflora rose, and redosier dogwood. Depending on canopy cover, hydrology, and soil characteristics, the following species can be observed as an herbaceous layer in PFO wetlands: skunk cabbage (*Symplocarpus foetidus*), fowl mannagrass (*Glyceria striata*), stout wood reed (*Cinna arundinacea*), garlic mustard (*Allaria* *petiolata*), white avens (*Geum canadense*), sensitive fern, poison ivy, yellow avens (*Geum aleppicum*), jewel weed, and various sedge species (*Carex* spp.).

Ohio Rapid Assessment Methodology

Wetlands in Ohio are categorized by using the ORAM as a quantitative tool to determine the quality of wetlands, and also outline the functionality of those wetlands. The quality and functionality of wetlands enact differing levels of protection and are utilized as part of the review process for compensatory mitigation where impacts to wetlands are unavoidable. There are three wetland categories (i.e., Category 1, Category 2, and Category 3) where quality directly correlates to minimal, good, and superior quality wetlands, respectively (Mack, 2001). Each category is explained in detail below.

Category 1 Wetlands

Category 1 wetlands are generally defined as limited quality waters, that support minimal hydrologic functions (e.g., water retention, flood flow alteration, flood storage), minimal wildlife habitat (e.g., no threatened or endangered species, or their habitat; no wildlife use), and minimal recreational purpose. Typically Category 1 wetlands are often hydrologically isolated, degraded habitats that foster low species diversity, non-native plant species, and limited potential for wetland functionality (Mack, 2001).

Category 2 Wetlands

Broadly defined as good quality wetland habitats, Category 2 wetlands could support moderate wildlife habitat, hydrological functions, and recreation. Category 2 wetlands are commonly dominated by native plant species, they may contain threatened or endangered species, or may serve as habitat for threatened, rare, or endangered wildlife. While there is likely to be some degradation in these wetland types, a moderate level of species diversity, hydrological connectivity, and flood flow alteration would be upheld (Mack, 2001).

Category 3 Wetlands

Category 3 wetlands are of superior habitat, hydrological, and recreational functions that support native species, threatened and endangered species, and their habitats. Examples of such wetlands would be forested wetlands, bogs, fens, and vernal pools, where species diversity is high, the flora and fauna are native species, and the hydrological, groundwater, wildlife, and recreational functions are of high value (Mack, 2001).

4.4.2 General Impacts and Mitigation

4.4.2.1 Avoidance and Minimization

Consistent with state and federal guidelines and regulations, the applicants routed their respective pipelines and sited their associated aboveground facilities to avoid wetlands to the extent practicable. Where wetlands could not be avoided, impacts would be minimized to the extent practicable.

After proposing several pipeline route alternatives, where wetland avoidance was a routing consideration, wetland impacts have been avoided to the extent practicable. Where wetland impacts could not be avoided, impacts would be minimized by implementing the applicants' *E&SCPs* and the *SPCC*

Plans, which are generally consistent with our *Plan* and *Procedures*, as summarized below. These procedures include:

- generally using a reduced, 75-foot-wide, construction right-of-way through wetlands;
- locating ATWS at least 50 feet away from the wetland edge where practicable;
- segregating the top 12 inches of topsoil excavated from the trench line in non-saturated wetlands and returning it to the appropriate horizon upon backfill of the trench;
- utilizing timber mats to support equipment in inundated or saturated wetlands;
- sealing the trench line at upland/wetland boundaries to maintain wetland hydrology;
- installing erosion and sediment control devices, as necessary (e.g., trench breakers, slope breakers, silt fences, and/or stacked hay bales);
- storing hazardous materials, including fuels, chemicals, and lubricating fluids, a minimum of 100 feet from any wetland boundary;
- prohibiting parking or refueling of vehicles within 100 feet of a wetland unless the on-site EI determines that there is no practicable alternative;
- implementing procedures to prevent the introduction and spread of invasive species;
- limiting construction equipment travel and operation within wetlands;
- restoring pre-construction contours to the extent practicable; and
- performing post-construction invasive species monitoring and control.

In addition to the routing and alternatives review, construction crossing methods were also considered for minimizing wetland impacts. Under appropriate circumstances, HDDa can be utilized to avoid impacts on sensitive wetland habitat. Furthermore, workspace boundaries surrounding aboveground facilities generally avoid placement within wetlands, thus avoiding and minimizing wetland impacts.

4.4.2.2 General Impacts and Mitigation Measures

Construction and operation of the NGT and TEAL Projects would temporarily and permanently impact wetlands. Construction activities would temporarily and permanently impact wetland vegetation and habitats, and could temporarily impact wetland soils characteristics, hydrology, and water quality. The effects on wetland vegetation would be greatest during and immediately following construction. In general, wetland vegetation would eventually transition back into a community with a function similar to that of the wetland before construction. PEM wetlands would recover to their pre-existing vegetative conditions in a relatively short period (typically within 1 to 2 years). PSS wetlands could take 2 to 4 years to reach functionality similar to pre-construction conditions depending on the age and complexity of the system. In PFO wetlands, the impact of construction would be long term due to the time needed to regenerate a forest community, although operation may not allow for PFO restoration in all areas. Given the species that dominate the PFO wetlands crossed by the NGT and TEAL Projects, regeneration to pre-construction conditions may take 30 years or longer for construction. PFO wetlands directly within the operation corridor would not restore to PFO, but would still function as PEM or PSS wetlands in order to maintain the vegetation along the right-of-way for operation. Impacts on the vegetative communities may also include changes in the density, type, and biodiversity of vegetation, including invasive species. Impacts on habitats may occur due to fragmentation, loss of riparian vegetation, and microclimate changes associated with gaps in canopy.

Wetland soils would be restored to their original profile to the extent possible. During construction, failure to segregate topsoil could result in the mixing of the topsoil with the subsoil. This disturbance could result in reduced biological productivity or modify chemical conditions in wetland soils that could affect the reestablishment and natural recruitment of native wetland vegetation. In addition, inadvertent compaction and rutting of soils during construction could result from the movement of heavy machinery and the transportation of pipe sections. The resulting alteration of the natural hydrologic patterns of the wetlands could inhibit seed germination and regeneration of vegetative species. The discharge of stormwater, trench water, or hydrostatic test water could also increase the potential for sediment-laden water to enter wetlands and cover native soils and vegetation. Finally, construction clearing activities and disturbance of wetland vegetation could also temporarily impact a wetland's capacity to buffer flood flows and control erosion. Wetland hydrology would be maintained by installation of trench breakers at the wetland/upland boundary, sealing the trench bottom where necessary, and by restoring wetlands to original contours without adding new drainage features that were not present prior to construction. Impacts on water quality may include changes in temperature, biochemistry, or water chemistry; sedimentation or release of hazardous materials (e.g., fuels, lubricants); addition of nutrients; and turbidity (see section 4.3.2.1).

Secondary and indirect effects are impacts on adjacent or other nearby environmental resources, such as sedimentation to water resources down-gradient of disturbed areas, habitat loss due to clearing of forested vegetation and fragmentation, and microclimate changes from removal of canopy cover and maintenance mowing immediately over the pipeline that affect vegetative species composition, density, interspersion, and biodiversity, including noxious weeds. The applicants propose measures in their construction and restoration plans to prevent secondary and indirect impacts on adjacent wetland areas. These include such measures as minimizing the length of open trench at any given time, using HDD installation methods in sensitive areas, installing trench breakers, employing erosion and sediment control measures to prevent discharge of sediment into adjacent wetlands and waterbodies, and limiting refueling and storage of hazardous materials. In addition, where secondary and indirect effects cannot be avoided or minimized, they would be mitigated as part of the applicable USACE and state wetland impact mitigation requirements described below.

Operation of the NGT and TEAL Projects would require periodic vegetation maintenance over the pipeline centerline to facilitate aerial inspections of the pipeline and prevent roots from compromising the integrity of the pipeline. The applicants would conduct annual vegetative maintenance to maintain herbaceous vegetation within a 10-foot-wide strip centered over the pipeline. Existing herbaceous wetland vegetation would not need to be mowed or otherwise maintained, and therefore would not be permanently impacted. PSS wetlands would be allowed to regenerate but would be impacted by maintenance of the 10-foot-wide strip. In PFO wetlands, trees within 15 feet of the pipeline centerline that are greater than 15 feet tall would be selectively cut and removed once every 3 years. Therefore, by maintaining the right-of-way and limiting revegetation of a portion of PSS and PFO wetlands, some of the functions of these wetlands (primarily habitat) would be permanently altered by conversion to scrub-shrub and/or PEM wetlands. Vegetation communities outside of the 10- and 30-foot-wide corridors would be allowed to transition back to pre-construction conditions.

The USACE, MDEQ, and OEPA would determine mitigation requirements depending on the types of impacts associated with construction and operation of the NGT and TEAL Projects. Ongoing consultations with the OEPA and MDEQ have indicated that restoration ratios of 1:1 would be required for temporary wetland impacts. Additional wetland mitigation would be required for any wetland conversion from PFO to PEM or PSS wetlands, pursuant to USACE permitting processes. In Ohio, the applicants plan to utilize in-lieu fee programs to address wetland mitigation requirements. In Michigan, NEXUS would include the purchase of wetland mitigation credits from USACE-approved wetland mitigation banks, would utilize in-lieu fee programs, or would implement a combination of both. A summary of the specific wetland impacts and potential mitigation banks that may be used for the NGT and TEAL Projects' components is provided in the following subsections.

4.4.3 Alternative Measures

The applicants have requested approval for specific modifications to the requirements of our *Procedures*, most commonly in regard to placing ATWS within wetlands or within 50 feet of wetlands. The specific modifications, their supporting justifications, and our acceptance status are summarized in appendix H-6 for both the NGT and TEAL Projects.

The FERC *Procedures* specify that extra workspace should not be within 50 feet of wetlands except where an alternative measure has been requested by the applicants and approved by the FERC. Areas where NEXUS and Texas Eastern have requested extra workspace and stated that a 50-foot setback from wetlands is infeasible (including its justification) are identified in appendix H-6. We have reviewed these and deem them acceptable for the NGT and TEAL Projects, as discussed in section 2.2.1.1; however, we recommend additional justification for certain ATWS within 50 feet of a wetland or waterbody as identified in section 4.3.2.2.

4.4.3.1 Project-specific Impacts and Mitigation

As presented in table 4.4.3-1, a total of 191.6 acres of wetlands would be impacted by construction of the NGT and TEAL Projects, including 171.4 acres in Ohio and 20.1 acres in Michigan. Operation of the NGT and TEAL Projects would impact 39.9 acres of wetlands, including up to 29.4 acres of wetland conversion impacts from PFO wetlands to PEM or PSS, as discussed in the following sections. Wetland impacts from operation would be limited to PFO wetland conversion impacts but would not result in any net loss of wetlands, although the associated vegetation communities may not be able to fully restore due to maintenance mowing. To a lesser degree, PSS wetlands would incur minimal wetland conversion impacts as well, where pipeline maintenance would affect a 10-foot-wide corridor centered on the pipe. No permanent impacts to PEM, AG-PEM, or PUB wetlands would be incurred as a result of operation because vegetation would be allowed to regenerate following construction.

The tables in appendix I detail each individual wetland impacted by construction and operation of the NGT and TEAL Projects, respectively, including impacts associated with the pipeline facilities, additional temporary workspace, access roads, and aboveground facilities. A discussion of these construction and operation impacts for each Project is provided in the following subsections.

NGT Project

Construction of the NGT Project would temporarily impact 190.2 acres of wetlands, including 63.5 acres of PEM wetlands, 24.1 acres of AG-PEM wetlands, 0.2 acre of PUB wetlands, 1.7 acres of PEM/PSS wetlands, 28.3 acres of PSS wetlands, and 72.4 acres of PFO wetlands (see appendix I-1). Following construction, wetlands would be allowed to return to pre-construction conditions, with the exception of PFO wetlands and some areas of PSS wetlands. Vegetative maintenance along the pipeline centerline during operations would result in a permanent conversion of 29.3 acres of PFO wetlands to PEM/PSS wetlands as a result of vegetation maintenance. Total operational impacts on PSS and PEM/PSS wetlands may be less than 9.8 acres and 0.7 acre, respectively, due to limited maintenance clearing of a 10-foot-wide corridor centered over the pipeline.

TABLE 4.4.3-1

Summary of Wetland Impacts Associated with the NGT and TEAL Projects

Type/State [a]	Construction (acres)	Operation (acres)
PEM WETLANDS		
Ohio	60.5	0.0
Michigan	4.2	0.0
Total PEM Wetland Impacts	**64.7**	**0.0**
AG-PEM WETLANDS		
Ohio	22.8	0.0
Michigan	1.4	0.0
Total AG-PEM Wetland Impacts	**24.1**	**0.0**
PUB WETLANDS		
Ohio	0.2	0.0
Michigan	0.0	0.0
Total PUB Wetland Impacts	**0.2**	**0.0**
PEM/PSS WETLANDS		
Ohio	1.7	0.7
Michigan	0.0	0.0
Total PEM/PSS Wetland Impacts	**1.7**	**0.7**
PSS WETLANDS		
Ohio	25.4	8.9
Michigan	3.0	1.0
Total PSS Wetland Impacts	**28.4**	**9.9**[b]
PFO WETLANDS		
Ohio	60.8	25.6
Michigan	11.6	3.7
Total PFO Wetland Impacts	**72.4**	**29.4**
Total Ohio Impacts	**171.4**	**35.2**
Total Michigan Impacts	**20.1**	**4.7**
Projects Grand Total for Wetland Impacts	**191.6**	**39.9**

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a Wetland classification according to Cowardin et al., (1979): PEM = Palustrine Emergent Wetland; AG-PEM = Agricultiral Palustrine Emergent Wetland; PSS = Palustrine Scrub-Shrub Wetland; PFO = Palustrine Forested Wetland.

b Total operational impacts on PEM/PSS and PSS acreage may be less than reflected in the table due to limited maintenance clearing of a 10-foot-wide corridor centered over the pipeline.

Note: Sum of addends may not equal total due to rounding.

Access roads associated with the NGT Project would temporarily impact less than 0.1 acre of wetlands, including PEM and AG-PEM wetlands in Ohio and PFO wetlands in Michigan. No permanent impacts due to access roads would occur.

The aboveground NGT Project facilities in Ohio and Michigan would not result in the permanent loss of any wetlands (i.e., conversion to upland). However, a total of 0.2 acre of PEM wetlands would be temporarily impacted by construction of MR04. No other wetland impacts are anticipated for construction or operation of any aboveground NGT Project facilities including compressor stations, MLV sites, M&R stations, and pipe/contractor yards in Ohio and Michigan.

During scoping, we received comments from the City of Green expressing concern about potential NGT Project impacts on Singer Lake Bog located in the City of Green in Summit County, Ohio. Singer Lake Bog is a 343.9-acre nature preserve owned by the Cleveland Museum of Natural History (CMNH) (CMNH, 2016) that is not directly crossed by the NGT Project route but is within 450 feet of the NGT Project area. Therefore, no direct impacts on Singer Lake Bog are anticipated as a result of construction of the NGT Project. The NGT Project route would cross several wetlands (AWB-SU-202, AWB-SU-221, AWB-SU-222, and AWB-SU-203) that may be associated with Singer Lake Bog. Implementation of special construction techniques described in NEXUS' *E&SCP*, such as installation of trench plugs, and restoration of wetland soils, vegetation, and contours following the completion of construction, would minimize impacts on wetlands that may be associated with Singer Lake Bog. Based on the construction and mitigation measures described previously, and our review of the issues raised by the City of Green, we do not anticipate that wetland hydrology and existing flows would be adversely impacted by construction of the NGT Project.

We received comments from Sandusky County Park District expressing concern about potential NGT Project impacts on PFO wetlands within Creek Bend Farm Park. The proposed NGT Project route would cross a PFO wetland (E14-43) and Muddy Creek (E14-43), a perennial stream, for a combined length of approximately 80 feet. Construction of the NGT Project would require clearing of trees within the construction right-of-way. As stated in section 4.4.2.2, NEXUS would maintain the permanent right-of-way in a vegetative state, clear of trees and large shrubs. In PFO wetlands, this would result in permanent vegetation conversion in PFO wetlands, but would not result in a net loss of wetlands because they would be converted to PEM and/or PSS wetlands. Additionally, NEXUS is developing a *Wetland Mitigation Plan* that outlines the mitigation measures that would be implemented to further minimize impacts on wetlands. Additionally, our determination of whether or not impacts are being minimized *to the extent practicable* is pending until the *Wetland Mitigation Plan* is filed.

We received comments expressing concern about the potential for impacts on fen habitat in the vicinity of Killinger Road, City of Green, Summit County, Ohio. The wetland crossing along Killinger Road (AWB-SU-13) is a PEM and PSS wetland complex; however, its classification (e.g., bog, fen, peatland, OEPA ORAM classifications) is undetermined at this point. The NGT Project would cross the wetland near MP 40.

Fens and peatlands are described as peat-forming wetlands that receive nutrients from sources other than precipitation, such as upslope drainage from surrounding mineral soils and groundwater movement, and are host to a diverse plant and animal community (EPA, 2015c). Peatlands are characterized by soils made up of partially decomposed plant remains that retain water (Andreas and Knoop, 1992). Research conducted by Andreas and Knoop shows the greatest impacts on peatlands in Ohio are from agriculture, water level control (e.g., dams, impoundments), mining and development, and recreation, in that order.

Pursuant to 33 CFR 332.3(e)(3), impacts on difficult-to-replace resources (e.g., fens and peatlands) would need to be appropriately mitigated via in-kind methods. Additionally, NEXUS has developed a *Wetland Mitigation Plan* that outlines the mitigation measures that would be implemented to further minimize impacts on wetlands. Based on these measures, we anticipate this wetland would be restored within one to three growing seasons and would not experience long-term impact. Additionally, our determination of whether impacts are being minimized *to the extent practicable* is pending until the *Wetland Mitigation Plan* is filed.

NEXUS would create a project-specific *Wetland Mitigation Plan* in consultation with USACE, MDEQ, and OEPA. Mitigation would include the purchase of wetland mitigation credits from established wetland mitigation banks, the use of an in-lieu fee program, or a combination of the two. However, because this mitigation plan has not been finalized, **we recommend that:**

- **<u>Prior to construction of the NGT Project</u>, NEXUS should file with the Secretary a copy of its final *Wetland Mitigation Plan* including and comments and required approvals from the USACE, MDEQ, and OEPA, as applicable.**

TEAL Project

Based on a review of field data, construction of the TEAL Project would temporarily impact 1.3 acres of wetlands, including 1.2 acres of PEM wetlands, <0.1 acre of PSS wetlands, and <0.1 acre of PFO wetlands (see appendix I-2). No wetland impacts are anticipated as a result of the construction or operation of aboveground facilities, pipe/contractor yards, or access roads associated with the TEAL Project.

Following construction, wetlands would be returned to pre-construction conditions, hydrological conditions of wetlands would be restored, and no net loss of wetlands is anticipated. However, less than 0.1 acre of PFO wetlands would be permanently converted to either PEM or PSS wetlands within the permanent right-of-way due to vegetative maintenance for pipeline operations (see appendix I-2).

Texas Eastern would create a project-specific *Wetland Mitigation Plan* in consultation with USACE and OEPA. Mitigation would include the purchase of wetland mitigation credits from established wetland mitigation banks, the use of an in-lieu fee program, or a combination of the two. However, because this mitigation plan has not been finalized, **we recommend that:**

- **<u>Prior to construction of the TEAL Project</u>, Texas Eastern should file with the Secretary a copy of its final *Wetland Mitigation Plan* including any comments and required approvals from the USACE and OEPA.**

4.4.4 Conclusion

Construction of the NGT Project would temporarily impact a total of about 190.2 acres of wetlands, and construction of the TEAL Project would temporarily impact a total of about 1.3 acres of wetlands. Emergent and scrub-shrub wetlands impacted by the Projects would be allowed to revegetate naturally, with limited operational impacts on PSS wetlands due to maintenance clearing of a 10-foot-wide corridor centered over the pipeline. The 29.3 acres of PFO wetlands within the permanent right-of-way would be converted to PEM or PSS wetlands, as no trees would be allowed to regrow. Additionally, while the remaining 43.0 acres of forested wetlands outside of the permanent right-of-way would be allowed to revegetate, it could take years to decades to revert to preconstruction conditions.

Operating the NGT and TEAL Projects would permanently impact only PFO, PSS, and PEM/PSS wetlands due to vegetative maintenance activities. As described in section 4.4.2.2, forested vegetation would be maintained within 15 feet of the pipeline centerline where trees taller than 15 feet may be selectively cut and removed. Additionally, the applicants would maintain a 10-foot-wide corridor centered over the pipeline as herbaceous vegetation, impacting PFO and PSS wetlands during operation. Wetland impacts specific to each Project are described in section 4.4.2.3.

Based on the types and amounts of wetlands that would be impacted and the applicants' measures to avoid, minimize, and mitigate wetlands impacts as described previously and in their construction and restoration plans, as well as our recommendations, we have determined that the NGT and TEAL Projects would not significantly impact wetlands. These impacts would be further minimized and mitigated by the applicants' compliance with USACE Section 404 and state permit requirements, including the purchase of wetland mitigation credits and use of in-lieu fee programs.

4.5 VEGETATION

4.5.1 Existing Environment

4.5.1.1 NGT Project

The NGT Project would be located in the Huron/Erie Lake Plains (53 percent of the Projects area), Erie/Ontario Drift and Lake Plains (37 percent of the Projects area), Eastern Corn Belt Plains (5 percent of the Projects area), Eastern Great Lakes Lowlands (5 percent of the Projects area), and the Western Allegheny Plateau (less than 1 percent of the Projects area). The Huron/Erie Lake Plains ecoregion has broad land uses, including farmland for crops such as corn, winter wheat, soybeans, hay, sugar beets, field and seed beans, canning crops, and fruit. The area was previously swampland but has largely been drain tiled for agricultural use. The Erie/Ontario Drift and Lake Plains ecoregion consists of rolling to level terrain with scattered woodlands. Lakes, wetlands, and swampy streams are often present in flat areas. Urban development, industrial development, and agricultural land uses are common. The Eastern Corn Belt Plains ecoregion consists primarily of agricultural land, with major crops being corn and soybeans. Other land uses include permanent pasture, small woodlots, and developed areas. The Eastern Great Lakes Lowlands ecoregion is a mix of forest, agricultural land, and developed areas. Major crops grown in the region include apples, cherries, pears, plums, corn, hay, wheat, oats, barley, soybeans, cabbage, and potatoes. The Western Allegheny Plateau ecoregion is primarily comprised of mixed temperate and oak forests on rugged hills with dairy, livestock, farming, and residential development concentrated in the valleys (Omernik, 2012).

The NGT Project has been categorized into six primary vegetative cover types: upland forest, forested wetlands, upland open land, agriculture, scrub-shrub wetlands, and emergent wetlands. While developed land (including commercial/industrial land and residential areas) is not a designated vegetation type, it is a land use category in which vegetation may be affected. Wetland cover types are further described in section 4.4.1.1. Descriptions of each vegetation cover type crossed by the NGT Project are provided in table 4.5.1-1.

Agricultural land is the most common vegetation type that would be affected by construction and operation of the pipeline facilities, followed by upland forest and upland open land (see section 4.5.1.2). Compressor stations and M&R stations would be located primarily in agricultural and upland open land. The Hanover Compressor Station (CS 1) and Willow Run M&R Station each contain small areas of wetland habitat. Access roads and yards would be primarily located in agricultural land and upland open land.

Vegetation Communities of Special Concern or Value

Sensitive vegetation communities that could be affected by the NGT Project include the historical Oak Openings Region. No vegetation communities of special concern or value were identified in the vicinity of the NGT Project, although state-listed plant species were identified. Threatened and endangered plant species are analyzed in section 4.8.

The NGT Project would cross approximately 9.7 miles of the Oak Openings Region between MPs 186.6 and 196.3 in Henry and Fulton Counties. Roughly 99 percent of the ecosystem has been altered and fragmented by agricultural development, primarily through tree clearing and wetland draining. Several areas of remaining higher-quality Oak Openings Region ecosystem are protected, including the Oak Opening Preserve Metropark (located approximately 2.5 miles east of the proposed Project), Kitty Todd State Nature Preserve (located approximately 7.7 miles northeast of the proposed Project), Irwin Prairie State Nature Preserve (located approximately 9.3 miles northeast of the proposed Project), and the Maumee State Forest/adjacent ODNR-owned parcels. Additional details about these recreation and special interest areas are provided in section 4.9.

TABLE 4.5.1-1

Vegetation Cover Types Crossed by the NGT Project

Vegetation Cover Types	State	Cover Type and Common Vegetation Species
Upland Forest	Ohio	Midwestern Dry and Dry-mesic Oak Forests, dominated by northern red oak, white oak, and shagbark hickory. Midwestern Mesic Hardwood Forests, dominated by American beech and sugar maple, can include red maple, eastern cottonwood, shagbark hickory, black cherry, and American elm. Midwestern Mesic Oak and Oak-Maple Forests, dominated by red oak, sugar maple, and elm species. Appalachian Highlands Dry-mesic Oak Forests, dominated by red oak, sugar maple, and yellow poplar. Appalachian Highlands Mixed Mesophytic/Cove Forests, dominated by sugar maple, red maple, American beech, white ash, yellow poplar, black cherry, white oak, and northern red oak.
	Michigan	Mesic Southern Forests, dominated by American beech, and sugar maple, can include bitternut hickory, yellow poplar, white oak, and red oak. Dry-mesic Southern Forests, dominated by white oak, black oak, red oak, and hickory tree species.
Forested Wetland	Ohio	Midwestern Rich Hardwood Swamps, dominated by red maple, American elm, green ash, black willow, pin oak, shagbark hickory, silver maple, and other oak species (see section 4.4.1.1). Midwestern Riverfront Floodplain Forests, dominated by silver maple, eastern cottonwood, American sycamore, American elm, black willow, boxelder, river birch, hackberry, and green ash. Midwestern Bottomland Hardwood Forests, dominated by maple species, hickory, and pawpaw. Midwestern Wet Flatwoods, dominated by American beech, sugar maple, swamp white oak, and red maple (see section 4.4.1.1).
	Michigan	Southern Hardwood Swamps, dominated by red maple, eastern cottonwood, pin oak, American sycamore, and silver maple (see section 4.4.1.1).
Upland Open Land	Ohio and Michigan	Open upland includes fallow crop fields, utility rights-of-way, vegetated roadway medians, and railroad rights-of-way. Common herbaceous species include Canada goldenrod, poison ivy, common dandelion, common cinquefoil, Queen Anne's lace, tall fescue, garlic mustard, smooth brome, Kentucky bluegrass, Canada thistle, red fescue, and common plantain.
Emergent Wetland	Ohio	Midwestern Deep Emergent Marsh, emergent wetlands, and depression marshes, including species such as jewel weed, deer tongue grass, arrowleaf tearthumb, joe pye weed, reed canary grass, rice cutgrass, common rush, fowl mannagrass, woolgrass, sensitive fern, narrowleaf cattail, fowl bluegrass, Canada bluejoint, giant goldenrod, Canada goldenrod, gray's sedge, and green bullrush (see section 4.4.1.1).
	Michigan	Characterized by gray's sedge, Canada bluejoint, reed canary grass, and common reed (see section 4.4.1.1).
Scrub-shrub Wetland	Ohio	Midwestern Rich Shrub Swamps, dominated by steeple bush, redosier dogwood, gray dogwood, silky dogwood, red maple, buttonbush, black raspberry, multiflora rose, willow, and elderberry (see section 4.4.1.1).
	Michigan	Small components of larger wetland complexes, understory/edge of southern hardwood swamps (see section 4.4.1.1).
Agriculture Land	Ohio and Michigan	Agricultural land includes actively cultivated cropland and hay fields, orchards, and specialty crop farms.
Developed Land	Ohio and Michigan	Developed land include residential lands, industrial and commercial lands, utility stations, manufacturing or industrial plants, landfills, mines, quarries, and commercial or retail facilities.

The Oak Openings Region is characterized by sandy dunes and swales on top of a clay layer that assists in moisture retention. Oak savannahs and sand barrens were common where the sand layer is deep, and wet prairies were located in areas of shallow sand that kept the water tables at higher levels. Originally covering approximately 833,000 acres, the Oak Openings Region was made up of several unique ecological communities that contain numerous rare species endemic to this ecosystem (EPA, 2015d). Botanical surveys confirmed two of these unique communities would be crossed by the NGT Project: the Swamp White Oak-Pin Oak Flatwoods and the Black Oak-White Oak/Blueberry Forest Plant communities. Botanical surveys confirmed that the Twig-rush Wet Meadows, Mesic Sand Tallgrass Prairies, Midwest Sand Barrens, or Black Oak-Lupine Barrens Plant Communities would not be crossed by the NGT Project.

The Swamp White Oak-Pin Oak Flatwoods community is a forested wetland community typically dominated by swamp white oak, pin oak, red maple, American elm, and winterberry. In its original state, this community had a sparse understory and relatively open canopy. Fire suppression has resulted in more closed canopies and many of the communities have been cleared and drained for agricultural use (Michigan Natural Features Inventory [MNFI], 2010a).

Botanical surveys conducted in 2015 identified two areas where the NGT Project would cross components of Swamp White Oak-Pin Oak Flatwoods. The first is located near MP 189.0, where characteristic species such as pin oak, red maple, spicebush, and fowl mannagrass were identified; however, non-characteristic species such as silver maple and cottonwood were also present along with invasive species such as common buckthorn and multiflora rose. The second location was near MP 193.0, where the NGT Project crosses through approximately 2,400 feet of the Maumee State Forest. Component species such as pin oak, red maple, winterberry, spicebush, and common lake sedge were found. Neither of these areas contained all of the indicative species that would be present in high-quality Oak Flatwoods communities. The NGT Project would affect approximately 4.7 acres of the Maumee State Forest during construction, permanently converting approximately 2.8 acres of forested land to open land.

The Black Oak-White Oak/Blueberry Forest community typically has a closed canopy and low species diversity, dominated by black oak and white oak. The shrub layer is dominated by lowbush blueberry and hillside blueberry. Due to fire suppression, this community type has become more common than it was historically (MNFI, 2010b). Four Black Oak-White Oak/Blueberry Forest Plant communities were identified in the survey corridor. One of the four sites was avoided to reduce impacts to the plant community. The remaining three sites included some indicative species and showed evidence of prior disturbance, as well as the spread of invasive species.

Public comments identified concerns regarding impacts on threatened and endangered vegetation species associated within the Singer Lake Bog near MP 38.5. These species include the spotted pondweed, grass-leaved pondweed, and swaying bulrush, which are listed as endangered by the state of Ohio. Owned by the CMNH, the bog is a 344-acre nature preserve that features several threatened and endangered plant species. The Singer Lake Bog is located approximately 0.3 mile southwest of the NGT Project. Although the NGT Project would not cross the bog, the public comments identified concerns regarding impacts on forested wetlands that may be associated with the bog. Forested wetlands have been identified along the right-of-way and they would be affected by construction and operations. Impacts within the construction right-of-way would be long term, lasting until the wetlands revegetate. Impacts within the operations right-of-way would be permanent, as forested wetland areas would be maintained in an herbaceous state as discussed in section 4.5.2.1. Botanical surveys did not identify any threatened/endangered or invasive plant species in the wetlands adjacent to the Singer Lake Bog.

4.5.1.2 TEAL Project

The TEAL Project would be located in the Western Allegheny Plateau ecoregion. As discussed previously, the Western Allegheny Plateau ecoregion is primarily comprised of mixed temperate and oak forests on rugged hills with dairy, livestock, farming, and residential development concentrated in the valleys (Omernik, 2012).

As with the NGT Project discussed previously, the TEAL Project area has been categorized into six primary vegetative cover types: upland forest, forested wetlands, upland open land, emergent wetlands, scrub-shrub wetlands, and agriculture land. Developed land (including commercial/industrial land and residential areas) is not a designated vegetation type, although it is a land use category in which vegetation may be affected. Wetland cover types are described in section 4.4.1.1. Descriptions of each vegetation cover type crossed by the TEAL Project are provided in table 4.5.1-2.

TABLE 4.5.1-2

Vegetation Cover Types Crossed by the TEAL Project

Vegetation Cover Types	Cover Type and Common Vegetation Species
Upland Forest	High Allegheny Rich Red Oak-Sugar Maple Forest, dominated by American beech, American elm, eastern cottonwood, northern red oak, red maple, shagbark hickory, white oak, and white pine.
Forested Wetland	Woody vegetation 20 feet or taller, including American elm, black willow, box elder, eastern cottonwood, green ash, pin oak, red maple, shagbark hickory, and silver maple (see section 4.4.1.1).
Upland Open Land	Fallow crop fields, utility rights-of-way, vegetated roadway medians, and railroad rights-of-way. Common herbaceous species include blackberries, brambles, multiflora rose, and viburnum species.
Emergent Wetland	Species such as sedges, common rush, dotted knotweed, jewelweed, woolyfruit sedge, aster species, creeping jenny, false mermaidweed, fowl bluegrass, reed canary grass, sensitive fern, and yellow avens (see section 4.4.1.1).
Scrub-Shrub Wetland	Species such as black raspberry, elderberry, green ash, multiflora rose, redosier dogwood, spicebush, and steeple bush (see section 4.4.1.1).
Agriculture Land	Cultivated cropland and hay fields, orchards, and specialty crop farms.
Developed Land	Developed land include residential lands, industrial and commercial lands, utility stations, manufacturing or industrial plants, landfills, mines, quarries, and commercial or retail facilities.

Of the land that would be required for construction and operation of the TEAL Project facilities, upland open land is the most common vegetation type that would be affected by the pipeline followed by forested land and agricultural land (see section 4.5.2.2). Compressor stations and M&R stations would be located primarily in agricultural and upland open land.

4.5.2 Impacts and Mitigation

4.5.2.1 NGT Project

Table 4.5.2-1 identifies the amount and types of vegetation that would be affected by construction and operation of the NGT Project. Cutting, clearing, and removing existing vegetation for construction would temporarily and permanently impact vegetation. Removing vegetation would increase the potential for soil erosion (see section 4.2), the introduction and establishment of noxious or invasive species (see section 4.5.4), and edge effects (see section 4.5.5), as well as reduce the amount of available wildlife habitat (see section 4.6). The degree of impact depends on the type and amount of vegetation affected, the rate at which vegetation regenerates after construction, and the frequency of vegetation maintenance conducted on the right-of-way during pipeline operation. Site-specific conditions such as grazing, rainfall amounts, elevation, weeds, and soil types would also influence the length of time required to achieve successful revegetation.

Construction of the NGT Project would affect the following vegetative types: upland forest, forested wetland, upland open land, emergent wetland, scrub-shrub wetland, agriculture, and other (including developed land and open water). During construction, the pipeline routes and infrastructure for the NGT Project would affect 3,952.6 acres of agricultural land, 461.8 acres of upland open land, 332.2 of forested land, 157.7 acres of developed land and open water, 43.1 acres of forested wetland, 42.6 acres of emergent wetland, and 19.5 acres of scrub-shrub wetland. Impacts on upland open land, emergent wetlands, and agricultural lands would be short term as these vegetation cover types would likely return to their pre-construction states within one to three growing seasons after restoration is complete. Impacts on these communities during operation of the pipeline facilities would be minimal because these areas would be allowed to recover following construction and would typically not require maintenance mowing. The construction or modification of aboveground facilities would result in the permanent loss of vegetation and would convert open land vegetation into industrial facility use.

Regeneration of shrub areas within upland open land and scrub-shrub wetland may take 2 to 4 years or longer. Permanent impacts on shrub vegetation would result primarily from right-of-way maintenance activities and the construction of aboveground facilities.

Impacts on upland forest and forested wetland would constitute the most pronounced change in vegetation strata, appearance, and habitat. Trees would be cleared along the construction right-of-way and replaced by herbaceous plants, shrubs, saplings, and other successional species until trees can again flourish, which can take several decades or longer to occur. As specified in the applicants' construction and restoration plans, vegetation maintenance activities may be conducted annually over a 10-foot-wide corridor centered over the pipeline, and vegetation clearing may occur every 3 years within the 50-foot-wide permanent right-of-way in non-riparian areas. The applicants would maintain a 30-foot-wide pipeline right-of-way in forested wetland areas. These clearing activities would prevent the establishment of larger woody species within the maintained pipeline right-of-way. The temporary and permanent removal of shrub and forested vegetation from construction and operation of the project facilities would result in habitat fragmentation, loss of wildlife habitat (see section 4.6.4), loss of natural noise barriers and buffers, and other impacts as described at the beginning of this section. The FWS has determined that, based on its definition, the NGT Project would not fragment any upland forests.

We received several comments expressing concern about the loss of mature trees and potential "old growth" forests. Old-growth forest is a subjective term describing forests that are relatively old and undisturbed by humans. Old-growth forests are characterized by the presence of large trees of late-successional (climax) species; living trees of multiple ages; decaying and large dead standing trees; and downed trees in various stages of decay (Shifley, 2016). Based on our review of recent and past aerial photographs, we observed isolated mature forested areas and older trees, but did not identify large contiguous old-growth forests; therefore, we have determined that constructing and operating the NGT Project would not impact old-growth forest.

NEXUS has discussed the expected impacts of the NGT Projects with the FWS. The FWS has used a Habitat Equivalency Analysis (HEA) to estimate the impact to forested habitat used by migratory birds and listed species. The FWS has provided recommendations to NEXUS regarding mitigation of those impacts through avoidance, minimization, and mitigation funding to replace or provide substitute resources for the impacted forested habitat. In several meetings with the FWS, NEXUS has committed to mitigate for loss of forested habitat, which is detailed further in section 4.6.

4.5.2.2 TEAL Project

The TEAL Project would be co-located with existing cleared right-of-way. A total of 29.8 acres of forested land would be cleared for construction, with 24.8 acres allowed to revegetate and return to forested land. As such, 5.0 acres of forested land would be converted to open land.

Similar to the impacts discussed previously for the NGT Project, impacts on upland open land (103.4 acres), emergent wetlands (1.0 acres), and agricultural lands (63.7 acres) would be short-term as these vegetation cover types would likely return to their pre-construction states within one to three growing seasons after construction is complete. These areas would be allowed to recover following construction and would typically not require maintenance mowing. The construction or modification of aboveground facilities would result in the permanent loss of vegetation and conversion of open land vegetation to industrial facility use.

Regeneration of shrub areas within upland open land may take 10 to 15 years or longer. Permanent impacts on shrub vegetation would result primarily from right-of-way maintenance activities and the construction of aboveground facilities.

TABLE 4.5.2-1

Vegetation Communities Affected by Construction and Operation of the NGT and TEAL Projects (in acres)

Project, State, Facility	Upland Forest		Forested Wetland		Upland Open Land		Emergent Wetland		Scrub-Shrub Wetland [a]		Agriculture		Other [b]		Project Totals	
	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Ops	Con.	Ops.
NGT PROJECT																
Ohio																
Mainline Right-of-Way [c]	251.8	134.1	33.2	25.6	207.4	103.3	30.4	19.9	14.0	9.5	1849.0	947.1	59.1	30.4	2444.7	1269.9
Mainline Additional Workspaces	43.9	0	2	0	90.2	0	9.7	0	3.5	0	897.8	0	26.6	0	1073.8	0
TGP Interconnect Pipeline Right-of-Way	1.1	0.4	0	0	4	2.3	<0.1	<0.1	0	0	5.3	2.7	0.3	0.1	10.7	5.4
TGP Interconnect ATWS	0.8	0	0	0	1.9	0	0	0	0	0	2	0	0.2	0	4.9	0
Aboveground Facilities	0	0	0	0	23.8	3.7	0	0	0	0	262.6	127.8	6.1	0	292.7	131.5
Access Roads	0.8	0	<0.1	0	20.6	1.1	0.2	0	0	0	27.5	2.5	10.6	0.1	59.7	3.7
Pipe/Contractor Yards and Staging Areas	0	0	0	0	9.6	0	0	0	0	0	196.5	0	1.2	0	208	0
Ohio NGT Project Total	**298.4**	**134.5**	**35.2**	**25.6**	**357.5**	**110.4**	**40.3**	**19.9**	**17.5**	**9.5**	**3240.7**	**1080.1**	**104.1**	**30.6**	**4093.7**	**1410.6**
Michigan																
Mainline Right-of-Way [c]	22.5	11.8	5.4	3.8	46.6	23.7	2.0	1.7	1.3	1.0	454.5	232.2	19.5	10.1	551.8	284.3
Additional Workspaces	10.6	0.0	2.4	0.0	52.8	0.0	0.3	0.0	0.7	0.0	191.1	0.0	21.5	0.0	279.4	0.0
Aboveground Facilities	0.0	0.0	0.0	0.0	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	1.0	0.7
Access Roads	0.6	0.0	0.1	0.0	3.2	<0.1	0.0	0.0	0.0	0.0	3.7	0.0	1.5	0.3	9.2	0.3
Pipe/Contractor Yards and Staging Areas	0.1	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	62.6	0.0	10.5	0.0	74.7	0.0
Michigan NGT Project Total	**33.8**	**11.8**	**7.9**	**3.8**	**104.3**	**24.0**	**2.3**	**1.7**	**2.0**	**1.0**	**711.9**	**232.2**	**53.6**	**10.7**	**915.8**	**285.2**
NGT Project Total	***332.2***	***146.3***	***43.1***	***29.4***	***461.8***	***134.4***	***42.6***	***21.6***	***19.5***	***10.5***	***3952.6***	***1312.3***	***157.7***	***41.3***	***5010.7***	***1696.0***
TEAL PROJECT																
Ohio																
Pipeline Loop Right-of-Way [c]	17.0	4.8	0.1	0.1	29.5	18.1	0.8	0.5	0.0	0.0	5.3	2.8	0.6	0.3	53.3	26.7
Connecting Pipeline Right-of-Way	0.0	0.0	0.0	0.0	0.9	0.3	0.2	0.1	0.0	0.0	4.6	1.5	1.1	**0.1**	6.9	2.0
Additional Workspaces	11.3	0.0	0.0	0.0	8.7	0.0	0.0	0.0	0.0	0.0	13.5	0.0	0.7	0.0	34.2	0.0
Aboveground Facilities	0.0	0.0	0.0	0.0	62.1	4.7	0.0	0.0	0.0	0.0	39.8	11.4	11.9	0.1	113.8	16.2
Access Roads	1.4	0.1	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.7	0.3	4.9	1.0
Pipe/Contractor Yards and Staging Areas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TEAL Project Total	***29.7***	***4.9***	***0.1***	***0.1***	***103.4***	***23.1***	***1.0***	***0.6***	***0.0***	***0.0***	***63.7***	***16.2***	***15.0***	***0.8***	***213.0***	***45.9***
Ohio Total	**328.1**	**139.4**	**35.3**	**25.7**	**460.9**	**133.5**	**41.3**	**20.5**	**17.5**	**9.5**	**3304.4**	**1096.4**	**119.1**	**31.4**	***4306.6***	***1456.3***
Michigan Total	**33.8**	**11.8**	**7.9**	**3.8**	**104.3**	**24.0**	**2.3**	**1.7**	**2.0**	**1.0**	**711.9**	**232.2**	**53.6**	**10.7**	***915.8***	***285.2***
NGT and TEAL Projects Grand Total	**361.9**	**151.2**	**43.2**	**29.5**	**565.2**	**157.5**	**43.6**	**22.2**	**19.5**	**10.5**	**4016.3**	**1328.6**	**172.7**	**42.1**	***5223.8***	***1741.9***

TABLE 4.5.2-1 (cont'd)

Vegetation Communities Affected by Construction and Operation of the NGT and TEAL Projects (in acres)

	Upland Forest		Forested Wetland		Upland Open Land		Emergent Wetland		Scrub-Shrub Wetland [a]		Agriculture		Other [b]		Project Totals	
Project, State, Facility	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Ops	Con.	Ops.

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a Impacts for mosaic wetlands (i.e., those consisting of a mix of emergent and scrub-shrub wetland components) have been combined with scrub-shrub wetland impact totals for comparison.

b The "Other" category includes developed land and open water. Although not typically considered vegetation components, these areas may include vegetation and have been included for comparison.

c Project-specific construction right-of-way widths are discussed in the previous project-specific sections. Note that impacts presented are based on a typical construction right-of-way width (i.e., 100 feet) for the entire length of the pipeline; however, the construction right-of-way would be reduced at certain locations (e.g., wetlands), some portions of the right-of-way would overlap with existing rights-of-way that have been previously disturbed, and/or the HDD method would be used to avoid direct impacts on vegetation.

Impacts on upland forest (29.7 acres) and forested wetland (0.1 acre) would constitute the most pronounced change in vegetation strata, appearance, and habitat. Trees would be cleared along the construction right-of-way and replaced by herbaceous plants, shrubs, saplings, and other successional species until trees can again flourish, which can take several decades or longer to occur. As specified in the applicants' construction and restoration plans, vegetation maintenance activities may be conducted annually over a 10-foot-wide corridor centered over the pipeline, and vegetation clearing may occur every 3 years within the 50-foot-wide permanent right-of-way in non-riparian areas. The applicants would maintain a 30-foot-wide pipeline right-of-way in forested wetland areas. These clearing activities would prevent the establishment of larger woody species within the maintained pipeline right-of-way.

Similar to the consultations described in 4.5.2.1, Texas Eastern has discussed the expected impacts of the TEAL Project with the FWS and has committed to mitigate for loss of forested habitat, which is detailed further in section 4.6.

4.5.3 General Construction and Restoration Procedures

Vegetation clearing impacts can be minimized by using special construction techniques, proper restoration measures, and post-construction monitoring. The applicants' *E&SCPs* include specific measures for construction and restoration in upland and wetland areas, plans to control invasive species, and plans to prevent or mitigate spills of hazardous substances (see section 2.3). The applicants have proposed, at a minimum, to segregate topsoil in residential areas, agricultural areas, and wetlands (except where standing water or saturated soils are present) as discussed in section 4.2. The existing seedbank within the replaced topsoil should increase revegetation success; however, the results of this process can be less than favorable. Weedy species are among the largest component of grassland seed banks. The presence of noxious and invasive weed species identified during environmental field surveys indicate that weed colonization or at least initial recruitment in disturbed sites would likely occur. Noxious and invasive weed mitigation is discussed further in section 4.5.4.

Seeding would be the primary method of re-establishing vegetation on affected lands. Following construction, the applicants would revegetate disturbed areas according to their *E&SCP*. Disturbed areas would be seeded within 6 working days after final grading is complete, weather and soil conditions permitting. If construction is completed outside of the permanent seeding season, a mulch would be applied to stabilize the soils. Fertilizer and soil pH modifiers would be used in accordance with seeding recommendation for the northern zone.

Revegetation would be considered successful when the cover and density of non-noxious vegetation within the construction right-of-way is similar to the adjacent undisturbed land. According to each applicants' restoration plans and procedures, the applicants would monitor disturbed areas for the first and second growing seasons after construction. It should be noted that this monitoring timeframe is the minimum baseline requirement adopted from the FERC *Plan*; the applicants would be required to monitor the success of revegetation and restore all disturbed areas until restoration and revegetation is deemed successful, regardless of the length of time this may take. During the restoration phase of the Projects, landowners may identify areas where additional seeding or restoration actions may be required, including areas of weed infestation. The FERC and various land managing agencies, as appropriate, would also monitor restoration and revegetation success and would determine when restoration is successful. If revegetation efforts are not successful after the second growing season, the applicants may need to conduct additional soil compaction mitigation and/or apply soil additives and additional seeding.

4.5.4 Noxious Weeds and Pathogens

Invasive species are those that display rapid growth and spread, becoming established over large areas (USDA, 2006). Most commonly they are exotic species that have been introduced from another part of the United States, another region, or another continent, although some native species that exhibit rapid growth and spread are also considered invasive. Invasive plant species can change or degrade natural vegetation communities, which can reduce the quality of habitat for wildlife and native plant species. Similar to invasive species, noxious weeds are frequently introduced but occasionally are native. Noxious weeds are defined as those that are injurious to commercial crops, livestock, or natural habitats and typically grow aggressively in the absence of natural controls (USDA, 2016a).

Executive Order 13112 directs federal agencies to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species can cause. The Executive Order further specifies that federal agencies shall not authorize, fund, or carry out actions likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless it has been determined that the benefits of such actions outweigh the potential harm caused by invasive species, and that all feasible and prudent measures to minimize the risk of harm would be taken in conjunction with the actions.

Per the administrative code, the State of Ohio has identified a list of Prohibited Noxious weeds (see table 4.5.4-1). These species present problems to agriculture or other human activity and are subject to federal, state, and local regulations. Additionally, although not mandated by state law, the ODNR has identified the top 10 most invasive species of concern: Japanese honeysuckle, Japanese knotweed, Autumn-olive, buckthorn, purple loosestrife, common reed/phragmites, reed canary grass, garlic mustard, multiflora rose, and bush honeysuckle.

The State of Michigan has laws regulating the sale and possession of certain plants. Per the Natural Resource and Environmental Protection Act (451 of 1994, as amended), prohibited plants cannot be grown or sold in the state, and may not be present in agricultural seed offered for sale (see table 4.5.4-1). Restricted species are limited to one seed per 2,000 in agricultural seed for sale.

4.5.4.1 NGT Project

Vegetation communities are more susceptible to infestations of invasive or noxious weed species following soil disturbances. Vegetation removal and soil disturbance during construction of the NGT Project could create optimal conditions for the establishment or spread of undesirable species. Invasive or noxious plants could negatively affect habitat by competing for resources such as water and light, changing the community composition, eliminating or reducing native plants, or changing the vegetation structure. The changes in community composition or vegetation structure could reduce native plant populations and can also negatively affect wildlife habitat. Equipment movement along the construction right-of-way and access roads also could provide opportunities for seed transport into un-infested areas. Due to the connectivity of lands by access roads and equipment transport, the potential to spread invasive or noxious weeds would not be limited to the NGT Project's area of disturbance.

Through field surveys and evaluation of habitats crossed by the NGT Project, the applicants have identified several areas where noxious weeds or invasive species are present or are located near the construction right-of-way.

TABLE 4.5.4-1

Regulated Noxious and Invasive Species in Ohio and Michigan

Regulation Status	Species
OHIO	
Prohibited Noxious Weeds (OH Admin. Code 901:5-37-01)	Shatter cane (*Sorghum bicolor*), Russian thistle (*Salsola Kali var. tenuifolia*), Johnsongrass (*Sorghum halepense L. (Pers.)*), wild parsnip (*Pastinaca sativa*), wild carrot (Queen Annes lace) (*Daucus carota L.*), oxeye daisy (*Chrysanthermum leucanthemum var. pinnatifidum*), wild mustard (*Brassica kaber var. pinnatifida*), grapevines (*Vitis spp*) (when growing in groups of 100 or more and not pruned, sprayed, cultivated, or otherwise maintained for 2 consecutive years), Canada thistle (*Cirsium arvense L. (Scop.)*), poison hemlock (*Conium maculatum*), cressleaf groundsel (*Senecio glabellus*), musk thistle (*Carduus nutans*), purple loosestrife (*Lythrum salicaria*), mile-a-minute weed (*Polygonum perfoliatum*), giant hogweed (*Heracleum mantegazzianum*), apple of Peru (*Nicandra physalodes*), marestail (*Conyza canadensis*), kochia (*Bassia scoparia*), Palmer amaranth (*Amaranthus palmeri*), kudzu (*Pueraria montana var. lobata*), and Japanese knotweed *(Polygonum cuspidatum*).
MICHIGAN	
Prohibited Plant Species (MI Natural Resource. and Environmental Protection Act; 451 of 1994, as amended)	Fanwort (*Cabomba caroliniana*), cylindro (*Cylindrospermopsis raciborskii*), Brazilian elodea (*Egeria densa*), Japanese knotweed (*Fallopia japonica*), giant hogweed (*Heracleum mantegazzianum*), hydrilla (*Hydrilla verticillata*), European frogbit (*Hydrocharis morsus-ranae*), African oxygen weed (*Lagarosiphon major*), parrot's feather (*Myriophyllum aquaticum*), starry stonewort (*Nitellopsis obtusa*), yellow floating heart (*Nymphoides peltata*), giant salvinia (*Salvinia molesta, auriculata, biloba, or herzogii*), *and* Water Chestnut *(Trapa natans).*
Restricted Plant Species (MI Natural Resource and Environmental Protection Act; 451 of 1994, as amended)	Flowering rush (*Butomus umbellatus*), purple loosestrife (*Lythrum salicaria*), Eurasian watermilfoil (*Myriophyllum spicatum*), phragmites/common reed (*Phragmites australis*), and curly leaf pondweed (*Potamogeton crispus*).
Noxious Weeds (MI Natural Resource and Environmental Protection Act; 451 of 1994, as amended)	Quackgrass (*Agropyron repens, Elytrigia repens*), whitetop/hoary cress/perennial peppergrass (*Cardaria draba*), plumeless thistle (*Carduus acanthoides*), musk thistle (*Carduus nutans*), spotted knapweed (*Centaurea maculosa*), Russian knapweed (*Centaurea picris*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), field bindweed (*Convolvulus arvensis*), hedge bindweed (*Convolvulus sepium*), dodder (*Cuscuta spp*), yellow nutsedge/chufa (*Cyperus esculentus*), leafy spurge (*Euphorbia esula*), morning glory (*Ipomea species*), serrated tussock (*Nasella trachoma*), horsenettle (*Solanum carolinense*), perennial sowthistle (*Sonchus arvensis*), johnsongrass (*Sorghum halapense*), *and* puncturevine (*Tribulus terrestris*).
Restricted Noxious Weeds (MI Natural Resource and Environmental Protection Act; 451 of 1994, as amended)	Velvetleaf *(Abutilon theophrasti*), wild onion *(Allium canadense*), wild garlic *(Allium vineale*), wild oat *(Avena fatua*), yellow rocket *(Barbarea vulgaris*), hoary alyssum *(Berteroa incana*), Indian mustard *(Brassica juncea*), black mustard *(Brassica nigra*), jimsonweed *(Datura stramonium*), wild carrot *(Daucus carota*), buckhorn plantain *(Plantago lanceolata*), wild radish *(Raphanus raphanistrum*), curled dock *(Rumex crispus*), giant foxtail *(Seteria faberii*), charlock *(Sinapis arvensis*), bitter nightshade *(Solanum dulcamara*), silver leaf nightshade *(Solanum eleagnifolium*), black nightshade *(Solanum nigrum*), Eastern black nightshade *(Solanum ptycanthum*), hairy nightshade *(Solanum sarrachoides*), and cocklebur *(Xanthium strumarium*).

Source: Ohio Administrative Code; Michigan Department of Agriculture & Rural Development

NEXUS has developed an *ISMP* to minimize and control the spread of the noxious and invasive species. Some of the management and control measures that would be implemented are discussed below.

- NEXUS would inform and train construction personnel regarding noxious weed and invasive species identification and the protocols to prevent or control the spread of invasive species. EIs would be employed during construction to monitor and provide oversight and implementation of the *ISMP*.

- Vehicles and equipment would be inspected for remnant soils, vegetation, and debris, and would be cleaned of these materials before they are brought to the NGT Project area.

- Equipment cleaning stations would be set up in yards/staging areas and would be monitored by the EIs.

- NEXUS would ensure that straw or hay bales used for sediment barrier installations or mulch distribution, where appropriate, are certified weed-free and obtained from state-cleared sources.

- Post-construction monitoring of invasive plant species populations and colonization of the right-of-way would be conducted during the second full growing season. Monitoring reports detailing the success of right-of-way restoration and revegetation measures would identify invasive plant species' colonization locations and densities as well as the management measures that would be implemented to control the identified populations.

- NEXUS would utilize mechanical treatment or herbicide application to control the spread of invasive species during and after construction. Herbicides would be applied according to the manufacturer's printed recommendations and in accordance with applicable agency regulations governing herbicide application.

With the implementation of the procedures identified above and NEXUS' *ISMP*, we conclude the spread of noxious and invasive species should be adequately prevented and controlled.

4.5.4.2 TEAL Project

The TEAL Project is located along existing pipeline right-of-way. Field surveys found existing invasive species, primarily multiflora rose and reed canary grass, in and adjacent to the Project area. Texas Eastern has developed an *ISMP* to minimize and control the spread of the noxious and invasive species. Some of the management and control measures that would be implemented by Texas Eastern are identical to the NEXUS mitigation and control measures discussed above. With the implementation of the procedures identified above and Texas Eastern's *ISMP*, we conclude that the spread of noxious and invasive species should be adequately prevented and controlled.

4.5.5 Fragmentation and Edge Effect

The breaking up of contiguous vegetation cover types into smaller patches results in vegetation fragmentation and forest edges. Forest edges play a crucial role in ecosystem interactions and landscape function, including the distribution of plants and animals, fire spread, vegetation structure, and wildlife habitat. Creation of new forest edge along dense canopy forests could impact microclimate factors such as wind, humidity, and light, and could lead to a change in vegetation species composition within the adjacent forest or increase the spread of invasive species. Vegetation along forest edges receives more direct solar radiation during the day, loses more long-wave radiation at night, receives less short-wave radiation than areas in the forest interior, and has lower humidity. Increased solar radiation and wind could desiccate vegetation by increasing evapotranspiration, affecting species that survive along the edge (typically favoring shade intolerant species) and impacting soil characteristics. Fragmentation and a loss of habitat connectivity could also impact wildlife.

4.5.5.1 NGT Project

The landscape that would be crossed by the NGT Project has already experienced fragmentation in the form of existing roads, other utility rights-of-way, residential and commercial development, and timber clear cuts. Construction and operation of the NGT Project pipeline facilities would create a new, cleared corridor and new forest edge in areas where the pipelines would not be co-located with existing linear infrastructure or corridors. Temporary construction workspace would also contribute to fragmentation by creating larger open patches within contiguous forested habitats.

In areas where the pipeline facilities would be co-located with existing cleared corridors, the NGT Project generally would not increase the amount of forest edges, but would incrementally widen existing corridors typically by 25 to 50 feet for operation.

To minimize fragmentation effects, NEXUS has co-located approximately 45 percent of the pipeline facilities adjacent to existing pipeline and transmission line rights-of-way. An additional 42 percent of the route would cross agricultural land. NEXUS would restore shrub and forested habitat within the temporary construction workspace. On May 11, 2016, NEXUS filed meeting notes with the FWS (Docket No. CP16-22-000), indicating that mitigation associated with forest fragmentation would not apply for this project since NEXUS has been successful in avoiding forest fragmentation in their routing plans. Therefore, we conclude that fragmentation effects would be minimized to the greatest extent practicable and would not be significant. The FWS has determined that, based upon its definition, the NGT Project would not fragment any upland forests.

4.5.5.2 TEAL Project

The TEAL Project has been sited along existing pipeline right-of-way, with existing edge habitat established. Construction and operation of the TEAL Project pipeline facilities would not result in the creation of new forest edge, but would widen the gap between existing forested areas. Temporary construction workspace would also contribute to fragmentation by creating larger open patches.

Because pipeline facilities would be entirely co-located with existing cleared corridors, the TEAL Project would not increase the amount of edge, but would incrementally widen existing corridors typically by 25 to 50 feet for operation. Texas Eastern would restore shrub and forested habitat within the temporary construction workspace. Therefore, we conclude that fragmentation effects would be minimized to the greatest extent practicable and would not be significant. The FWS has determined that, based on its definition, the TEAL Project would not fragment any upland forests.

4.5.6 Pollinator Habitat

On June 20, 2014, President Barack Obama signed the Presidential Memorandum *Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators* (The White House – Office of the Press Secretary, 2014). According to the memorandum, “there has been a significant loss of pollinators, including honey bees, native bees, birds, bats, and butterflies, from the environment.” The memorandum also states that “given the breadth, severity, and persistence of pollinator losses, it is critical to expand Federal efforts and take new steps to reverse pollinator losses and help restore populations to healthy levels.” In response to the Presidential Memorandum, the federal Pollinator Health Task Force published a National Strategy to Promote the Health of Honey Bees and Other Pollinators in May 2015. This strategy established a process to increase and improve pollinator habitat.

Pollinator habitat in and adjacent to the Projects area can be found in a variety of vegetation types, including upland open land, forested land, forested wetland, emergent wetland, and scrub-shrub wetland.

4.5.6.1 NGT Project

Constructing the NGT Project would temporarily impact about 899.2 acres of pollinator habitat, including upland forest, forested wetland, upland open land, emergent wetland, and scrub-shrub wetland. The temporary loss of this habitat would increase the rates of stress, injury, and mortality experienced by honey bees and other pollinators. NEXUS would revegetate both the temporary workspace and permanent rights-of-way immediately after the pipeline facilities are installed with herbaceous and riparian seed mixes in consultation with the NRCS. Once revegetated, the restored workspace and permanent rights-of-way would provide pollinator habitat after the first or second growing season, and may naturally improve pollinator habitat along the Project area. The USFWS, a cooperating agency on this EIS, commented that revegetation of disturbed areas should include nectar-producing plants and milkweed endemic to the area in order to assist butterflies, bees, and other pollinators. To ensure the impacts on pollinator habitat are sufficiently minimized, and consistent with the USFWS recommendation and Presidential Memorandum and subsequent strategy regarding pollinators, **we recommend that:**

- **<u>Prior to construction of the NGT Project</u>, NEXUS should provide a plan describing the feasibility of incorporating plant seeds that support pollinators into the seed mixes used for restoration of construction workspaces. This plan should also describe NEXUS' consultations with the relevant federal and/or state regulatory agencies.**

4.5.6.2 TEAL Project

The TEAL Project would temporarily impact about 134.2 acres of pollinator habitat, including upland forest, forested wetland, upland open land, emergent wetland, and scrub-shrub wetland. The temporary loss of this habitat would increase the rates of stress, injury, and mortality experienced by honey bees and other pollinators. Similar to NEXUS, Texas Eastern would revegetate both the temporary workspace and permanent rights-of-way immediately after the pipeline facilities are installed with herbaceous and riparian seed mixes in consultation with the NRCS. As discussed above, the USFWS, a cooperating agency on this EIS, commented that revegetation of disturbed areas should include nectar-producing plants and milkweed endemic to the area in order to assist butterflies, bees, and other pollinators. To ensure the impacts on pollinator habitat are sufficiently minimized, and consistent with the USFWS recommendation and Presidential Memorandum and subsequent strategy regarding pollinators, **we recommend that:**

- **<u>Prior to construction of the TEAL Project</u>, Texas Eastern should provide a plan describing the feasibility of incorporating plant seeds that support pollinators into the seed mixes used for restoration of construction workspaces. This plan should also describe Texas Eastern's consultations with the relevant federal and/or state regulatory agencies.**

4.5.7 Conclusion

Based on our review of the potential impacts on vegetation as described above, we conclude that the primary impact from construction and operation would be on forested lands. However, due to the prevalence of forested habitats within the NGT and TEAL Projects area, the ability to co-locate the proposed facilities adjacent to existing rights-of-way, and the eventual regrowth of forested areas outside of the permanent right-of-way, we conclude that the permanent conversion of forested lands would not result in a significant impact on the vegetative resources within the NGT and TEAL Projects area. In addition, impacts on forested and non-forested vegetation types would be further mitigated through implementation of the applicants' *E&SCPs* and our recommendations.

4.6 WILDLIFE

4.6.1 Existing Environment

The NGT and TEAL Projects area contains a diversity of wildlife, including large and small mammals, reptiles and amphibians, and birds (e.g., raptors, waterfowl, and songbirds). Wildlife is dependent on available habitat that is generally associated with existing vegetation cover types. The vegetation characteristics of each cover type are the most important factors for determining the presence or absence of a species at a particular site.

As described in sections 4.4 and 4.5, as well as in the following sections, the Projects would cross several distinct upland and wetland vegetation cover types. These include upland forest, open upland, forested wetlands, scrub-shrub wetlands, emergent wetlands, agricultural and developed land. Tables 4.6.1-1 and 4.6.1-2 identify the terrestrial wildlife species commonly occurring in these vegetation cover types. Open water areas also provide wildlife habitat for several species of waterfowl and wading birds.

TABLE 4.6.1-1

Wildlife Species Potentially Occurring within the NGT Project Area

Vegetation Cover Types Affected by the NGT Project	Wildlife Species
Upland Forest	White-tailed deer, Virginia opossum, common raccoon, gray squirrel, red-bellied woodpecker, wild turkey, great crested flycatcher, wood thrush
Upland Open Land	White-tailed deer, coyote, eastern cottontail, gray fox, red fox, eastern box turtle, wild turkey, blue-winged warbler, field sparrow, prairie warbler, eastern towhee, American kestrel, red-tailed hawk, and sharp-shinned hawk
Forested Wetland	Wood frog, red-spotted newt, garter snake, little brown bat, raccoon, white-tailed deer, wild turkey, wood duck
Scrub-shrub Wetland	Pickerel frog, spring peeper, red-winged blackbird
Emergent Wetland	Common grackle, killdeer, red-winged blackbird, American mink, muskrat, raccoon, star-nosed mole, while-tailed deer, American bullfrog, common snapping turtle, painted turtle, pickerel frog
Agricultural Land	White-tailed deer, eastern cottontail, eastern mole, ground dove, mourning dove, mockingbird, tree swallow, kestrel, black vulture, eastern bluebird, common crow
Developed Land	Raccoon, striped skunk, squirrels and rat species, white-tailed deer, raccoon, European starling, house sparrow, rock pigeon, mourning dove, northern mockingbird

TABLE 4.6.1-2

Wildlife Species Potentially Occurring within the TEAL Project Area

Vegetation Cover Types Affected by the TEAL Project	Wildlife Species
Upland Forest	White-tailed deer, gray squirrel, opossum, raccoon, blue jay, red-bellied woodpecker, wild turkey, great crested flycatcher, wood thrush
Upland Open Land	Eastern cottontail, eastern meadowlark, song sparrow, yellow-breasted chat, coyote, gray fox, red fox, wild turkey, field sparrow, American kestrel, red-tailed hawk, sharp-shinned hawk
Forested Wetland	Beaver, great blue heron, kingbird, raccoon, white-tailed deer, wood duck
Scrub-shrub Wetland	Brown thrasher, common yellowthroat, red-winged blackbird
Emergent Wetland	Common grackle, red-winged blackbird, mink, muskrat, raccoon, star-nosed mole, white-tailed deer, bullfrog, snapping turtle, northern spring peeper
Agricultural Land	White-tailed deer, eastern cottontail, eastern mole, ground dove, mourning dove, mockingbird, tree swallow, kestrel, black vulture, eastern bluebird, common crow
Developed Land	Raccoon, striped skunk, squirrels and rat species, white-tailed deer, raccoon, European starling, house sparrow, rock pigeon, mourning dove, northern mockingbird

4.6.1.1 Upland Forest

The upland forests in the NGT and TEAL Projects area provide moderate quality habitat for a variety of mammals, birds, amphibians, reptiles, and invertebrates. The predominance of oak is an important habitat component in the Projects area. Some mammals rely directly on oak mast as a food source, while amphibians and invertebrates rely on the soil chemistry of an oak forest. Predatory species, such as raptors and red fox, are also attracted to oak-dominated forests and their edges due to the abundance and diversity of prey species. Tree and shrub layers provide food and cover for birds and larger mammals, such as white-tailed deer. Detritus provides food and cover for invertebrates, amphibians, reptiles, and smaller mammals.

The NGT Project crosses the Oak Opening Region of northwestern Ohio. The Oak Openings Region is known to support a diversity of wildlife, including rare species. Historically, this region supported a variety of habitats, including oak savanna, oak woodland, wet prairie, oak barrens, and floodplain forest that supported abundant wildlife. However, much of the region has been converted to agricultural land uses and developed for urban use, resulting in habitat conversion and fragmentation. While portions of the region continue to support wildlife diversity and rare species, these areas are generally limited to conservation lands such as preserves and state forests.

4.6.1.2 Upland Open Land

This habitat type includes all non-forested vegetation; grasslands, pasture, agricultural land; shrublands; and maintained utility rights-of-way. Although row crops generally provide poor to moderate habitat, they often provide forage for a number of species. On landscapes where intensive row crop agriculture is the dominant land use, these strip habitats are extremely important for grassland birds and other wildlife. Hayfields, small grains, fallow and old fields, pastures, idled croplands, and grasslands provide nesting and foraging habitats for grassland birds (USDA, 1999). Utility rights-of-way maintained in early successional communities also provide valuable nesting and foraging habitats for grassland bird species (USDA, 1999). Grasslands and old fields can be utilized as foraging and denning habitat by mammals and also provide nesting and breeding habitat to upland game birds such as pheasants. Shrublands provide sources of food and nesting sites for various birds, as well as cover for invertebrates, reptiles, and amphibians. Open fields and shrublands provide habitat for small mammal species such as mice, rabbits, and voles, which make them prime hunting grounds for predator species such as foxes, coyotes, and raptors.

Wetlands

Forested wetlands provide a diverse assemblage of vegetation and an abundance of food and water sources for wildlife. Mammals such as mink, muskrat, raccoon, and white-tailed deer use these areas for foraging. Many waterfowl and wading birds use forested wetlands adjacent to scrub-shrub and emergent wetlands for nesting and foraging. Forested wetland communities are also important habitats for reptiles and amphibians including the American bullfrog and various salamander species.

Scrub-shrub wetlands provide nesting and roosting habitat for a variety of bird species, as well as aquatic habitat and cover for frog species and other amphibians.

Emergent wetlands provide important habitat for waterfowl, muskrats, herons, frogs, and salamanders. Bird species such as red-winged blackbird and grey catbird also utilize emergent wetland habitat.

Open water areas crossed by the Projects include creeks, streams, and rivers. In addition to the aquatic resources discussed in section 4.7, the open water cover type provides important foraging and breeding habitat for various terrestrial species, including waterfowl, reptiles, amphibians, and some mammals.

Developed Land

Developed lands consist of industrial/commercial areas, residential areas, and road crossings provide minimal habitat for wildlife species. Wildlife diversity is often limited to species that are adapted to human disturbance, such as paved and landscaped areas.

4.6.2 Impacts and Mitigation

4.6.2.1 NGT and TEAL Projects

General Impacts

The impact of the Projects on wildlife is dependent on a species' ability to leave project work areas and successfully utilize adjacent habitats during project construction and restoration. Much of the wildlife that would be displaced by construction would relocate to similar adjacent habitats; however, lower survival rates may result if there were a lack of adequate territorial space, inter- and intra-specific competition, or lower reproductive success. Where similar adjacent habitat is present, displacement impacts would generally be short term for species that utilize herbaceous habitats and long term for species that utilize scrub or forested habitats, as restoration of wooded areas would require a greater amount of time. Upon successful restoration, wildlife would be expected to return and colonize habitats that were temporarily affected by construction.

Constructing the Projects may result in mortality of less mobile animals, such as small rodents, reptiles, amphibians, and invertebrates that may be unable to escape the immediate construction area, and disruption of bird courting, breeding, or nesting behaviors within and adjacent to construction work areas. These impacts would primarily occur during construction but may also occur during restoration.

Constructing the Projects would disturb approximately 5,223.8 acres of potential habitat. The temporary loss of habitat would reduce (protective) cover and foraging habitat in the immediate Projects area. Changes to wildlife habitat, whether by vegetation removal, conversion of one type to another, or degradation, also impact wildlife populations. The degree of impact would depend on the type and quantity of habitat affected and the rate at which vegetation regenerates after construction. Habitat that is converted to an aboveground facility would be permanently affected where it is maintained along the 50-foot-wide permanent pipeline right-of-way or is permanently altered by the construction of access roads.

Based on our restoration monitoring efforts along previous pipeline rights-of-way, we have found that wetland and upland herbaceous open land cover types typically restore to a pre-construction structural condition in a relatively short time (i.e., one to three growing seasons). Impacts on species that utilize agricultural land would be minor and temporary as these areas are regularly disturbed and would be replanted during the next growing season. The effect on forest-dwelling wildlife species would be greater because forest habitat would take a comparatively longer time to regenerate and would be prevented from reestablishing along maintained portions of the pipeline rights-of-way. Restoring the temporary construction areas to forest habitats could take 30 years or longer, depending on site-specific conditions such as rainfall, elevation, grazing, and weed introduction. The impacts on shrub-dwelling species would be comparable to impacts on forest-dwelling species due to the lengthy regeneration timeframes of these habitats. The fragmentation and edge effects of maintaining the pipeline rights-of-way are further discussed in the following section.

Noise

Noise could impact wildlife during all phases of the Projects. Certain species rely on hearing for courtship and mating, prey location, predator detection, and/or homing. These life functions could be affected by project construction and operational noise.

Research has demonstrated various wildlife reactions to noise from traffic, airplanes, sonic booms, helicopters, military activities, and blasting; however, specific noise studies from pipeline construction have not been conducted. Studies show that some species avoid roadways due to noise from a few meters to over 3 kilometers in distance. These species appear to be most sensitive during the breeding season. Conversely, the abundance of small mammals and birds (e.g., starlings, house sparrows, song sparrows, red-winged blackbirds) increases closer to the roadway, possibly due to increased availability of prey species such as insects. Construction-related sounds may have an adverse impact on raptors and bird species during nesting and breeding. These impacts occur when noise levels substantially exceed ambient conditions that existed prior to a project (i.e., by 20 to 25 dB, as experienced by the animal) and/or when the total sound level exceeds 90 dB. Such impacts could result in nest abandonment, egg failure, reduced juvenile growth and survival, or malnutrition or starvation of the young. During construction, these impacts are generally related to areas immediately adjacent to the construction right-of-way, but can extend to greater distances for activities such as blasting.

Noise generated from construction of the Projects would result from heavy equipment and machinery use. Most construction activities would be limited to daytime hours, with the exception of a limited number of 24-hour activities, such as water pump operation, road bores, and HDD installations. Construction is anticipated to occur throughout the year and would generally last 6 to 12 weeks at any given location. Noise levels along the construction right-of-way are expected to vary depending on the phase of work, number of locations of operating equipment, distance from noise receptors, and intervening topography. The worst-case noise level for the construction is estimated at 85 dB at 50 feet from NGT and TEAL Projects work area (see section 4.12.2.1).

The proposed compressor stations would generate noise on a continuous basis once in operation. The noise impacts associated with the compressor stations would be limited to the general vicinity of the facilities; however, certain operations, such as blow-downs, would generate infrequent, but high noise levels that would extend for a greater distance from the compressor stations. Noise emissions associated with compressor stations are described in section 4.12.2.1. While compressor station noise could affect birds in the area, we expect that in subsequent years, birds and other wildlife would either be habituated to the noise source, or would move into similar available habitat farther from the noise source. This, in turn, could lead to increased competition for preferred habitats, depending on the amount of habitat available.

During pipeline operation, noise emissions also would be generated during monitoring and maintenance activities, such as vegetation clearing on the permanent right-of-way, or during ground or air surveillance of the pipeline, as required by regulations.

In conclusion, construction and operation of the Projects would result in short- and long-term impacts on wildlife and wildlife habitat. These impacts are expected to be minor given the mobile nature of most wildlife in the area, the availability of similar habitat adjacent to and near the NGT and TEAL Projects area, and the compatible nature of the restored right-of-way with species occurring in the area. In order to minimize permanent impacts on forested and other habitats, the majority of the Projects would be routed along existing corridors and agricultural lands. They would be constructed in accordance with the *E&SCPs*, and vegetative maintenance in the permanent right-of-way would take place no more than once every 3 years. Impacts on ground-nesting birds in upland areas would be minimized by conducting maintenance activities outside the nesting season (i.e., March 31 to August 1).

Noxious and Invasive Species

Short- or long-term impacts on wildlife habitat could occur if pipeline construction spreads noxious weeds and other invasive species (see section 4.5.4 for a discussion regarding noxious weed impacts on vegetation). Noxious weeds can out-compete native vegetation and displace native species by spreading rapidly and co-opting resources (i.e., nutrients, water, and sunlight) that can eventually lead to a weed-dominated monoculture. Such transformed habitat can be unsuitable to former wildlife inhabitants. Often, as habitat quality degenerates, wildlife diversity declines. Invasive plant species can form dense monocultures that inhibit native vegetation from flourishing, cause a decrease in species diversity, limit water flow and wildlife access to water, and in some instances make waterfowl nesting areas unsuitable.

The applicants have developed *ISMP*s to prevent the introduction or spread of noxious or invasive species. We have reviewed these plans and find them acceptable. Therefore, we conclude that wildlife impacts due to invasive species would not be significant.

4.6.3 Sensitive or Managed Wildlife Habitats

Sensitive or managed wildlife habitats, such as national wildlife refuges, state parks and forests, wildlife management areas, and reserve program lands, are generally established to protect lands and waters that have a high potential for wildlife production, public hunting, trapping, fishing, and other compatible recreational uses. The NGT Project would cross the Missionary Island State Wildlife Preserve, an island within the Maumee River that is managed by ODNR. The Maumee River, and consequently, the Missionary Island State Wildlife Preserve, would be crossed utilizing HDD construction methods; therefore, no impacts on the preserve or any wooded buffers along the Maumee River would occur.

Approximately 1 percent of natural communities remain intact within the Oak Openings Region, while the remaining 99 percent of its plant communities have been converted to agricultural, commercial, and industrial land use. The NGT Project has been sited to minimize protected lands within the Oak Openings Region, and NEXUS has developed a crossing plan specific to this region. The 0.5 mile of forest conversion in the Maumee State Forest would not increase edge effect or fragmentation as the NGT Project route is sited at the edge of the woodland. See section 4.9 for more information on sensitive or managed lands.

4.6.4 Habitat Fragmentation and Edge Effect

4.6.4.1 NGT Project

Fragmenting contiguous wildlife habitats into smaller units could alter wildlife habitat. Many wildlife species require large, undisturbed habitats. When these habitats are affected, wildlife may be subject to increased predation, parasitism, or inter-specific competition; reduced pairing, nesting, and reproductive success; inhibited migration, dispersal, and foraging; and expansion of non-native vegetation.

Fragmentation generally affects birds by creating dispersal barriers, resulting in smaller suitable microhabitats, smaller population sizes, and edge effects (Degraaf and Healy, 1990). Edge effects can cause interactions between birds that nest in the interior of forests and species that inhabit surrounding landscapes, typically lowering the reproductive success of the interior species. Other evidence suggests that certain mammals, amphibians, reptiles, and plants are also adversely affected by forest fragmentation. Species that require large tracts of unbroken forest land may be forced to seek suitable habitat elsewhere. Less mobile species, such as reptiles and amphibians, could experience greater impacts from habitat fragmentation, as they are less mobile and less likely to relocate to more suitable habitat. The loss of forest habitat, expansion of existing corridors, and the creation of open, early successional and induced edge habitats could decrease the quality of habitat for forest interior wildlife species in a corridor much wider than the actual cleared right-of-way. The distance an edge effect extends into a woodland is variable, but most studies point to at least 300 feet (Rodewald, 2001; Jones, et al., 2000; Ontario Ministry of Natural Resources, 2000; Robbins, 1988; Rosenberg, et al., 1999). Edge effects within this distance could include a change in available habitat for some species due to an increase in light and temperature levels on the forest floor and the subsequent reduction in soil moisture, thereby resulting in habitat that would no longer be suitable for species that require these specific habitat conditions, such as salamanders and amphibians. An alteration of habitat could affect the fitness of some species and increase competition both within and between species, possibly resulting in an overall change to the structure of the forest community.

Potential positive impacts from creating or widening utility rights-of-way would include increased diversity and density of bird species, increased access to a variety of food resources, and increased ground cover, which would favor ground-nesting species (Rosenberg and Raphael, 1986). The close proximity of cover and forage areas at forest edges provides ideal habitat for many bird and game species. For example, bird species diversity in power line corridors through forested vegetation was found to be higher in the corridor than within the adjacent forest (Kroodsma, 1984). Higher levels of flower and fruit production, pollinator, and frugivore densities are often found along the edge.

For the NGT Project, habitat fragmentation would generally occur where the pipeline facilities are not co-located with existing rights-of-way and forested and scrub habitats would be affected. As outlined in section 2.0, the NGT Project pipeline would be co-located with existing, maintained rights-of-way and corridors for 44 percent of their total length, which would reduce fragmentation effects. When co-located with existing corridors, it is unlikely that the relatively small widening of existing permanently cleared right-of-way would impede the movement of most wildlife species. Where the facilities would create a new corridor through shrub and forested habitats, wildlife composition would shift from those species favoring shrub and forest habitat to those favoring edge habitat or open areas.

As discussed in section 4.5.5, to adequately minimize fragmentation impacts and restore the construction right-of-way, NEXUS would restore the construction right-of-way according to its *E&SCP*, which includes reseeding measures using site-specific seed mixtures recommended by local seeding authorities, augmented by recommendations from the FWS, land-managing agency, and/or landowner to enhance wildlife habitat. Additionally, NEXUS would monitor the pipeline rights-of-way for at least 2 years following initial seeding or until required by FERC and other permit restoration criteria is achieved. With NEXUS' ability to co-locate the proposed facilities and the commitment to implement and adhere to the measures outlined in the construction and restoration plans and other permit requirements, we conclude that habitat fragmentation and edge effect impacts that could result from construction and operation of the NGT Project would be adequately minimized.

4.6.4.2 TEAL Project

Construction of the TEAL Project would fragment habitat where the pipeline facilities are not co-located with existing right-of-way; forested and scrub habitats would be affected. As outlined in section 2.0, the TEAL Project is a looping project, and as such is co-located throughout its 4.4-mile length, which would reduce fragmentation effects. When co-located with existing corridors, it is unlikely that the relatively small widening of existing permanently cleared right-of-way would impede the movement of most wildlife species. Where the facilities would create a new corridor through shrub and forested habitats, wildlife composition would shift from those species favoring shrub and forest habitat to those favoring edge habitat or open areas.

4.6.5 Game Species and Game Harvesting

Certain wildlife species, as well as other wildlife furbearers and migratory birds, are important game animals in the NGT and TEAL Projects area. They include the white-tailed deer, bobcat, gray squirrel, raccoon, cottontail rabbit, opossum, wild turkey, bobwhite, mourning dove, and various waterfowl (e.g., ducks and geese).

The potential impacts on game species would be similar to those discussed previously for general wildlife species. Game species would be subject to temporary displacement and habitat loss until restoration is complete and native vegetation is reestablished. However, if adjacent habitats are at or near carrying capacity, displacement of or stress on game species could cause reduction in wildlife populations. Permanent habitat impacts would occur where the pipeline rights-of-way are maintained, aboveground facilities are constructed, and where fragmentation occurs. In most instances, suitable adjacent habitat would be available for wildlife species until grasses and woody vegetation are reestablished. Forage vegetation would be expected to recolonize quickly. Following construction, game species would utilize the newly established right-of-way for foraging and travel. Restored pipeline rights-of-way generally provide an opportunity for developing high-quality feeding areas for game species, especially if noxious weeds are controlled and native forage is seeded.

Construction activities that coincide with hunting seasons, which vary in the NGT and TEAL Projects area depending on species and location, may impact the hunters' experience and success by temporarily restricting access to hunting areas and temporarily affecting the spatial distribution of game species. Construction-related disturbance likely would displace game species from adjacent habitats. In general, game species would be expected to return to habitats they vacated after construction and restoration efforts are completed, and success rates would likely be similar to pre-construction success rates.

The new pipeline right-of-way could increase access to remote or previously inaccessible hunting areas, which could result in increased hunting success. In addition, game species that use a cleared right-of-way could be more likely harvested. Increased public recreation along cleared rights-of-way in the hunting season, especially near crossings of existing access points, has been documented elsewhere (Crabtree, 1984). Increased public access along the new pipeline rights-of-way could increase poaching of game and non-game wildlife. This impact would be greater on smaller game species because they typically have smaller home ranges and movement areas than larger species and could experience greater population impacts from habitat loss and fragmentation.

4.6.6 Migratory Birds

4.6.6.1 Existing Environment

NGT Project

Migratory birds are protected under the MBTA (16 USC 703-711). The MBTA, as amended, prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, or nests unless authorized under a FWS permit. Bald and golden eagles are additionally protected under the BGEPA (16 USC 668-668d). Executive Order 13186 (66 Federal Register 3853) directs federal agencies to identify where unintentional take is likely to have a measurable negative effect on migratory bird populations and to avoid or minimize adverse impacts on migratory birds through enhanced collaboration with the FWS and to restore and enhance their habitat. The Executive Order states that emphasis should be placed on species of concern, priority habitats, and key risk factors, and that particular focus should be given to addressing population-level impacts.

On March 30, 2011, the FWS and the Commission entered into a Memorandum of Understanding that focuses on avoiding or minimizing adverse impacts on migratory birds and protected bat species and strengthening migratory bird conservation through enhanced collaboration between the two agencies. This voluntary agreement does not waive legal requirements under the MBTA, BGEPA, ESA, Federal Power Act, NGA, or any other statutes and does not authorize the take of migratory birds.

The 1988 amendment to the Fish and Wildlife Conservation Act mandates that the FWS "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act of 1973." As a result of this mandate, the FWS created the Birds of Conservation Concern (BCC) list (FWS, 2008a). The goal of the BCC list is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions and coordinating consultations in accordance with Executive Order 13186. As outlined in table 4.6.6-1, a total of 10 BCC species within FWS Region 3 are known to breed in Michigan and Ohio and may occur within the NGT Project area.

A variety of migratory birds, including forest-interior birds, BCCs, and waterfowl use or could use the wildlife habitats affected by the NGT Project. These birds use these habitats for resting (stopover), sheltering, foraging, breeding, and nesting.

TABLE 4.6.6-1

Birds of Conservation Concern Potentially Occurring within the NGT Project Area [a]

	Confirmed Breeding in State		
Bird Species	Michigan [b]	Ohio [c]	Preferred Habitat
Bald Eagle	Yes	Yes	Breeds in forested areas near large bodies of water. Breeds/nests from October 1 to May 15.
Black-capped Chickadee	Yes	Yes	Any habitat that has trees or woody shrubs, from forests and woodlots to residential neighborhoods and parks. Breeds/nests from May to September.
Blue-winged Warbler	Yes	Yes	Breeds at forest and field edges, often shaded by large trees. Breeds/nests from April to July.
Cerulean Warbler	Yes	Yes	Breeds in forests with tall deciduous trees and open understory, such as we bottomlands and dry slopes. Breeds/nests from May to August.
Field Sparrow	Yes	Yes	“Old-field” specialists – tall grass and brush, particularly thorny shrubs. Breeds/nests from May to September.
Louisiana Waterthrush	Yes	Yes	Breeds along gravel-bottomed streams flowing through deciduous forest. Breeds/nests from May to August.
Peregrine Falcon	Yes	Yes	Habitat generalist, but requires artificial structures or cliffs for nesting. Breeds/nests from April to August.
Northern Flicker	Yes	Yes	Open habitats near trees, including woodlands, edges, yards, and parks. Breeds/nests May to August.
Red-headed Woodpecker	Yes	Yes	Old trees in open areas. Breeds/nests from February to September.
Wood Thrush	Yes	Yes	Heavy deciduous or mixed forested areas, including riparian or wetlands. Breeds/nests from April to August.

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a Based on the FWS Region 3 (Midwest Region) BCC 2008 List (FWS, 2008a)
b Based on Michigan Breeding Bird Atlas II (Chartier et al., 2011)
c Based on the Ohio Bird Records Committee Checklist (Whan and Harlan, 2004)

NEXUS conducted aerial bald eagle nest surveys along the NGT Project route in spring 2015. No bald eagle nests were identified within 660 feet of the NGT Project area; however, seven nests were identified greater than 660 feet from the area. One nest observed in Lorain County, Ohio is at a distance of approximately 750 feet from the edge of the construction corridor. Therefore, at this time, no impact on bald eagles is anticipated from the NGT Project.

Because it is possible that new bald eagle nests could be built within or near the NGT Project area before construction begins, **we recommend that:**

- **<u>Prior to construction of the NGT Project</u>, NEXUS should conduct additional bald eagle nest surveys to determine if any new eagle nests are present within 660 feet of the construction workspace. If bald eagle nests are identified within 660 feet of the construction workspace, NEXUS should consult with the relevant FWS Field Office**

and file with the Secretary the results of its consultation for review and written approval from the Director of OEP.

TEAL Project

As outlined in table 4.6.6-2, a total of 12 BCC species within FWS Region 3 are known to breed within the TEAL Project vicinity.

TABLE 4.6.6-2

Birds of Conservation Concern Potentially Occurring within the TEAL Project Area [a]

Bird Species	Breeding Potential in Ohio [b]	Preferred Habitat
Bald Eagle	Yes – ODNR and FWS confirmed no bald eagle nests in the project vicinity	Breeds in forested areas near large bodies of water. Breeds/nests from October 1 to May 15.
Black-capped Chickadee	Yes	Any habitat that has trees or woody shrubs, from forests and woodlots to residential neighborhoods and parks. Breeds/nests from May to September.
Canada Warbler	Yes	Moist thickets including riparian thickets, brushy ravines, and forest bogs. Breeds/nests from June to July.
Cerulean Warbler	Yes	Breeds in forests with tall deciduous trees and open understory, such as we bottomlands and dry slopes. Breeds/nests from May to August.
Kentucky Warbler	Yes	Ground nest in moist, deciduous woodlands. Breeds/nests from May to July.
Louisiana Waterthrush	Yes	Breeds along gravel-bottomed streams flowing through deciduous forest. Breeds/nests from May to August.
Olive-sided Flycatcher	Yes [c]	Open woodlands, particularly burned forests. Breeds/nests from March to July.
Red Crossbill	Yes [d]	Mature coniferous forests. Breeds/nests from January to August.
Red-headed Woodpecker	Yes	Old trees in open areas. Breeds/nests from February to September.
Whip-poor-whill	Yes	Deciduous and mixed-pine forests, often in areas with sandy soil and open understories. Breeds/nests from May to July.
Wood Thrush	Yes	Heavy deciduous or mixed forested areas, including riparian or wetlands. Breeds/nests from April to August.
Worm-eating Warbler	Yes	Breeds in mature deciduous or mixed deciduous-coniferous forest with patches of dense understory, usually on a steep hillside. Breeds/nests from May to July.

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a Based on the FWS Region 3 (Midwest Region) BCC 2008 List (FWS, 2008a)
b Based on the Ohio Bird Records Committee Checklist (Whan and Harlan, 2004)
c One confirmed breeding record in the state (Ashtabula County, 1932)
d One confirmed breeding record in the state (Ross County, 1973)

A variety of migratory birds, including forest-interior birds and BCC-listed birds use or could use the wildlife habitats affected by the TEAL Project. These birds use these habitats for resting (stopover), sheltering, foraging, breeding, and nesting.

Texas Eastern conducted a bald eagle desktop habitat assessment and determined that habitat for the bald eagle is unlikely to be affected by the TEAL Project; therefore, a bald eagle nest survey was deemed unnecessary by the FWS Columbus Field Office. Effects on bald eagles are not anticipated along the TEAL Project.

4.6.6.2 Impacts and Mitigation

The NGT and TEAL Projects construction schedules would overlap with the migratory bird nesting season (generally between February and August). Construction of the NGT Project would result in the loss of approximately 332.2 acres of upland forest and 43.1 acres of forested wetlands, and construction of the TEAL Project would result in the loss of approximately 29.7 acres of upland forest and 0.1 acre of forested wetlands. The impacts of forested habitat loss are considered long-term due to the amount of time required for the forested habitat to return to its previous state, often taking decades. The impacts associated with pipeline and aboveground facility construction would have long-term effects on migratory birds that depend on forest habitats. Vegetation clearing and other construction activities could affect egg and young survival. Bird displacement could impact bird migration, nesting, foraging, and mating behaviors. Behavior changes could increase the amount of stress, injury, and mortality experienced by migratory birds. Construction would also reduce the amount of habitat available for foraging and predator protection and would temporarily displace birds into adjacent habitats, which could increase the competition for food and other resources. This in turn could increase stress and susceptibility to predation, as well as negatively impact reproductive success.

Additionally, increased human presence and noise from construction activities could disturb actively nesting birds. Impacts would not be significant for non-nesting birds, as these individuals would temporarily relocate to avoid construction activities. However, construction activity near active nests during incubation or brood rearing could result in nest abandonment; overheating, chilling, or desiccation of unattended eggs or young, causing nestling mortality; premature fledging; and/or ejection of eggs or young from the nest.

Migratory birds, including BCC-listed birds, could also be affected during project operations. The NGT Project would permanently convert 146.3 acres of upland forest and 29.4 acres of forested wetland, while the TEAL Project would convert 4.9 acres of upland forest. These areas would be maintained in an herbaceous state. The reduction in forest habitat could result in increased competition, parasitic bird species, edge effects (as previously discussed in sections 4.5.5 and 4.6.4). 185.9 acres of upland forest and 13.7 acres of forested wetland would be allowed to regenerate along the NGT Project route, and 24.8 acres of upland forest and 0.1 acres of forested wetlands would be allowed to regenerate along the TEAL Project route. The FWS has determined that, using their definitions, there will be no fragmentation of upland forest habitat.

To address FWS concerns about migratory birds, the applicants have prepared a draft *Migratory Bird Conservation Plan* (*MBCP*) for the Michigan portions of the Project (see appendix E-6). The *MBCP* is being developed as a contingency to be used in the event that clearing cannot be completed within the September 1 to March 31 window for migratory birds. The May 11, 2016 filing from (Docket No. CP16-22-000), the FWS details the process by which the applicants completed the draft *MBCP* for the Michigan portions of the NGT Project. To construct the draft *MBCP*, NEXUS concentrated on BCC-listed birds, as well as federal- and state-listed species. Using the Ohio and Michigan breeding bird atlases and the National Audubon Society's Important Bird Area Program, NEXUS identified potentially suitable habitat along the NGT Project route. Species and nesting periods that might be associated with these areas were identified, and target clearing windows were determined to avoid impacts to nesting birds of concern. FWS region 3 and field office staff approved of the methodology used to develop the *MBCP* for the Michigan portion of the Projects. NEXUS is using this same methodology to develop a draft *MBCP* for the Ohio portion of the Projects. Coordination regarding migratory birds and the *MBCP* is ongoing and the applicants may adopt additional measures as necessary, or require different measures for facilities located in Ohio.

The applicants have committed to implementing the following measures to protect migratory bird species:

- Routing project facilities to avoid sensitive resources where possible;
- Maximizing the use of existing pipeline and utility rights-of-way;
- Limiting the construction and operational right-of-way widths to the minimum necessary;
- Adhering to measures outlined in the applicants' *E&SCPs*;
- Limiting routine right-of-way maintenance clearing and prohibiting clearing during the migratory bird nesting season (i.e., March 31 to August 1); and
- Actively working on a Memorandum of Understanding (MOU) whereby NEXUS agrees to mitigate for loss of forested habitat, including avoidance and minimization of impacts, and providing mitigation funding for loss of forested migratory bird habitat.

Since the final *MBCPs* for Michigan and Ohio are not yet complete, and to ensure the impacts on migratory bird upland forest habitat are sufficiently minimized, and consistent with the E.O. 13186 and the resulting MOU between FERC and the FWS, **we recommend that:**

- **<u>Prior to construction of the NGT Project</u>, NEXUS should file with the Secretary its final *MBCPs* developed in consultation with the FWS incorporating any additional avoidance or mitigation measures incorporated into the plans.**

Impacts on non-special status bird species that do not have significantly reduced populations would not result in long-term or significant population-level effect, given the stability of local populations, the abundance of available habitat outside the proposed rights-of-way, and the linear nature of the Projects over a large geographic range. While the Projects would not likely result in population-level impacts on migratory bird species, it is acknowledged that pipeline construction during the migratory bird breeding season could impact individual birds and/or nests. Habitat loss could have a greater impact on BCC species due to their limited populations in the area and more restrictive habitat needs. However, with the implementation of the measures outlined previously, including mitigation funding for loss of migratory bird habitat, we conclude that constructing and operating the Projects would likely not result in population-level impacts or significant measureable negative impacts on BCC-listed or migratory birds.

4.6.7 Conclusion

Overall, constructing and operating the Projects is not expected to significantly impact wildlife as a significant amount of similar adjacent habitat is available for use. The applicants would minimize wildlife and habitat impacts by implementing their *E&SCPs*, routing the pipeline to minimize impacts on sensitive areas, co-locating the pipeline with other rights-of-way where feasible, reducing the construction right-of-way through wetlands, and providing mitigation funding for loss of migratory bird upland forest habitat.

4.7 FISHERIES AND AQUATIC RESOURCES

4.7.1 Existing environment

Fisheries and aquatic habitats are typically characterized by water temperature (warmwater or coldwater), salinity (freshwater, marine, or estuarine), types of fishing uses (commercial or recreational), and utilization by open water marine fishes that require freshwater upstream areas to spawn (anadromous species) or freshwater species that migrate to marine waters for reproduction (catadromous species).

4.7.1.1 NGT Project

As described in section 4.3, construction and operation the NGT Project would require 450 waterbody crossings, many of which support fisheries and aquatic habitat. All of the waterbodies crossed by the NGT Project are classified as warmwater fisheries, which generally support fish able to tolerate water temperatures above 80 degrees Fahrenheit (°F). Fish species commonly found in the waterbodies crossed by the project are listed in table 4.7.1-1.

The National Marine Fisheries Service (NMFS) does not manage any waterbodies that would be crossed by the NGT Project, nor do the crossed waterbodies support essential fish habitat as defined under the Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265, as amended through January 12, 2007). In addition, no commercial, saltwater marine, or estuarine fisheries would be affected by the NGT Project. Threatened and endangered fish species are discussed in section 4.8.

TABLE 4.7.1-1

Typical Fish Species within the NGT and TEAL Projects Area

State	Species [a]
Ohio	Black bullhead (*Ameiurus melas*), black crappie (*Poxomis nigromaculatus*), **bluntnose minnow (*Pimephales notatus*)**, **central stoneroller (*Campostoma anomalum*)**, common carp (*Cyprinus carpio*), **creek chub (*Semotilus atromaculatus*)**, gizzard shad (*Dorosoma cepedianum*), green sunfish (*Lepomis cyanellus*), **Johnny darter (*Etheostoma nigrum*)**, largemouth bass (*Micropterus salmoides salmoides*), logperch darter (*Percina caprodes*), mottled sculpin (*Cottus bairdii*), northern hogsucker (*Hypentelium nigricans*), pumpkinseed sunfish (*Lepomis gibbosus*), rock bass (*Ambloplites rupestris*), smallmouth bass (*Micropterus dolomieu*), spotfin shiner (*Cyprinella spiloptera*), stonecat madtom (*Noturus flavus*), striped shiner (*Luxilus chrysocephalus*), sunfish bluegill (*Lepomis macrochirus*), white crappie (*Poxomis annularis*), **white sucker (*Catostomus commersonii*)**, yellow bullhead (*Ameiurus natalis*), and yellow perch (*Perca flavescens*).
Michigan	Black crappie (*Poxomis nigromaculatus*), bluntnose minnow (*Pimephales notatus*), blacknose dace (*Rhinichthys atratulus*), blacknose shiner (Notropis heterolepis), common shiner (*Luxilus comutus*), creek chub (*Semotilus atromaculatus*), emerald shiner (*Notropis atherinoides*), grass pickerel (*Esox americanus vermiculatus*), horneyhead chub (*Nocomis biguttatus*), largemouth bass (*Micropterus salmoides salmoides*), rock bass (*Ambloplites rupestris*), smallmouth bass (*Micropterus dolomieu*), spotfin shiner (*Cyprinella spiloptera*), stonecat madtom (*Noturus flavus*), sunfish bluegill (*Lepomis macrochirus*), white crappie (*Poxomis annularis*), white sucker (*Catostomus commersonii*), and yellow perch (*Perca flavescens*).

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a **Bolded** species may be present in the vicinity of the smaller streams and waterbodies crossed by the TEAL Project.

4.7.1.2 TEAL Project

Constructing and operating the TEAL Project would require 15 waterbody crossings. Of these, five are intermittent waterbodies and the remaining nine are classified as warmwater fisheries. Fish species that would occur in these waterbodies typically prefer small streams with gravel or cobble substrates. Species that may be present in waterbodies crossed by the TEAL Project are listed in table 4.7.1-1.

4.7.2 Impacts and Mitigation

4.7.2.1 NGT Project

Construction and operation the NGT Project could result in temporary and permanent impacts on fisheries and aquatic resources. Sedimentation and turbidity, alteration or removal of instream and stream bank cover, stream bank erosion, introduction of water pollutants, water depletions, and entrainment of small fishes during water withdrawals resulting from project activities would increase stress, injury, and mortality of stream biota. The degree of impact on fisheries from construction activities would depend on the waterbody crossing method, the existing conditions at each crossing location, the restoration procedures and mitigation measures employed, and the timing of construction. The discussions in the following sections further describe construction impacts on fisheries and aquatic resources and the measures that would be implemented to minimize impacts.

Sedimentation and Turbidity

Increased sedimentation and turbidity from in-stream and adjacent construction activities would impact fisheries resources. Sedimentation could smother fish eggs and other benthic biota, as well as alter stream bottom characteristics, such as converting sand, gravel, or rock substrate to silt or mud substrate. These habitat alterations could reduce juvenile fish survival, spawning habitat, and benthic community diversity and health. Fish and other stream biota would be displaced to similar habitat upstream or downstream of the pipeline crossing, which could lead to increased competition for habitat and food sources, affecting fish survival and health.

Increased turbidity could temporarily reduce dissolved oxygen levels in the water column and reduce respiratory functions in stream biota, which could temporarily displace fish to unaffected stream segments, reduce fish health, or increase fish mortality. Turbid conditions could also reduce the ability for biota to find food sources or avoid prey. The extent of impacts from sedimentation and turbidity would depend on sediment loads, stream flows, stream bank and stream bed composition, sediment particle size, and the duration of the disturbances. Waterbody crossing methods are discussed in detail in section 2.3.2.1.

The wet open-cut crossing method would generate the highest amount of sediment and turbidity, but the elevated levels would be short-term and occur over a short distances downstream of the crossing. Furthermore, the warmwater species found in these streams are typically resilient to turbid conditions. According to construction plans, NEXUS would complete all in-stream work in less than 24 hours for minor streams (less than 10 feet across) and less than 48 hours for intermediate streams (between 10 and 100 feet across). Trench spoil would be stored above the banks of waterbodies and would be protected with erosion control devices that prevent, or significantly reduce, sediment runoff from entering the waterbody.

The dry open-cut crossing methods (e.g., fluming, dam and pump) would further reduce sedimentation and turbidity impacts on fisheries by temporarily rerouting water flow and conducting construction activities in a dry waterbody environment.

The HDD method would involve drilling under a waterbody, avoiding work (and impacts) within the feature. The HDD method would avoid direct sedimentation and turbidity impacts on fisheries but could release drilling fluid, a naturally occurring clayey material called bentonite, into a waterbody. In the event of an inadvertent release, NEXUS would implement the *HDD Monitoring and Inadvertent Return Contingency Plan* (see appendix E-4) to prevent, minimize, or mitigate inadvertent losses of drilling fluid. All waterbodies identified as fisheries of concern (potentially containing federal or state-listed species) would be crossed using dry crossing methods or HDDs. The *HDD Monitoring and Inadvertent Return Contingency Plan* indicates that if inadvertent returns occur within a waterway, NEXUS would notify appropriate parties and evaluate the potential impact of the returns in order to determine an appropriate course of action. In general, NEXUS does not believe that it is environmentally beneficial to try to contain and collect drilling fluid returns in a waterway, as HDD drilling fluids are nontoxic and discharge of the amounts normally associated with inadvertent returns, in most cases, do not pose a threat to the environment or public health and safety. NEXUS also contends that placement of containment structures and attempts to collect drilling fluid within a waterway often result in greater environmental impact than simply allowing the drilling fluid returns to dissipate naturally.

Overall, the impact of construction on fish and stream biota is expected to be localized and short term because in-stream conditions and suspended sediment concentrations would return to background condition levels soon after in-stream construction has been completed.

Loss of Stream Bank Cover

Stream bank vegetation and structure such as logs, rocks, and undercut banks provide important habitat for fish and stream biota. Open-cut construction through waterbodies would temporarily remove this habitat, which could displace fish and other stream biota to similar habitat upstream or downstream of the pipeline crossing. Displacement would result in increased competition for habitat and food sources, which could affect fish health and survival. Clearing of stream bank cover may also result in locally elevated water temperatures. Approximately 70.5 acres of riparian habitat (within 100 feet of waterbody banks) would be affected by the NGT Project.

Once construction is complete, streambeds and banks would be restored to pre-construction conditions to the fullest extent possible. Substrate such as rock and gravel would be returned to the stream. Stream bank vegetation is expected to recover over several months to a few years, although a 10-foot-wide area centered over the pipeline would be maintained in an herbaceous state in order to conduct periodic pipeline corrosion and leak surveys.

Fuel and Chemical Spills

An inadvertent release of fuel or equipment related fluids could impact water quality. The chemicals released during spills could have acute fish impacts, such as altered behavior, changes in physiological processes, or changes in food sources. Fish could also experience greater mortality if a large volume of hazardous liquid is spilled into a waterbody. Furthermore, ingestion of large numbers of contaminated fish could impact fish predators in the food chain.

NEXUS has developed and would implement a *SPCC Plan* that includes preventive measures such as personnel training, equipment inspection, and refueling procedures to reduce the likelihood of spills, as well as mitigation measures such as containment and cleanup to minimize potential impacts should a spill occur. Adherence to the *SPCC Plan* would prevent a large spill from occurring near surface waters because construction equipment fueling would be prohibited within 100 feet of the waterbody banks (except for water pumps, which would be placed in secondary containment structures), and hazardous material storage would be prohibited within 100 feet of waterbodies. If a small spill were to occur, adherence to measures in the *SPCC Plan* would decrease the response time for control and cleanup, thus avoiding or minimizing the effects of a spill on aquatic resources. Additionally, the *SPCC Plan* requires adequate supplies be available on all construction spreads of suitable absorbent material and any other supplies and equipment necessary for the immediate containment and cleanup of inadvertent spills. Training and lines of communication to facilitate the prevention, response, containment, and cleanup of spills during construction activities also are described in the *SPCC Plan*.

Hydrostatic Testing and Water Withdrawals

NEXUS would utilize surface waters for dust control and/or hydrostatic testing of the pipeline (see section 4.3). Surface water withdrawals could reduce stream flows and water levels and could entrain or impinge stream biota. Hydrostatic test water discharges to surface waters could change water temperature and dissolved oxygen levels, increase turbidity and stream flows, and contribute to stream bank and substrate scour. Additionally, the discharge of hydrostatic test water to different watershed basins could contribute to the spread of nuisance exotic and invasive organisms. These impacts could reduce fish and biota health or result in injury or mortality.

Impacts from surface water withdrawals and hydrostatic test water discharges would be minimized by:

- adhering to the measures in NEXUS' construction and restoration plans, which prevent water withdrawals from and discharges to exceptional value waters or waters that provide habitat for federally listed threatened and endangered species, unless approved by applicable resource and permitting agencies;
- screening and positioning water intakes at the water surface to prevent the entrapment of fish and other biota;
- maintaining adequate flow rates to protect aquatic species;
- placing water pumps in secondary containment devices to minimize the potential for fuel spills or leaks;
- regulating discharge rates; and
- using energy dissipating devices and sediment barriers to prevent erosion, streambed scour, and sedimentation.

NEXUS also would be required to obtain and comply with state water withdrawal and discharge permits.

Aboveground Facilities and Access Roads

Construction of aboveground facilities would not cause noticeable fisheries impacts. NEXUS would implement its *E&SCP* to prevent sediment from entering adjacent waterbodies. Access road use and the placement of temporary or permanent bridges could temporarily impact waterbodies by increasing sedimentation and turbidity, reducing available stream habitat, and limiting fish passage. These impacts would displace fish and other stream biota to similar habitat upstream or downstream of the bridges, which could lead to increased competition for habitat and food sources, affecting fish survival and health.

Blasting

If blasting would be required adjacent to waterbodies, stream flow would be maintained and care would be taken to avoid damage to springs and other surface water resources. The contractor would comply with waterbody crossing timing windows and would conduct operations in accordance with the NGT Project *E&SCP*. Blasting procedures are discussed further in sections 2.3.1.3 and 4.3.1.2.

4.7.2.2 TEAL Project

The TEAL Project would cross 15 waterbodies, 5 of which are small, intermittent waterbodies, none of which are part of commercial fisheries or essential fish habitat. While the TEAL Project is within range of the channel darter, a state-listed species, the Project would not cross any waterbodies with channel darter habitat. The wet (open-cut) crossing method would be used on dry and/or minor waterbodies. In-stream work must be completed within 24 hours. The three larger waterbodies would be crossed using dry cuts methods. The flume or dam-and-pump dry crossing methods would minimize impacts on fish species by reducing sedimentation effects. Although fish passage would be restricted during crossing operations, dry cut crossings would be completed within 48 hours. Impacts on fish passage are expected to be minor and temporary. Texas Eastern does not anticipate that blasting would be necessary for any waterbody crossings. Hydrostatic test water would be taken from municipal sources or the Ohio River, and no streams in the TEAL Project area would be used for withdrawal. Implementation of Texas Eastern's *SPCC Plan* would further prevent impacts to fisheries and aquatic resources.

4.7.3 Conclusion

Based on our review of the potential impacts discussed previously, we conclude that construction and operation of the Projects would not significantly impact fisheries or aquatic resources. As described previously, the applicants have proposed several measures to avoid or minimize impacts on fisheries, and would be required to implement construction, mitigation, and restoration measures required by the USACE or state permitting agencies that would further minimize impacts. Based on our review, we also conclude that the measures the applicants would implement would not significantly impact fisheries of special concern, which are more sensitive to construction impacts or are held to a higher level of value or protection by state agencies.

4.8 SPECIAL STATUS SPECIES

Special status species are afforded protection by law, regulation, or policy by state and federal agencies. Special status species generally include federally listed species that are protected under the ESA, proposed or petitioned for listing under the ESA, considered as candidates for such listing by the FWS or NMFS, or state-listed as threatened, endangered, or other designations.

To assist in compliance with Section 7 of the ESA, the applicants, acting as the FERC's non-federal representative, initiated informal consultation with the FWS regarding federally listed species and designated critical habitat. The applicants also consulted with state agencies to identify state-listed and sensitive species that are known to occur in the general vicinity of the Projects. Prior to commencing field studies, the applicants consulted with the FWS Columbus Field Office and East Lansing Field Office, ODNR, MNFI, and MDNR to request known federal or state species records within a 1-mile-wide corridor of the proposed pipeline route. ODNR provided Natural Heritage Inventory information on November 13, 2014 and June 26, 2015, while MNFI provided data on October 9, 2014. Based on the information received from the agencies, the applicants evaluated the potential occurrence of protected species and their locations relative to the proposed pipeline route and facilities. Based on information from the agencies, 11 federally listed species (including proposed, petitioned, or candidate species) and 77 species protected at the state level could occur in the NGT and TEAL Projects area.

The applicants surveyed the NGT and TEAL Projects area to determine whether special status species habitat would be affected, using a generally 300-foot-wide survey corridor. Based on special status species habitat preferences and the results of the habitat surveys, the applicants, FWS, and state agencies determined which special status species have the greatest potential to be affected by the NGT and TEAL Projects. The narrowed list of special status species was then used to develop survey requirements and protocols. The survey plans identified which special status species required species-specific surveys, where the surveys should be conducted, and what time of year the surveys should be completed.

The applicants completed habitat and species surveys in 2015 and filed survey reports that outlined the survey methodologies, locations where surveys were conducted, and survey results. Surveys for protected species are ongoing during 2016. The applicants would file the results of any remaining surveys as they are available.

4.8.1 Federally Listed Threatened and Endangered Species

Federal agencies, in consultation with the FWS and/or NMFS, are required by ESA Section 7(a)(2) to ensure that any action authorized, funded, or carried out by the agency would not jeopardize the continued existence of a federally listed threatened or endangered species or species proposed for listing, or result in the destruction or adverse modification of designated critical habitat. As the lead federal agency, the FERC is responsible for consulting with the FWS and/or NMFS to determine whether any federally listed endangered or threatened species or any of their designated critical habitats are near the proposed action, and to determine the proposed action's potential effects on those species or critical habitats. As stated in section 4.7.1.1, none of the waters in the NGT Project area are managed by the NMFS; therefore, consultation with NMFS is not required under the ESA.

For actions involving major construction activities that may affect listed species or critical habitats, a Biological Assessment (BA) must be prepared for those species that may be affected. NEXUS would prepare an Applicant-Prepared BA (APBA) for submittal to FERC and the FWS and, if it is determined the action may adversely affect a federally listed species, the lead agency must submit a request for formal consultation to comply with Section 7 of the ESA. FERC will prepare a final BA to submit to FWS. In response to our BA, the FWS would issue a Biological Opinion as to whether or not the federal action would likely adversely affect or jeopardize the continued existence of a listed species, or result in the destruction or adverse modification of designated critical habitat. We determined the Projects may affect federally listed species and their designated critical habitats.

Although proposed, petitioned, and candidate species and proposed critical habitat do not receive federal protection through the ESA, we considered the potential effects on these species and habitats so that Section 7 consultation could be facilitated in the event one or more of these species become listed before or during construction of the Projects. Should a federally listed, proposed, petitioned, or candidate species be identified during construction that has not been previously identified during field surveys or assessed through consultation and project activities could adversely affect the species, the applicants are required to suspend the construction activity and notify the Commission and the FWS of the potential effects. The construction activity would not resume until the Commission completes its consultation with the FWS.

One proposed species, the eastern massasauga rattlesnake, has been identified as potentially occurring in the Projects area. In order to facilitate Section 7 requirements for the proposed eastern massasauga rattlesnake in the event the species becomes listed or the critical habitat becomes designated before or during project activity, potential effects on the species have been evaluated and mitigation measures are proposed as part of this draft EIS.

4.8.1.1 NGT Project

NEXUS, as the non-federal representative to the FERC, initiated informal consultation with the FWS. In a January 6, 2016 letter to the FERC, the FWS identified 10 federally listed species and 1 proposed species that are within the NGT Project area (FWS, 2016). These species are summarized in table 4.8.1-1.

Indiana Bat

The Indiana bat is a federally listed endangered species and is state-listed endangered in both Ohio and Michigan. The Indiana bat occurs in forests and caves from the east coast to Midwestern United States, primarily inhabiting regions in the Midwest (FWS, 2006). During the fall, from August through October, Indiana bats congregate at hibernation sites (i.e., hibernaculum) including caves and abandoned mine shafts, where bats engage in mating activities. During this time, bats also forage the surrounding areas to build fat reserves needed for hibernation (FWS, 2006). From October through April, Indiana bats hibernate in these areas, preferring cool, humid caves with stable temperatures under 50 °F. There are hibernacula located within Ohio and Michigan, and potential for this species to be located within each of the counties crossed by the NGT Project (FWS, 2006). Indiana bats emerge from hibernacula between mid-April and late May and again forage in areas typically within 10 miles of hibernaculum sites. Small maternity colonies are then formed under exfoliating bark for the duration of the summer months (FWS, 2006). Roosting colonies are commonly found in bottomland or riparian areas, but may also include some upland forests and pastures.

TABLE 4.8.1-1

Summary of Effects on Federally Listed Species for the NGT Project

Species	FWS Status [a]	State Status [b]	State Occurrence	Habitat	Comments
Indiana bat (*Myotis sodalis*)	E	OH – E MI – E	Ohio and Michigan	Inhabits caves and abandoned mines that provide cool and stable temperature during winter and then inhabit under loose bark of exfoliating trees or in tree hollows during the summer.	TBD – determination pending
Northern long-eared bat (*Myotis septentionalis*)	T	OH – T MI – T	Ohio and Michigan	Hibernation sites used during the winter (caves, mines) and roosting sites for reproduction (tree cavities) during the summer.	TBD – determination pending
Kirtland's warbler (*Setophaga kirtlandii*)	E	OH - E	Ohio	Kirtland's warblers are known to migrate along the Lake Eire shoreline through Ohio in late April-May and late August-early October.	May Affect, Not Likely to Adversely Affect
Rayed bean mussel (*Villosa fabalis*)	E	OH – E MI – E	Ohio and Michigan	Small headwater creeks, but they are sometimes found in large rivers.	May affect, Not Likely to Adversely Affect
Northern riffleshell mussel (*Epioblasma torulosa rangiana*)	E	MI – E	Michigan	Large streams and small rivers in firm sand of riffle areas; also occurs in Lake Erie.	No Effect
Snuffbox mussel (*Epioblasma triquetra*)	E	OH – E MI – E	Michigan	Small- to medium-sized creeds in areas with a swift current and some larger rivers.	No Effect
Mitchell's satyr butterfly (*Neonympha mitchellii michellii*)	E	MI – E	Michigan	Fens; wetlands characterized by calcareous soils that are fed by carbonate-rich water from seeps and springs.	No Effect
Powesheik skipperling (*Oarisma poweshiek*)	E	MI – T	Michigan	Wet prairie fens.	No Effect
Karner blue butterfly (*Lycaeides melissa samuelis*)	E	OH – E MI – T	Michigan	Pine barrens and oak savannas on sandy soils and containing wild lupines (*Lupinus perennis*).	No Effect
Eastern prairie fringed orchid (*Platanthera leucophae*)	T	OH – T MI – E	Ohio and Michigan	Wet prairies, sedge meadows, and moist roadside ditches. Typically restricted to sandy or peaty lakeshores or bogs.	No Effect
Eastern massasauga rattlesnake (*Sistrurus catenatus*)	P	OH – E MI – SC	Ohio and Michigan	Wet prairies, sedge meadows, and early successional fields, preferred wetland habitats are marshes and fens.	TBD – determination will be made once surveys are complete

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a Federal Status: E = Endangered, T = Threatened, P = Proposed.

b State Status: E = Endangered, T = Threatened, SC = Special Concern.

Source: FWS, 2016

Roost trees commonly include mixed mesophytic hardwoods and mixed hardwood-pine stands (FWS, 2006). According to the FWS, potential roosting habitats are those with at least 16 suitable trees per acre. Suitable trees include live shagbark hickory over 9 inches in diameter at breast height (dbh); dead, dying, or damaged trees of any species over 9 inches dbh with at least 10 percent exfoliating bark; den trees, broken trees, or stumps over 9 inches in dbh and over 9 feet in height; or live trees of any species over 26 inches dbh (FWS, 2006).

Indiana bats often forage in both riparian and upland forests, as well as cropland borders and wooded fencerows. Preferred habitat include streams and associated floodplain forests, and impounded bodies of water, including ponds and reservoirs. Indiana bats search for flying insects at or near the canopy at night and similar to other bat species, utilize openings in the forest, such as stream corridors and rights-of-way to feed (FWS, 2006).

NEXUS conducted mist net surveys in 2015 in areas along the NGT Project route. Surveys were not required in areas where the Indiana bat had previously been confirmed. Surveys were conducted outside of previous capture areas in Wayne, Medina, Lorain, Erie, Sandusky, Wood, Lucas, and Fulton Counties, Ohio, and in all Michigan counties associated with the NGT Project route. NEXUS drafted a survey plan following FWS and ODNR guidance and MDNR deferred to FWS regarding the mist net survey protocols. Survey reports were submitted to FWS on December 14, 2015. No Indiana bats were detected during the 2015 summer presence/absence surveys, demonstrating probable absence of Indiana bats in these portions bat of the NGT Project area. Mist-net surveys to demonstrate presence/probable absence will continue in 2016. NEXUS would also conduct habitat assessment surveys within areas where there are known Indiana bat records. Additionally, portal searches in 2015 determined that no caves or abandoned mines would be affected by the NGT Project. NEXUS commits to conducting all tree clearing within the winter clearing timeframe (i.e., October 1 through March 31). Tree clearing would be prioritized to clear known Indiana bat habitat first.

Additionally, NEXUS has avoided impacting greenfield forested areas to the extent practicable, which is evidenced by 92 percent of the NGT Project route being either co-located with existing utility corridors or located in active agricultural areas. Where possible, the NGT Project has been designed to avoid isolated woodlots in areas with heavy agricultural use. In several locations, the NGT Project has been routed away from existing utility corridors and into agricultural fields to avoid unnecessary impacts on forested areas. The routing, in conjunction with the seasonal tree clearing in confirmed occupied habitat, would ensure that any effects on Indiana bats are insignificant or discountable.

As discussed in the May 11, 2016 filing (Docket No. CP16-22-000, Accession No. 20160511-5301), NEXUS is preparing an APBA as a contingency for adjustments to construction schedules and constraints regarding access to properties. The APBA would define anticipated impacts on Indiana bats in the event that spring and/or summer clearing may be required. Impacts would be measured based on the amount of quality suitable habitat utilized by Indiana bats in the Projects area. Indiana bats would be assumed present until presence/probable absence surveys are complete and absence can be assumed based on negative survey findings. Impacts to the species are expected only if tree clearing in occupied suitable habitat takes place in spring and/or summer. A determination cannot be made at this time due to incomplete survey data. Our BA will make the final effects determination for the Indiana bat, and is expected to be complete in July or August 2016.

Northern Long-eared Bat

The northern long-eared bat is a federally-listed threatened species and is state-listed threatened in Ohio and Michigan. In Ohio, the northern long-eared bat is assumed present wherever suitable habitat occurs unless a presence/absence survey has been performed to document absence. Suitable summer habitat for northern long-eared bats consists of a wide variety of forested/wooded habitats that are used for roosting, foraging, and travel. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags greater than 3 feet dbh that have any exfoliating bark, cracks, crevices, hollows and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of other forested/wooded habitat. Suitable habitat may also include some adjacent and interspersed non-forested habitats such as emergent wetland, agricultural fields, old fields, and pasture. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat. In the winter, northern long-eared bats hibernate in caves and abandoned mines.

The NGT Project is near several confirmed northern long-eared bat records in Sandusky, Erie, Wayne, Summit, Stark, Columbiana, and Carroll Counties, Ohio. The FWS Columbus Field Office provided detailed information on where the NGT Project intersects known northern long-eared bat habitat and for these areas has recommended not clearing, to the maximum extent possible, upland and lowland woodlots and tree-lined corridors that provide forage sites to avoid adverse effects on the bat.

NEXUS conducted desktop and field surveys for portals (e.g., hibernacula) within the NGT Project area. No portals were identified during the surveys; therefore, no potential hibernacula would be affected by the NGT Project. NEXUS also conducted summer presence/absence surveys in 2015 within the NGT Project area that fall outside the northern long-eared bat record buffers. NEXUS drafted a survey plan following FWS and ODNR guidance. Four northern long-eared bats were captured in Ohio during the survey; three were successfully radio-tracked, resulting in the identification of multiple roost trees. No northern long-eared bats were captured in Michigan. There are, however, recent records within the range of the NGT Project in the MNFI database.

The northern long-eared bat was federally listed as a threatened species in May, 2015 with an interim 4(d) rule; effective February 16, 2016, the FWS finalized the 4(d) rule. The FWS has developed a map identifying counties containing hibernacula where bats have been found to exhibit White Nose Syndrome (WNS) and/or have tested positive for the fungus that causes WNS. These counties have been buffered by approximately 150 miles; within this area, the northern long-eared bat is considered to be at greater risk of population decline. For areas within the WNS zone, incidental take is prohibited under the circumstances described below. The FWS identified activities within the conditions below as “take prohibitions” that require incidental take permits and additional formal consultation:

- If take occurs within a hibernacula, regardless of season;
- If take results from tree-removal activities and the activity occurs within 0.25 mile of a known, occupied hibernacula; or,
- The activity cuts or destroys a known, occupied maternity roost tree or other trees within a 150-foot radius from the maternity roost tree during the pup season from June 1 through July 31.

NEXUS has verified with the FWS Columbus and East Lansing Field Offices there are no known hibernacula within 0.25 mile and no maternity roost trees within 150 feet of the NGT Project. In addition, NEXUS has committed to clearing trees for the NGT Project between October 1 and March 31.

Impacts to the species are expected only if tree clearing in occupied suitable habitat takes place in spring and/or summer. NEXUS would utilize the final 4(d) rule for the northern long-eared bat in the event that winter clearing timelines cannot be adhered to, and would institute the summer clearing restrictions as defined in the final 4(d) rule. As discussed in the May 11, 2016 filing (Docket No. CP16-22-000, Accession No. 20160511-5301), NEXUS is preparing an APBA as a contingency for adjustments to construction schedules and constraints regarding access to properties, and in the event the 4(d) rule is no longer applicable due to pending legal challenges. The APBA would define anticipated impacts to northern long-eared bats in the event that spring and/or summer clearing may be required, and would provide the data necessary for the FWS to calculate levels of adverse impacts for the species. A determination cannot be made at this time due to incomplete survey data. Our BA will make the final effects determination for the northern long-eared bat, and is expected to be complete in July or August 2016.

Kirtland's Warbler

The Kirtland's warbler is a federally listed endangered species and is state-listed endangered in Ohio. This small blue-gray songbird has a bright yellow-colored breast and is found in low scrub, thickets, and deciduous woodland (Mayfield, 1992). This warbler migrates through Ohio in the spring and fall, traveling between breeding grounds in north-central North America and wintering grounds in the Bahamas. While migration occurs in a broad front across the entire state, approximately half of all observations in Ohio are within 3 miles of Lake Erie. During migration, individual birds usually forage in scrub-shrub or forested habitats and only stay in the area for a few days.

The current location of the NGT Project is more than 3 miles from Lake Erie; therefore, we conclude the NGT Project *may affect, but is unlikely to adversely affect* the Kirtland's warbler.

Rayed Bean

The rayed bean is a federally listed endangered species and is state-listed endangered in both Ohio and Michigan. The rayed bean is a small freshwater mussel about 1.5 inches long as an adult. The shell can be brown, green, or yellow-greenish in coloration with wavy, dark-green lines. Sand or gravel and margins of water willow beds of headwater creeks and larger rivers make up the typical habitat of this species. In Ohio, the rayed bean is known to occur in the Lake Erie basin including recent records in Swan Creek, which flows through Fulton and Lucas Counties, Ohio. In Michigan, the rayed bean mussel is known to occur in the Huron River and River Raisin.

NEXUS conducted mussel surveys in Swan Creek, the Huron River, and the Sandusky River in Ohio between August and September 2015; no live rayed bean mussels were identified in these areas. Surveys conducted in the Vermillion River identified rayed bean shell fragments within the waterbody. In Michigan, live individuals were present in the River Raisin during mussel surveys. The Vermillion River and River Raisin would all be crossed using HDD methods, which would avoid any direct impacts on this species. Potential impacts from inadvertent releases of drilling mud during the HDD activities would be minimized by the implementation of NEXUS' *HDD Monitoring and Inadvertent Return Contingency Plan*. This plan states that in the event of an inadvertent drilling fluid return within a waterway, NEXUS would immediately contact applicable agencies by telephone and/or e-mail detailing the location and nature of the inadvertent return, corrective actions being taken, and whether the inadvertent return poses any threat to the environment or public health and safety.

The applicant has performed a risk identification and assessment for each waterbody being crossed utilizing HDD methods. The River Raisin crossing is considered to have a "low" level of risk of an inadvertent return. The Vermilion River crossing is determined to have an "average" level of risk. Per guidance from FWS Region 3, the possibility of an inadvertent return from an HDD crossing must be considered "discountable" in order to make a determination of not likely to affect for the species. Under these circumstances, the risk assessment of the Vermilion River cannot be considered discountable. Therefore we conclude that the NGT Project *may affect, and is likely to adversely affect* the rayed bean mussel.

Northern Riffleshell

The northern riffleshell is a federally listed endangered species and is state-listed endangered in Michigan. The northern riffleshell is considered a moderately sized mussel reaching 2 inches. The shell of the northern riffleshell is ovate to quadrate in shape and becomes thicker toward the anterior. The color of the shell can range from light greenish-yellow to an olive green, with narrow, dark, closed-spaces rays. The northern riffleshell is typically observed in well-oxygenated large streams or rivers with sand and coarse gravel. The species historically occurred in Macon Creek, a tributary of River Raisin, as well as the Huron River in Michigan.

NEXUS completed mussel surveys in Macon Creek and the Huron River in September 2015. No northern riffleshells were observed during the surveys. Additionally, the Huron River would be crossed by the HDD method. Therefore, we conclude that the NGT Project would have *no effect* on the northern riffleshell mussel.

Snuffbox

The snuffbox mussel is a federally listed endangered species and is state-listed endangered in both Ohio and Michigan. The snuffbox is a thick-shelled and triangular shaped species that is about 2 inches in length, with males typically larger than females. Coloration is light yellowish with numerous dark-green rays that are broken intermediately. This mussel inhabits small- to medium-sized rivers but can be found in larger waterbodies. During project coordination, the FWS indicated this species could occur in the Huron River near the NGT Project area in Michigan. Surveys were completed in 2015 and no snuffbox or its habitat were identified. Furthermore, the Huron River would be crossed by the HDD method. Therefore, we conclude that the NGT Project would have *no effect* on the snuffbox mussel.

Mitchell’s Satyr Butterfly

The Mitchell’s satyr butterfly is a federally listed endangered species and is state-listed endangered in Michigan. Mitchell’s satyr is a medium-sized, brown butterfly with black circular eyespots outlines in distinctive orange rings. This butterfly inhabits prairie fens, geologically and biologically unique wetland communities. Hydrological processes are critical in maintaining the vegetative structure and ultimately the habitat for the Mitchell’s satyr. Even minor alterations of the hydrology in these areas can significantly alter and even eliminate suitable fen habitat and increase woody plant species incompatible with the butterfly’s life cycles.

The FWS identified a historic occurrence element for the species in Washtenaw County, Michigan, and indicated the Mitchell’s satyr could occur near the NGT Project. NEXUS completed botanical surveys and confirmed that no prairie fens or large undisturbed grasslands would be affected by the NGT Project. Due to lack of suitable habitat, we conclude that the NGT Project would have *no effect* on the Mitchell’s satyr.

Poweshiek Skipperling

The Poweshiek skipperling is a federally listed endangered species and is state-listed threatened in Michigan. The Poweshiek skipperling is a small butterfly with dark brown and orange wings with a lighter brown and prominent white veins on the underside of the wing. This butterfly lives in high-quality prairie habitats and is typically found in select upland or wet tallgrass prairies. In Michigan, the skipperling has been found mainly in prairie fen habitats. The FWS noted occurrence records for Washtenaw County, Michigan. The majority of the NGT Project route in Michigan is within active agriculture, commercial, or industrial land uses. NEXUS completed botanical surveys and confirmed that no prairie fens or large undisturbed grasslands would be affected by the NGT Project. Therefore, we conclude that the NGT Project would have *no effect* on the Poweshiek skipperling.

Karner Blue Butterfly

The Karner blue butterfly is a federally listed endangered species, is state-listed endangered in Ohio, and is state-listed threatened in Michigan. The Karner blue butterfly has four stages in its lifecycle:

the egg, larva, pupa, and adult. There are two generations per year, with the first adults appearing in late May to mid-June. The second brood of adults, emerging in mid-July to early August, lay their eggs singly in dried lupine seed pods or near the ground on the lupine stems. Eggs of the second brood hatch the following May. Additionally, although the Karner blue adults are nectar-feeders, the larvae are highly specialized and feed exclusively on the wild lupine *(Lupinus perenis*) leaves. Without lupine, the butterfly populations would not survive (FWS, 2008b).

According to the FWS, no impacts on this species are anticipated in Ohio (FWS, 2014). In Michigan, the species distribution is limited to pine and scrub oak habitats scattered among open grassy areas, commonly within wild lupine habitat (FWS, 2008b). The FWS identified this species as potentially occurring near the NGT Project in Michigan. NEXUS conducted botanical surveys and confirmed that neither oak savanna nor wild lupine is located within the NGT Project area. Therefore, we conclude that the NGT Project would have *no effect* on the Karner blue butterfly.

Eastern Prairie Fringed Orchid

The eastern prairie fringed orchid is a perennial, upright, leafy stem plant that ranges from 8 to 40 inches in height. This plant has 3- to 8-inch lance-shaped leaved with one single flower cluster called an inflorescence. More specifically, the single flower spike is comprised of anywhere from 5 to 40 creamy-white flowers. The eastern prairie fringed orchid is primarily located in sandy or peaty lakeshores or bogs. The orchid thrives in low-competition and grass- and sedge-dominated communities where natural processes, such as seasonal flooding or disturbance, maintain the early successional stage (Penskar and Higman, 2000).

Previous records place the orchid in Wayne and Sandusky Counties in Ohio, and Monroe and Washtenaw Counties in Michigan. NEXUS completed eastern prairie fringed orchid surveys, including habitat assessment and meander surveys, in all areas identified as potential habitat along the NGT Project route. No individuals were located within the NGT Project area. Therefore, we conclude that the NGT Project would have *no effect* on eastern prairie fringed orchid.

Eastern Massasauga Rattlesnake

The eastern massasauga rattlesnake is currently proposed for listing as threatened under the ESA; critical habitat has not been proposed at this time. While proposed species are not afforded protections under the ESA, once a listing becomes effective, prohibitions against take and jeopardizing the species' continued existence apply. A final decision whether to list the species is expected in 2016; if the species is listed as threatened, as proposed, Section 7 consultation will need to be reinitiated for the species.

The eastern massasauga exists in disjunctive population segments near both wetland habitats and along forest edges in Michigan and Ohio (MNFI, 2007). Populations in southern Michigan and Ohio typically use shallow, sedge- or grass-dominated wetlands, while those in northern Michigan prefer lowland coniferous forests. This species also requires sunny areas with scattered shade to exist with thermoregulation, so it will avoid heavily wooded or closed canopy areas. It is typical for massasauga to hibernate from the end of October through April in the hummocked wetland landscapes and move to drier upland areas along fields and old wood edges for hunting purposes in the summer months (New York State Department of Environmental Conservation, 2015).

NEXUS performed a habitat analysis to determine if suitable habitat for eastern massasauga would be impacted by the NGT Project. No suitable habitat for this species was found in Ohio along the NGT Project route. In Michigan, 10 potential habitat sites were identified through desktop review and 2 sites were confirmed as suitable massasauga habitat during field habitat surveys. Fall season presence/absence surveys were conducted at the two sites with confirmed suitable habitat and no individuals observed. Spring emergence surveys will be conducted in 2016 at both locations.

At this time, the FWS recommends project applicants in the range of eastern massasauga rattlesnake to consider voluntary conservation measures in areas of known or suspected massasauga habitat. These include minimizing ground disturbance in areas of potential massasauga habitat, and limiting the operation of vehicles and equipment, clearing of trees, and other construction-related activities in known or presumed occupied massasauga habitat to between October 31 - March 15 and when the ground is frozen and air temperatures are less than 45°F. During this time, under these conditions, eastern massasaugas are most likely underground and are less likely to be impacted by these activities.

Based on current survey findings, the FWS has stated the NGT Project in Ohio is unlikely to have an effect on the species. However, surveys for the eastern massasauga rattlesnake in Michigan are not yet complete. Therefore, **we recommend that:**

- **<u>Prior to construction of the NGT Project</u>, NEXUS should file with the Secretary 2016 survey results and any mitigation measures developed in consultation with the FWS for the eastern massasauga rattlesnake.**

4.8.1.2 TEAL Project

Texas Eastern, as the non-federal representative to the FERC, initiated informal consultation with the FWS. In a January 6, 2016 letter to the FERC, the FWS identified 10 federally listed species and 1 proposed species within range of the TEAL Project. These species are summarized in table 4.8.1-2.

TABLE 4.8.1-2

Summary of Effects to Federally Listed Species for the TEAL Project

Species	FWS Status [a]	State Status [b]	Habitat	Comments
Indiana bat (*Myotis sodalis*)	E	OH – E	Inhabits caves and abandoned mines that provide cool and stable temperature during winter, and then inhabits under loose bark of exfoliating trees or in tree hollows during the summer.	TBD – determination pending
Northern long-eared bat (*Myotis septentionalis*)	T	OH – T	Hibernation sites used during the winter (caves, mines) and roosting sites for reproduction (tree cavities) during the summer.	TBD – determination pending
Eastern massasauga rattlesnake (*Sistrurus catenatus*)	P	OH – E	Wet prairies, sedge meadows, and early successional fields, preferred wetland habitats are marshes and fens.	No Impact

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a Federal Status: E = Endangered, T = Threatened, P = Proposed.

b State Status: E = Endangered, T = Threatened

Source: FWS, 2016

Indiana Bat

Life history information for Indiana bat is included in the previous NGT Project-specific section.

Due to previous Indiana bat records in the TEAL Project vicinity, presence/absence surveys were not required, as presence is presumed in these areas. Texas Eastern conducted portal searches during spring 2015 and no cave/mine portals were identified. Texas Eastern has also committed to winter tree clearing (i.e., October 1 through March 31).

Texas Eastern is preparing an APBA as a contingency for adjustments to construction schedules and constraints regarding access to properties. The APBA would define anticipated impacts to Indiana bats in the event that spring and/or summer clearing may be required. Impacts would be measured based on the amount of quality suitable habitat utilized by Indiana bats in the Projects area. Impacts to the species are expected only if tree clearing in occupied suitable habitat takes place in spring and/or summer. A determination cannot be made at this time. Our BA will make the final effects determination for the Indiana bat, and is expected to be complete in July or August 2016.

Northern Long-eared Bat

Life history information for northern long-eared bat is included in the previous NGT Project-specific section.

Texas Eastern conducted portal searches during spring 2015 and no cave/mine portals were identified. Texas Eastern has verified with the FWS Columbus Field Office that there are no known hibernacula within 0.25 mile and no maternity roost trees within 150 feet of the TEAL Project. Texas Eastern has committed to clearing trees for the TEAL Project between October 1 and March 31. Impacts to the species are expected only if tree clearing in occupied suitable habitat takes place in spring and/or summer. Texas Eastern would utilize the final 4(d) rule for the northern long-eared bat in the event that it cannot adhere to winter clearing timelines. Texas Eastern would institute the summer clearing restrictions as defined in the final 4(d) rule. Texas Eastern is being preparing an APBA as a contingency for adjustments to construction schedules and constraints regarding access to properties, and in the event the 4(d) rule is no longer applicable due to pending legal challenges. The APBA would define anticipated impacts to northern long-eared bats in the event that spring and/or summer clearing may be required, and would provide the data necessary for the FWS to calculate levels of adverse impacts for the species. Impacts to the species are expected only if tree clearing in occupied suitable habitat takes place in spring and/or summer. A determination cannot be made at this time. Our BA will make the final effects determination for the northern long-eared bat, and is expected to be complete in July or August 2016.

Eastern massasauga rattlesnake

Life history information for the eastern massasauga rattlesnake is included above in the previous NGT Project-specific section.

Although the TEAL Project is within the range of the eastern massasauga rattlesnake, the FWS has indicated that the TEAL Project area does not contain suitable habitat for the species (FWS, 2015). Therefore, the TEAL Project would have *no effect* on eastern massasauga rattlesnake.

4.8.1.3 Conclusion

We have recommended avoidance and mitigation measures where we believe the Projects, as proposed, would not adequately support certain federally listed species' conservation needs or agency-recommended conservation measures, or where additional habitat data or species-specific surveys are necessary. We note that implementation of these recommendations would minimize impacts on federally listed species and their habitat associations (e.g., wetlands, waterbodies, sand ridges). Thus, we conclude that the Projects-related impacts on federally listed species would be reduced to levels that would not threaten a species population viability, or contribute to trends toward extinction.

Because surveys and our consultations are ongoing for federally listed species, **we recommend that:**

- **NEXUS should not begin construction activities <u>until</u>:**
  - **a) all outstanding biological surveys have been completed;**
  - **b) the staff receives comments from the FWS regarding the proposed actions;**
  - **c) the staff completes formal consultation with the FWS; and**
  - **d) NEXUS has received written notification from the Director of OEP that construction or use of mitigation may begin.**
- **Texas Eastern should not begin construction activities <u>until</u>:**
  - **a) all outstanding biological surveys have been completed;**
  - **b) the staff receives comments from the FWS regarding the proposed actions;**
  - **c) the staff completes formal consultation with the FWS; and**
  - **d) Texas Eastern has received written notification from the Director of OEP that construction or use of mitigation may begin.**

4.8.2 State-listed Species

In Ohio, the Ohio Division of Wildlife (OHDW) has legal authority over Ohio's fish and wildlife, while the Ohio Division of Natural Areas and Preserves (OHDNAP) has authority over rare plants. In Michigan, the MIDNR is responsible for special status plant and animal species. Records of rare species and unique natural features are maintained in the Michigan Natural Features Inventory (MNFI) natural heritage database, administered by the Michigan State University Extension service.

Ninety-one species that are state-listed as threatened, endangered, or of special concern have been identified as potentially present in the Projects area (see appendix J-1). Fourteen (14) of these species are also federally listed or proposed for federal listing. Eleven (11) of these are discussed above in section 4.8.1 and 3 federally listed were determined to not be present in the Projects area. The Projects will not impact 58 species; suitable habitat is not present in the Projects area, surveys have determined the absence of individuals, or the Projects have been routed to avoid suitable habitat. The remaining 19 species which may be impacted by the Projects are discussed in greater detail below.

Impacts on state-listed species may be greater than impacts on other vegetation and wildlife because these species may be more sensitive to disturbance, more specific to a habitat, and less able to move to unaffected suitable habitat that may not be available (or currently exists only in small tracts). Disturbances could therefore have a greater impact on a species' population. Potential impacts that could affect a species' conservation needs or decrease a population's viability include habitat fragmentation, loss, or degradation; decreased breeding or nesting success; increased predation or decreased food sources; and injury or mortality.

Potential impacts and corresponding minimization or mitigation measures are often related to a species' habitat associations. For example, the clearing and removal of grassland could have similar effects on the grasshopper sparrow, regal fritillary, Canadian milk vetch, and other grassland species. Corresponding measures to minimize impacts on scrub habitat, particularly within high-quality or important habitat, often benefit all grassland associate species. Similarly, measures that are implemented to minimize impacts on freshwater marshes would benefit all species within that habitat association.

The applicants have proposed measures to reduce habitat and species impacts, and continue to consult with resource agencies to identify and develop additional conservation and mitigation measures to further minimize impacts on state-listed species. For instance, the applicants have committed to following ODNR recommendations to prevent impacts on the barn owl by avoiding barns, silos, and abandoned structures in areas with documented records of this owl. Additionally, the applicants have committed to tree clearing restrictions to avoid adverse impacts on sensitive species. State permitting agencies have further opportunity during their permit review and authorization processes to require additional conservation and mitigation measures that would further protect and conserve sensitive species and their habitats according to each agencies' mission and conservation goals.

Mammals

The evening bat is the only exclusively state-listed mammal species identified in the NGT Project area as being potentially impacted by the Projects. The federally-listed northern long-eared bat and the Indiana bat are also listed as threatened and endangered at the state level in Ohio, respectively; potential impacts on these species has been discussed above in section 4.8.1.

The evening bat (*Nycticeius humeralis*) is listed as threatened in the state of Michigan. The evening bat is a small, forest-dwelling bat found in the U.S. from the East Coast west to eastern Nebraska and south through East Texas; in Michigan, it is found only in the southern portion of the state (Sargent and Carter 1999). The pelage is bicolored above (dark brown at the base and dull grayish brown at the tips) and lighter brown below (TPWD 2016). The species is differentiated from most other small bats by a curved and rounded tragus and two upper incisors as opposed to the four present in many myotids (TPWD 2016, MNFI 2007, Sargent and Carter 1999). The evening bat roosts behind loose bark and tree crevices, and can sometimes be found roosting in buildings. The species does not utilize caves, but may participate in swarming activities at cave entrances in late summer (TPWD 2016, Arroyo-Cabrales and Álvarez-Castañeda 2008). Evening bats utilize echolocation to identify beetles, moths leafhoppers and flies, which they capture and consume in flight (Neely 2003). In the northern portions of the range, evening bats may be migratory. Female evening bats migrate north to maternity colonies in spring, while males stay in the southern portion of the range year-round. Females tend to migrate south from northern colonies in October (Neely 2003).

Mist-net surveys were conducted in summer, 2015 at 35 sites in the Project survey area in Michigan; two evening bats were captured and radio-tagged, neither of which were successfully tracked back to roost trees. Evening bats may be impacted by the Project; however, modifications made to the route to avoid potentially suitable habitat have reduced the potential impact on the species. NEXUS commits to conducting all tree clearing within the winter clearing timeframe (i.e., October 1 through March 31); migratory evening bats are unlikely to be present on the landscape at this time, further minimizing impacts to the species. Impacts on the species are expected only if tree clearing in occupied suitable habitat takes place in spring and/or summer. Based on our recommendation below, we conclude that impacts on the evening bat would be temporary and minor.

Birds

Eight state-listed bird species have been identified in the Projects area as being potentially impacted by the Projects; 7 in Ohio and 1 in Michigan. The American bittern, black tern, king rail, northern harrier, sandhill crane, trumpeter swan, and upland sandpiper all have the potential to occur in the Project area in Ohio (ODNR, 2015A). A review of the MNFI identified records for the grasshopper sparrow within 1 mile of the Project route in Michigan; it is state-listed as a species of special concern. Impacts on habitat that supports these species should be avoided during the relevant timeframes, to the extent practicable, to avoid impacts on the species as discussed below.

The NGT and TEAL Projects are within the range of the American bittern (*Botaurus lentiginosus*), state-listed as endangered in Ohio. The bittern is a stocky, medium-sized heron found in large, undisturbed wetlands with scattered small pools and dense vegetation. Coloration is brown with tan stripes, and is well-camouflaged. The species also occasionally occupy bogs, large wet meadows, and dense shrubby swamps. These habitats could potentially exist within the NGT Project area. ODNR recommends if these types of habitats occur along the pipeline route, construction be avoided during the nesting period of May 1 to July 31 (ODNR, 2015A). Based on our recommendation below, we conclude that impacts on the American bittern would be temporary and minor.

The NGT Project is within the range of the black tern (*Chlidonias niger*), state-listed as endangered in Ohio. The species is found in large, undisturbed, densely vegetated inland marshes with pockets of open water. Cattail marshes are preferred for nesting, but will utilize various kinds of marsh vegetation. Nests are built on top of muskrat houses or over floating vegetation. ODNR recommends if these types of habitats occur along the pipeline route, construction be avoided during the nesting period of April 1 to June 30 (ODNR, 2015A). Based on our recommendation below, we conclude that impacts from the Project would be temporary and minor for the black tern.

The NGT Project is within the range of the king rail (*Rallus elegans*), state-listed as endangered in Ohio. Found in freshwater wetland habitats, the species is primarily associated with dense cattails stands and other thick marsh vegetation. The king rail constructs deep, bowl-shaped nests out of grass; these are well-hidden in marsh vegetation. ODNR recommends if these types of habitats occur along the pipeline route, construction be avoided during the nesting period of May 1 to August 1 (ODNR, 2015A). Based on our recommendation below, we conclude that impacts from the Project would be temporary and minor for the king rail.

The NGT Project is within the range of the northern harrier (*Circus cyaneus*), state-listed as endangered in Ohio and is a common migrant and winter species in the state. The northern harrier rarely nests in the area, but may occasionally breed in large marshes and grasslands. ODNR recommends if these types of habitats occur along the pipeline route, construction be avoided during the nesting period of May 15 to August 1 (ODNR, 2015A). Based on our recommendation below, we conclude that impacts from the Project would be temporary and minor for the northern harrier.

The NGT Project is within the range of the sandhill crane (*Grus canadensis*), state-listed as endangered in Ohio. Primarily a wetland-dependent species, sandhill cranes utilize large tracts of wet meadow, shallow marsh, or bog wetlands for breeding and nesting. In the winter, sandhill cranes will forage in agricultural fields; however, they roost in shallow, standing water or moist bottomlands. If grassland, prairie, or wetland habitat will be impacted, construction should be avoided in this habitat during the species' nesting period of April 1 to September 1. With avoidance of nesting periods, the Project is not likely to have an impact on this species (ODNR, 2015A). Based on our recommendation below, we conclude that impacts from the Project would be temporary and minor for the sandhill crane.

The NGT Project is within the range of the trumpeter swan (*Cygnus buccinator*), state-listed as threatened in Ohio. Trumpeter swans inhabit large, shallow marshes, lakes, and wetlands ranging in size from 40 to 150 acres. They prefer a diverse mix of emergent and submergent vegetation and open water. If this type of habitat will be impacted, construction should be avoided in this habitat during the species' nesting period of April 15 to June 15. With avoidance of nesting periods, the Project is not likely to have an impact on this species (ODNR, 2015A). Based on our recommendation below, we conclude that impacts from the Project would be temporary and minor for the trumpeter swan.

The upland sandpiper (*Bartramia longicauda*) is state-listed as endangered in Ohio. A review of the ODNR Natural Heritage Database identified multiple records for this species within 1 mile of the NGT Project corridor. Nesting upland sandpipers utilize dry grasslands including native grasslands, seeded grasslands, grazed and ungrazed pasture, hayfields, and grasslands established through the Conservation Reserve Program (CRP). These habitats may occur within the Project area. ODNR requested that construction should be avoided in this habitat during the species' nesting period of April 15 to July 31 (ODNR, 2015A). Based on our recommendation below, we conclude that impacts from the Project would be temporary and minor for the upland sandpiper.

The grasshopper sparrow (*Ammodramus savannarum*) is state-listed as special concern in Michigan. A review of the MNFI database documented the species within 1 mile of the Project area. Special concern species are not protected under the state's endangered species legislation, but efforts should be taken to minimize all potential impacts to the species and its habitats (MNFI 2014). Based on our recommendation below, we conclude that impacts from the Project would be temporary and minor for the grasshopper sparrow.

Reptiles and Amphibians

Two exclusively state-listed reptiles have been identified in the Projects area in Ohio as being potentially impacted by the NGT Project. No exclusively state-listed reptile or amphibian species are expected to be impacted within the Project area in Michigan. The federally proposed eastern massasauga rattlesnake is also listed as endangered at the state level in Ohio; potential impacts on this species has been discussed above in section 4.8.1.

The Blanding's turtle (*Emydoidea blandingii*) is state-listed as threatened in Ohio. A review of the ODNR Natural Heritage Database identified multiple records for the Blanding's turtle within 1 mile of the NGT Project corridor (ODNR, 2015A). Blanding's turtles inhabit marshes, ponds, lakes, streams, wet meadows, and swampy forests but are also found in dry areas while moving from one wetland to another. The ODNR recommends that a habitat suitability survey be conducted by an approved herpetologist (ODNR, 2015A). Wetland data collected during field surveys has been evaluated for the presence of potentially suitable habitat for the species. The ODNR has requested that if suitable habitat is found to be present along the project route, presence/absence surveys be conducted for individual Blanding's turtles. Based on our recommendation below, we conclude that impacts from the Projects would be temporary and minor for the Blanding's turtle. NEXUS would be required to continue consulting with the state of Ohio to identify the need for any species-specific mitigation measures based on the outcome of the surveys.

The spotted turtle (*Clemmys guttata*) is state-listed as threatened in Ohio. A review of the ODNR Natural Heritage Database identified multiple records for the spotted turtle within 1 mile of the NGT Project corridor. Much of the pipeline is within the range of the spotted turtle (ODNR, 2015A). Spotted turtles prefer fens, bogs, and marshes but may also inhabit wet prairies, meadows, pond edges, wet woodlands, and shallow, slow-moving streams or ditches. The ODNR recommends that the habitat suitability survey be conducted by an approved herpetologist. If suitable habitat is found, the ODNR recommends that presence/absence survey for individual spotted turtles be conducted; the results of all surveys would be submitted to ODNR. Based on our recommendation below, we conclude that impacts from the Projects would be temporary and minor for the spotted turtle. NEXUS would be required to continue consulting with the state of Ohio to identify the need for any species-specific mitigation measures based on the outcome of the surveys.

Insects

Ohio and Michigan state-listed insects may be impacted by the NGT Project. The ODNR Natural Heritage Database has records within 1 mile of the proposed pipeline corridor for the chalk-fronted corporal (*Ladona julia*), a state endangered dragonfly, the elfin skimmer (*Nannothemis bella*), a state endangered dragonfly, the marsh bluet (*Enallagma ebrium*), a state threatened damselfly, and the racket-tailed emerald (*Dorocordulia libera*), a state endangered dragonfly. Impacts to wetlands should be avoided and/or minimized to the fullest extent possible to avoid impacts these species (ODNR, 2015A). Based on our recommendation below, we conclude that impacts from the Project would be temporary and minor for state-listed dragonfly and damselfly species.

The proposed NGT pipeline route is within the range of Ohio state-listed butterflies, including the purplish copper (*Lycaena helloides*). Due to the location, and the type of work proposed, we do not anticipate impacts to the purplish copper butterfly species (ODNR, 2015A).

The pipevine swallowtail (*Ammodramus savannarum*) is state-listed as special concern in Michigan. A review of the MNFI database documented the species within 1 mile of the Project area. Special concern species are not protected under the state's endangered species legislation, but efforts should be taken to minimize all potential impacts to the species and its habitats (MNFI 2014). Based on our recommendation below, we conclude that impacts from the Project would be temporary and minor for the pipevine swallowtail.

Plants

No state-listed plant species are expected to be impacted within Projects area in Ohio (see appendix J-1). Two state-listed plants have been identified in the Projects area in Michigan as being potentially impacted by the Projects.

The cup plant (*Silphium perfoliatum) is state-listed as threatened in Michigan.* A review of the MNFI database documented the species within 1 mile of the Project area, and the plant was identified during 2015 botanical field surveys. Native occurrences are all associated with rivers, particularly the Huron, Raisin, and Galien Rivers. However, the species can also be found as chance introductions along weedy railroad rights of way (Penskar and Crispin 2010). Based on our recommendation below, we conclude that impacts from the Projects would be temporary and minor for the cup plant. NEXUS would be required to continue consulting with the state of Michigan to identify the need for any species-specific mitigation measures, based on the positive findings of the 2015 field surveys.

Ginseng (*Panax quinquefolius*) is state-listed as threatened in Michigan. A review of the MNFI database documented the species within 1 mile of the Project area, and the plant was identified during 2015 botanical field surveys. The species is predominantly found in rich hardwoods, often on slopes or ravines, ranging even into swampy portions. It also occurs in wooded dune hollows and leeward slopes along the Lake Michigan shoreline (Penskar and Higman 1996). Based on our recommendation below, we conclude that impacts from the Projects would be temporary and minor for ginsing. NEXUS would be required to continue consulting with the state of Michigan to identify the need for any species-specific mitigation measures, based on the positive findings of the 2015 field surveys.

Based on the above discussion, we conclude that the NGT Project could impact certain state-listed threatened and endangered species. Defining the magnitude, intensity, and duration of impacts on special status species would depend upon the outcome of ongoing habitat surveys and special status species surveys, as well as avoidance, conservation, and mitigation plans being completed by the applicants. Therefore, **we recommend that:**

- **Prior to construction of the NGT Project, NEXUS should finalize its results of consultations with the applicable state agencies that identifies any additional mitigation measures for state-protected species in Ohio and Michigan. The results of such consultations and any outstanding surveys should be filed with the Secretary.**

- **Prior to construction of the TEAL Project, Texas Eastern should finalize its results of consultations with the applicable state agencies that identifies any additional mitigation measures for state-protected species in Ohio. The results of such consultations and any outstanding surveys should be filed with the Secretary.**

4.9 LAND USE, RECREATION, SPECIAL INTEREST AREAS, AND VISUAL RESOURCES

As discussed in section 2.1.1, NEXUS is proposing to construct approximately 255 miles of new 36-inch-diameter natural gas pipeline and approximately 0.9 mile of new 36-inch-diameter interconnecting pipeline to the existing TGP system. Aboveground facilities associated with the NGT Project would include 4 new compressor stations, 5 new M&R Stations, 17 MLVs, 4 pig launchers, 4 pig receiver facilities, and 5 communication towers (see table 2.1.1-2 NGT Project Aboveground Facilities). The NGT Project pipeline would originate in Columbiana County, Ohio, extend through Ohio and Michigan, and connect with the existing DTE Gas system in Wayne County, Michigan.

In conjunction with the NGT Project, Texas Eastern is proposing to construct approximately 4.4 miles of 36-inch-diameter pipeline loop; 1,790 feet of 30-inch-diameter interconnecting pipeline to Texas Eastern's existing Line 73 with the NGT Project; one new compressor station; modifications to an existing compressor station; two pig launchers; and two pig receivers; to remove an existing launcher/receiver site; and to conduct piping modifications (see section 2.1.2). The TEAL Project would originate in Monroe County, Ohio, include portions of Belmont County, and terminate in Columbiana County, Ohio.

This section discusses the land requirements for construction and operation of the Projects, describes the current use of those lands, and provides an evaluation of project-related impacts. This section quantifies the acreage of each land use type that would be affected and discusses measures that would be taken to avoid, minimize, or mitigate land use impacts. Impacts on recreational and special interest areas, as well as impacts on visual resources, are also presented.

TABLE 4.9.1-1

Acreage Affected by Construction and Operation of the NGT and TEAL Projects

Project, Facility, State, Component	Forest/Woodland		Open Land		Agricultural		Industrial/ Commercial		Residential		Open Water		Total	
	Const. [b]	Op. [c]	Const.	Op.	Const.	Op.	Const.	Op.	Const.	Op.	Const.	Op.	Const.	Op.
NGT PROJECT														
Pipeline Facilities [a]														
Ohio														
Mainline	330.7	157.9	355.6	132.0	2,746.4	949.3	25.1	9.3	52.5	16.9	8.2	4.4	3,518.5	1,269.7
TGP Interconnect	1.9	0.3	6.0	2.3	7.3	2.7	0.4	0.1	0.0	0.0	0.0	0.0	15.6	5.5
Michigan														
Mainline	41.0	15.6	103.6	25.9	645.6	232.5	33.9	7.1	3.3	0.9	3.8	2.0	831.2	284.0
Pipeline Facility Total	**373.6**	**173.8**	**465.2**	**160.2**	**3,399.3**	**1,184.5**	**59.4**	**16.5**	**55.8**	**17.8**	**12.0**	**6.4**	**4,365.3**	**1,559.1**
Access Roads														
Ohio														
Access Roads	0.8	0.0	20.8	1.1	27.5	2.5	3.0	<0.1	7.6	0.1	<0.1	0.0	59.7	3.7
Michigan														
Access Roads	0.8	0.0	3.2	0.0	3.7	0.0	1.2	0.3	0.3	0.0	0.0	0.0	9.2	0.3
Access Road Total	**1.6**	**0.0**	**24.0**	**1.1**	**31.2**	**2.5**	**4.2**	**0.3**	**7.9**	**0.1**	**0.0**	**0.0**	**68.9**	**4.0**
Pipe/Contractor Yards														
Ohio														
Yard 1-1	0.0	0.0	0.2	0.0	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.2	0.0
Yard 2-1	0.0	0.0	<0.1	0.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.0	0.0
Yard 3-1a	0.0	0.0	0.1	0.0	22.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	22.4	0.0
Yard 3-1b	0.0	0.0	0.8	0.0	37.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.0	0.0
Yard 3-2	0.0	0.0	0.0	0.0	75.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.3	0.0
Michigan														
Yard 4-1	0.0	0.0	0.4	0.0	40.9	0.0	0.6	0.0	0.0	0.0	0.0	0.0	41.9	0.0
Yard 4-3	0.1	0.0	0.0	0.0	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.4	0.0
Yard 4-4	0.0	0.0	<0.1	0.0	0.0	0.0	9.9	0.0	0.0	0.0	0.0	0.0	9.9	0.0
Pipe/Contractor Yards Total	**0.1**	**0.0**	**1.5**	**0.0**	**221.8**	**0.0**	**10.7**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**234.1**	**0.0**
Meter, Regulation, and Receipt Stations														
Ohio														
MR01	0.0	0.0	<0.1	0.0	10.3	3.5	<0.1	0.0	0.0	0.0	0.0	0.0	10.3	3.5
MR02&03	0.0	0.0	<0.1	0.0	10.2	5.3	0.1	0.0	0.0	0.0	0.0	0.0	10.3	5.3
MR05	0.0	0.0	0.1	0.0	9.9	1.9	< 0.1	0.0	0.0	0.0	0.0	0.0	10.0	1.9
MR06	0.0	0.0	0.0	0.0	7.8	1.1	0.0	0.0	0.0	0.0	0.0	0.0	7.8	1.1
Michigan														
MR04	0.0	0.0	0.4	0.4	0.0	0.0	0.6	0.3	0.0	0.0	0.0	0.0	1.0	0.7
Meter Station Total	**0.0**	**0.0**	**0.5**	**0.4**	**38.2**	**11.4**	**0.7**	**0.3**	**0.0**	**0.0**	**0.0**	**0.0**	**39.4**	**12.5**

TABLE 4.9.1-1 (cont'd)

Acreage Affected by Construction and Operation of the NGT and TEAL Projects

Project, Facility, State, Component	Forest/Woodland		Open Land		Agricultural		Industrial/ Commercial		Residential		Open Water		Total	
	Const. [b]	Op. [c]	Const.	Op.	Const.	Op.	Const.	Op.	Const.	Op.	Const.	Op.	Const.	Op.
Compressor Stations														
Ohio														
Hanoverton (CS1)	0.0	0.0	8.5	2.7	84.8	25.0	0.0	0.0	0.0	0.0	0.0	0.0	93.3	27.7
Wadsworth (CS2)	0.0	0.0	14.8	0.9	43.5	21.1	0.1	0.0	5.6	0.0	0.0	0.0	64.0	22.0
Clyde (CS3)	0.0	0.0	0.4	0.1	59.1	37.1	0.1	0.0	0.0	0.0	0.0	0.0	59.6	37.2
Waterville (CS4)	0.0	0.0	0.1	0.0	37.1	33.0	0.1	0.0	0.0	0.0	0.0	0.0	37.3	33.0
Compressor Station Total	**0.0**	**0.0**	**23.8**	**3.7**	**224.5**	**116.2**	**0.3**	**0.0**	**5.6**	**0.0**	**0.0**	**0.0**	**254.2**	**119.9**
Staging Areas														
Ohio														
Staging Areas	0.0	0.0	8.8	0.0	29.0	0.0	0.3	0.0	1.0	0.0	0.0	0.0	39.3	0.0
Michigan														
Staging Areas	0.0	0.0	1.0	0.0	8.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0	9.5	0.0
Staging Areas Total	**0.0**	**0.0**	**9.8**	**0.0**	**37.4**	**0.0**	**0.4**	**0.0**	**1.0**	**0.0**	**0.0**	**0.0**	**48.8**	**0.0**
NGT Project Total	**375.3**	**173.8**	**524.8**	**165.4**	**3,952.4**	**1,315.5**	**75.7**	**17.1**	**70.3**	**17.9**	**12.0**	**6.4**	**5,010.7**	**1,696.0**
TEAL PROJECT														
Proposed Pipeline Loop	17.0	4.9	30.4	18.7	5.3	2.8	0.2	0.1	N/A	N/A	0.4	0.2	53.3	26.7
Connecting Pipeline to NGT	0.0	0.0	1.0	0.4	4.7	1.5	1.1	0.1	N/A	N/A	0.0	0.0	6.9	2.0
ATWS	11.3	0.0	8.7	0.0	13.5	0.0	0.8	0.0	N/A	N/A	0.0	0.0	34.3	0.0
Access Roads	1.4	0.1	2.4	0.0	0.5	0.5	0.6	0.4	N/A	N/A	0.0	0.0	4.9	1.0
Proposed Salineville Compressor Station	0.0	0.0	1.2	0.0	39.8	11.5	0.1	0.1	N/A	N/A	0.0	0.0	41.0	11.6
Existing Colerain Compressor Station	0.0	0.0	51.2	0.0	0.0	0.0	10.9	0.0	N/A	N/A	0.0	0.0	62.1	0.0
Line 73 Launcher/Receiver Site	0.0	0.0	0.7	0.0	0.0	0.0	0.5	0.0	N/A	N/A	0.0	0.0	1.1	0.0
Line 73 Regulator site	0.0	0.0	9.0	4.7	0.0	0.0	0.4	0.0	N/A	N/A	0.0	0.0	9.4	4.7
TEAL Project Total	**29.7**	**5.0**	**104.5**	**23.8**	**63.9**	**16.3**	**14.5**	**0.6**	**N/A**	**N/A**	**0.4**	**0.2**	**213.0**	**45.9**
NGT and TEAL Projects Total	**405.0**	**178.8**	**629.3**	**189.1**	**4,016.3**	**1,331.8**	**90.2**	**17.7**	**70.3**	**17.9**	**12.4**	**6.6**	**5,223.7**	**1,741.9**

TABLE 4.9.1-1 (cont'd)

Acreage Affected by Construction and Operation of the NGT and TEAL Projects

Project, Facility, State, Component	Forest/Woodland		Open Land		Agricultural		Industrial/ Commercial		Residential		Open Water		Total	
	Const. [b]	Op. [c]	Const.	Op.	Const.	Op.	Const.	Op.	Const.	Op.	Const.	Op.	Const.	Op.

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a Pipeline facility acreages include impacts from ATWS and MLVs.

b Project-specific construction right-of-way widths are discussed in the following sections. Note that impacts presented are based on the construction right-of-way widths for the entire length of both Projects' pipelines; however, the construction right-of-way would be reduced at certain locations (e.g., wetlands), some portions of the right-of-way would overlap with existing rights-of-way that have been previously disturbed, and/or the HDD method would be used to avoid direct impacts on land use.

c Project-specific permanent right-of-way widths are discussed in the following sections. Note that impacts presented are based on a typical permanent right-of-way width of 50 feet for the entire length of both Projects' pipelines; however, most land use types would be allowed to revert to pre-construction conditions, limited vegetation maintenance would be allowed in wetlands, some portions of the right-of-way would overlap with existing rights-of-way that are maintained, and/or the HDD method would be used to avoid direct impacts on land use.

Note: Due to rounding, some addends may be off by 0.1.

N/A = not applicable

4.9.1 Environmental Setting

Six general land use types would be affected by the NGT and TEAL Projects. Table 4.9.1-1 summarizes the acreage of each land use type that would be affected. The definitions of each land use type are as follows:

- Forest/Woodland: Upland and wetland forest.
- Open Land: Utility rights-of-way, open fields, pasture, vacant land, herbaceous and scrub-shrub uplands, non-forested lands, emergent wetland, and scrub-shrub wetland.
- Agricultural: Active hayfields and cultivated cropland, including specialty crops.
- Industrial/Commercial: Developed areas, natural gas utility facilities, quarries, roads and paved areas, manufacturing or industrial plants, auto salvage and scrap yards, electric power facilities, railroads and rail yards, and commercial or retail facilities.
- Residential: Existing and planned residential development areas; low-, medium-, and high-density residential neighborhoods; and residentially zoned areas.
- Open Water: Waterbody crossings visible on recent aerial photography.

Construction of the Projects would temporarily affect a total of 5,223.7 acres of land, including 405.0 acres of forest/woodland, 629.3 acres of open land, 4,016.3 acres of agricultural land, 90.2 acres of industrial/commercial land, 70.3 acres of residential land, and 12.4 acres of open water. On a state-by-state basis, construction of the Projects would temporarily affect 4,307 acres in Ohio and 916 acres in Michigan.

Operation of the Projects would affect a total of 1,741.9 acres of land, including 178.8 acres of forest/woodland, 189.1 acres of open land, 1,331.8 acres of agricultural land, 17.7 acres of industrial/commercial land, 17.5 acres of residential land, and 6.6 acres of open water. Following construction, lands outside of the permanent right-of-way and at ATWS, staging areas, pipe/contractor yards, and temporary access roads would be allowed to revert to their original land use types. Pipeline operation would not change the general land use but would preclude construction of aboveground structures within the 50-foot-wide permanent right-of-way.

This section summarizes the impacts on each land use type as defined above. Section 4.3 provides more detailed information regarding Projects-related impacts on waterbodies, wetlands are discussed in more detail in section 4.4, and quarries are discussed in more detail in section 4.1. Also, section 4.5 provides a detailed discussion of the various vegetation types and communities affected by the Projects.

Lands required for construction would experience temporary to long-term impacts based on the time it would take the land to recover to pre-construction conditions. Impacts are generally considered temporary if the affected resource would recover to pre-construction conditions almost immediately after construction. Short-term impacts generally occur during construction with the resource returning to pre-construction conditions within 3 years following construction. Long-term impacts require anywhere from an estimated 3 to 50 years to return to pre-construction conditions. Permanent impacts would occur as a result of activities that modify resources to the extent that they would not return to pre-construction conditions within 50 years, such as clearing of old growth forest or conversion of land to an aboveground facility site.

4.9.1.1 Pipeline Facilities

Land use-related impacts associated with the NGT and TEAL Projects would include disturbance of existing uses within the right-of-way during construction and creation of a new permanent right-of-way for operation of the pipeline. NEXUS and Texas Eastern propose to generally use a 100-foot-wide construction right-of-way that includes the 50-foot-wide permanent right-of-way. In wetland areas, NEXUS and Texas Eastern would use a 75-foot-wide construction right-of-way.

NGT Project

The NGT Project would consist of 255.9 miles of 36-inch-diameter pipe. Predominant land uses are agricultural land (76.7 percent), open land (12.1 percent), and forest/woodland (7.9 percent). Residences and other structures within 50 feet of the construction workspace are discussed in section 4.9.4.1. The remaining 3.2 percent of the land is comprised of commercial/industrial, residential, and open water.

In general, land use-related impacts associated with the NGT Project would include disturbance of existing land uses within the construction right-of-way during construction and retention of a new permanent right-of-way for operation of the pipeline. In addition to the typical construction right-of-way, ATWS adjacent to the outer dimensions of the construction right-of-way would be required to facilitate construction at road, railroad, utility, wetland, and waterbody crossings, as well as for areas requiring specialized construction techniques such as steep side slopes, bedrock outcrops, and HDDs. A list of ATWS areas for the NGT Project is located in appendix C-2.

About 113.0 miles (44 percent) of the right-of-way would be co-located with (i.e., overlap or abut) existing utility rights-of-way such as overhead electric transmission lines, pipelines, and railroads. Appendix C-1 lists locations where the construction right-of-way would be co-located with other existing utility rights-of-way and quantifies the amount of workspace overlapping existing rights-of-way. Appendix K-1 identifies specific locations where the NGT Project would cross existing utility rights-of-way.

We received comments from FirstEnergy expressing concern over the NGT Project disturbing existing or future FirstEnergy utility facilities, and not having enough information to evaluate the potential impacts of the NGT Project. The Hayes-West Fremont Transmission Line Project includes construction of a new 138-kilovolt (kV) transmission line that would extend approximately 30 miles from FirstEnergy's proposed new Hayes Substation in Erie County to the existing West Fremont Substation in Sandusky County, with a connection to a proposed distribution substation. The transmission line would be located within a 60-foot-wide right-of-way and would be built primarily on wooden poles. Clearing of the proposed right-of-way is scheduled for February 2017, and construction of the transmission line is scheduled for May 2017 (FirstEnergy, 2016a). Regarding disturbance of existing or future FirstEnergy utility facilities, FirstEnergy requested the NGT Project pipeline and facilities be located adjacent to, not across, FirstEnergy's existing utility rights-of-way that are owned in fee or by easement by FirstEnergy or their affiliated companies. Regarding additional information, FirstEnergy requested the identification of mileposts, facility names, distances from pipeline centerline to utility rights-of-way, depths of the pipeline, crossing distances, construction techniques, and limits of construction right-of-way.

The NGT Project pipeline and FirstEnergy's transmission line generally follow similar linear routes between MPs 127.0 and MP 148.0 along the north and south sides of Interstate 80 through Erie and Sandusky counties. NEXUS has routed the pipeline to avoid overlapping parallel utility rights-of-way, with the exception of five locations where the NGT Project would cross the transmission line right-of-way at MPs 127.3, 135.9, 137.5, 137.9, and 144.8. NEXUS has indicated it would work with FirstEnergy to coordinate construction activities. Because consultations are ongoing, and more information is needed in order to evaluate potential impacts from the NGT Project, **we recommend that:**

- **<u>Prior to the start of construction of the NGT Project,</u> NEXUS should provide updated consultation documentation from FirstEnergy regarding coordination of construction activities where the NGT Project and FirstEnergy's transmission lines would cross.**

TEAL Project

The TEAL Project would consist of 4.7 miles of 30- and 36-inch-diameter pipe. Predominant land uses are open land (45.6 percent), agricultural land (32.1 percent), and forest/woodland (16.3 percent). The remaining 6.0 percent of the land is comprised of commercial/industrial and open water.

General land use impacts associated with the TEAL Project would be the same as described earlier in this section and for the NGT Project. A list of ATWS areas for the TEAL Project is presented in appendix C-4. All of Texas Eastern's proposed pipeline facilities would be co-located within or adjacent to existing utility rights-of-way.

4.9.1.2 Aboveground Facilities

NGT Project

Construction of aboveground facilities for the NGT Project would affect a total of 293.6 acres of land. Of this total, 132.4 acres of land would be permanently retained for operation. NEXUS proposes to construct four new compressor stations in Ohio. The four compressor stations would temporarily affect 254.2 acres of land (88.3 percent of which is agricultural land) and would permanently convert 119.9 acres of land into industrial/commercial land. Land located outside the permanent right-of-way would be allowed to revert to pre-construction land use.

Thirty-five (35) other aboveground facilities would be constructed as part of the NGT Project, including 5 M&R stations, 4 pig launchers, 4 pig receiver facilities, 17 MLVs, and 5 communication towers (see table 2.2.1-1). MLVs would be installed at other proposed aboveground facility sites or within the permanent right-of-way. The pig launcher and receiver sites and communication towers would be located within the limits of the compressor and M&R stations. Therefore, land use effects associated with pig launchers and receivers and communication towers are included within those associated with the applicable compressor or M&R station. Land located outside the permanent right-of-way of the M&R stations would be allowed to revert to pre-construction land uses. New facilities would result in a permanent land use conversion to industrial/commercial land. Aboveground facilities are further described in section 2.1.

TEAL Project

Construction of aboveground facilities for the TEAL Project would affect a total of 113.6 acres of land. Of this total, 16.3 acres of land would be permanently retained for operation. Texas Eastern would construct one new compressor station (Salineville Compressor Station) and upgrade one existing compressor station (Colerain Compressor Station) as part of the TEAL Project. Modifications to the Colerain Compressor Station would not result in any land use impacts or changes.

Other aboveground facilities associated with the TEAL Project include two new pig launchers, two new pig receivers, and one communication tower. Also, Texas Eastern would conduct modifications to an existing regulation facility and remove an existing launcher/receiver facility. Land use at the removed launcher/receiver would be allowed to revert back to agricultural land. Aboveground facilities are further described in section 2.1.2.2.

4.9.1.3 Pipe/Contractor Yards and Staging Areas

NGT Project

To support construction activities, NEXUS proposes to use 8 pipe/contractor yards and 82 staging areas (72 in Ohio and 10 in Michigan). The pipe/contractor yards and staging areas would temporarily affect 282.9 acres of land, including 259.2 acres of agricultural land, 0.1 acre of forest/woodland, 11.3 acres of open land, 11.1 acres of industrial/commercial land, and 1.0 acre of residential land. Following construction, these areas would be restored according to NEXUS' *E&SCP* or allowed to revert to pre-construction conditions or as requested by the landowner or land-managing agency. Pipe/contractor yards and staging areas are further described in section 2.2.1.1.

TEAL Project

There are no pipe/contractor yards associated with the TEAL Project.

4.9.1.4 Access Roads

NGT Project

In addition to public roads, NEXUS proposes to use 26 permanent access roads and 115 temporary access roads (see table 4.9.1-2). Of the 115 temporary access roads, 51 would be newly constructed, 28 would require expansion of existing roads, and 36 would be existing roads. The new and expanded temporary access roads would impact 68.9 acres of land. Following construction, these temporary roads would be restored and reseeded according to NEXUS' *E&SCP*. Of the 26 permanent access roads, 22 of them would be newly constructed, 3 would be partially new and partially existing roads that would require expansion, and 1 would be an existing road that would require expansion. Permanent access roads would encumber 4.0 acres, of which 3.8 acres would be associated with the 22 newly constructed roads and the 3 partially new and partially existing roads, and 0.2 acre would be associated with the existing road. Generally, roads would be up to 25 feet wide. NEXUS' proposed temporary and permanent access roads and their required improvements are listed in appendix C-3, summarized in table 4.9.1-2 below, and discussed additionally in Section 2.2.1.

TEAL Project

In addition to public roads, Texas Eastern proposes to use two permanent access roads and four temporary access roads. Of the 4 temporary access roads, 3 would be newly constructed and 1 would require expansion of existing roads. The new and expanded temporary access roads would impact 4.9 acres of land. Following construction, these temporary roads would be restored and reseeded according to Texas Eastern's *E&SCP*. The proposed access roads are listed in appendix C-3 and discussed further in section 2.2.2. The 2 permanent access roads would be newly constructed and would encumber 1.0 acre. Generally, roads would be up to 25 feet wide.

During operation, Texas Eastern would permanently maintain two roads to access the pig launcher site at MP 0.1 on the loop pipeline near Headley Ridge Road and the two filter separator sites (aboveground facilities) at MP 4.5 on the loop pipeline. No new access roads would be required for the Colerain Compressor Station. Permanent access roads would affect 0.3 acre of land. Section 2.2.2 describes the permanent facilities needed for the TEAL Project.

TABLE 4.9.1-2

Summary of NGT Project Access Roads

State, Facility	Temporary Access Roads	Permanent Access Roads
OHIO		
Mainline		
Columbiana	9	0
Erie	13	0
Fulton	2	0
Lorain	11	0
Lucas	2	0
Medina	18	0
Sandusky	8	0
Stark	9	0
Summit	8	0
Wayne	4	0
Wood	13	0
Compressor Stations		
Columbiana	0	1
Lucas	0	1
Medina	0	1
Sandusky	0	1
Mainline Valve Stations		
Erie	0	2
Lorain	0	2
Lucas/Henry	0	1
Medina	0	2
Sandusky	0	1
Stark	0	2
Summit	0	2
Wood	0	1
Cathodic Protection Site		
Wayne	0	1
M&R Stations		
Columbiana	0	2
Erie	0	1
Sandusky	0	1
Ohio Total	**97**	**22**
MICHIGAN		
Mainline		
Lenawee	5	0
Monroe	1	0
Washtenaw	12	0
Mainline Valve Stations		
Lenawee	0	2
Washtenaw	0	1
M&R Stations		
Washtenaw	0	1
Michigan Total	**18**	**4**
Grand Total	**115**	**26**

4.9.2 Project-specific Impacts and Mitigation

Constructing and operating the Projects would result in temporary and permanent land use impacts. In general, the effects of pipeline construction on open, agricultural, industrial/commercial, residential land, and open water would be minor and temporary to short term. Temporary to short-term impacts would be confined primarily to the duration of construction and would result from clearing of existing vegetation, row crops, and landscaping; ground disturbance from grading, creating the pipeline trench, and backfilling the pipeline trench; and increased equipment traffic associated with construction activities. Construction impacts would include temporary loss of land use, disturbance of the visual landscape, increased noise and dust, and increased local traffic congestion. Construction-related impacts would end after the right-of-way is restored and revegetated, and temporary work areas are relinquished to landowners. Following construction, the land for the temporary construction right-of-way, ATWS, staging areas, pipe/contractor yards, and temporary access roads would be restored and allowed to revert to prior uses.

Open land would be affected during construction by removing vegetation and disturbing soils. Impacts on open land would be minor and temporary to short term, and would be minimized by the implementation of NEXUS' and Texas Eastern’s *E&SCPs*, which are consistent with the requirements of FERC’s *Plan* and *Procedures*, and any specific requirements associated with applicable permits and regulations, or identified by landowners during easement negotiations. Temporary fencing would be used in affected pasture areas, with alternative feeding or boarding arrangements made if necessary, as negotiated with the landowner. Following construction, open land would be restored to pre-construction conditions. During operations of the Projects, routine mowing or vegetation clearing would not occur over the full width of the permanent right-of-way in wetlands or riparian areas. Since the permanent right-of-way would be maintained as open land, there would be no permanent change in land use. During operations, these areas would continue to function as open land.

Impacts on agricultural land would be minor and temporary to short term. Agricultural land would be affected during construction by crop removal, soil disturbance, increased dust, and interruption of drainage and irrigation systems along the pipeline route. Crops within the construction work areas would be taken out of production for one growing season while construction occurs and landowners would be compensated for the lost crops. If irrigation lines are damaged during construction, temporary repairs would be conducted immediately and permanent repairs would be completed following construction. NEXUS and Texas Eastern would minimize temporary impacts on agricultural land by maintaining landowner access to fields, storage areas, and other agricultural facilities during construction. Following construction, impacted agricultural land (except fruit and Christmas trees within the permanent right-of-way) would be restored to pre-construction conditions, in accordance with NEXUS’ and Texas Eastern’s *E&SCPs*, NEXUS’ *Drain Tile Mitigation Plan*, and any specific requirements associated with applicable permits and regulations, or identified by landowners during easement negotiations. Given that landowners would be permitted to grow commonly cultivated and most specialty crops on the pipeline right-of-way during pipeline operations, there would be little permanent change in the land use of agricultural areas. Impacts on specialty crop land (including organic farms) are discussed by individual project in section 4.9.5. Impacts on and mitigation for prime farmlands and statewide important farmlands are discussed in section 4.2.1.2.

Based on the estimated sound levels, adherence to local noise regulations, and our recommendations, we believe that the noise attributable to operation of the Hanoverton, Wadsworth, Clyde, Waterville, Salineville, and Colerain (existing) Compressor Stations would not cause a significant impact on the noise environment in the Projects area.

Residential lands that would be affected are discussed by individual project in the following sections. Construction methods proposed for residential areas are described in section 4.9.4.

Impacts on commercial/industrial land would be minor and temporary. Commercial/industrial land would be affected during construction by increased dust from exposed soils, construction noise, and traffic congestion. NEXUS and Texas Eastern would minimize impacts on industrial/commercial land uses by timing construction to avoid peak use periods, maintaining access to businesses at all times, expediting construction through these areas, and coordinating with the affected industrial/commercial landowners. NEXUS and Texas Eastern would coordinate directly with affected commercial/industrial landowners on an individual basis to further reduce potential adverse effects of construction and operations and to address the specific needs of each commercial/industrial facility. Following construction, commercial/business operations on the Projects' rights-of-way would be allowed to continue.

Open water affected by the Projects is discussed by individual project in the following sections. Construction methods proposed for waterbodies are described in section 4.3.2.2.

Forest/woodland would be affected during construction by tree removal within the construction rights-of-way and in ATWS areas, staging areas, pipe/contractor yards, aboveground facility sites, and new or modified access roads. The amount of tree clearing required for construction and operation is dependent on the width of the construction and permanent rights-of-way, and the degree to which these areas overlap other existing cleared rights-of-way.

Following construction, forested areas affected within temporary construction workspaces, including ATWS, staging areas, pipe/contractor yards and temporary access roads, would be allowed to reestablish as forest. Forested areas within the permanent right-of-way, aboveground facility sites, and new permanent access roads would not be allowed to revert to pre-construction conditions. Post-construction maintenance of the permanent right-of-way would prevent the reestablishment of trees, including orchards and tree crops.

Construction and operation of aboveground facilities and new access roads would result in minor to moderate and permanent impacts on land uses as a result of converting the area to a commercial/industrial use.

NEXUS and Texas Eastern would work with landowners to maintain access to the forest/woodland portions of their property during pipeline construction and landowners would be compensated for the value of felled trees. The felled trees would be available to landowners upon request. NEXUS and Texas Eastern would restore temporary access roads that are cleared of trees, including logging roads, which are impacted during construction. Following construction, landowners would be required to contact NEXUS and Texas Eastern prior to commencing logging or the use of logging roads that pass over the permanent right-of-way. Impacts on tree and shrub specialty crops are discussed in section 4.9.5.

Land encumbrances associated with use restrictions on the permanent right-of-way and aboveground facility sites would permanently impact land uses. Landowners would have use of the permanent right-of-way, though permanent fencing and structures such as houses, trailers, garages, tool sheds, poles, guy wires, catch basins, septic tanks, leech fields, and swimming pools would not be permitted above the pipeline. Also, the tree planting within the permanent right-of-way would not be allowed. The permanent right-of-way would remain accessible for maintenance and inspection and for emergency response access. Maintenance activities would be conducted in accordance with NEXUS' and Texas Eastern's respective *E&SCPs*.

The following discussion provides additional detail to the impacts and mitigation measures described in section 4.9.2 and is unique to each project.

4.9.3 Land Ownership and Easement Requirements

Most of the lands affected by the NGT Project are privately owned. Public land affected by the NGT Project includes public road crossings; state land managed by the ODNR and ODOT; county lands owned by Stark, Medina, Lorain, Erie, Sandusky, Summit, and Toledo Counties; and municipal lands owned by the City of Green. No federally owned, tribally owned, or reservation land would be crossed or affected by the NGT Project. With the exception of public road crossings, all lands affected by the TEAL Project are privately owned. Section 4.9.7 discusses recreational and public interest areas located on public and private land.

Pipeline operators must obtain easements from landowners to construct and operate natural gas facilities, or acquire the land on which the facilities would be located. Easements can be temporary, granting the operator the use of the land during construction (e.g., for temporary workspace, access roads, pipe/contractor yards), or permanent, granting the operator the right to operate and maintain the facilities after construction. The applicants would need to acquire long-term easements and/or special use permits to construct and operate the new project facilities. These authorizations would convey temporary and permanent rights-of-way to NEXUS and Texas Eastern for construction and operation of the proposed facilities.

An easement agreement between a company and a landowner typically specifies compensation for losses resulting from construction, including losses of non-renewable and other resources, damages to property during construction, and restrictions on existing uses that would not be permitted on the permanent right-of-way after construction. The easement would give the company the right to construct, operate, and maintain the pipeline, and establish a permanent right-of-way. Landowners would be compensated for the use of their land through the easement negotiation process.

If an easement cannot be negotiated with a landowner and the Projects have been certificated by FERC, then NEXUS and Texas Eastern may use the right of eminent domain granted to it under Section 7(h) of the NGA and the procedure set forth under the Federal Rules of Civil Procedure (Rule 71A) to obtain the areas needed for construction and operation. NEXUS and Texas Eastern would still be required to compensate the landowner for the right-of-way and for any damages incurred during construction; however, the level of compensation would be determined by a court according to state or federal law. In either case, the landowner would be compensated for the use of the land. Eminent domain would not apply to lands under federal ownership.

4.9.4 Existing Residences, Commercial Buildings, and Planned Developments

4.9.4.1 Existing Residences

NGT Project

As currently designed, approximately 70.3 acres of residential lands would be affected by construction of the NGT Project. Following construction, 17.9 acres of residential land would be within the permanent right-of-way and would be subject to restrictions such as planting trees or placement of certain structures. The remaining 52.4 acres of land would not be subject to any restrictions. All residential lands would be restored to pre-construction conditions.

NEXUS' construction work area would be within 50 feet of 178 residential structures (including homes, garages, and associated structures), 15 of which would be within or on the edge of the construction work area. No homes are within the proposed construction work areas. These structures are listed in appendix K-2.

The construction workspace would be within or less than 10 feet of 7 residences because of construction constraints along those portions of the NGT Project route. Because of the increased potential for construction of the NGT Project to disrupt these residences and to ensure that property owners have adequate input to a construction activity occurring so close to their homes, **we recommend that:**

- **<u>Prior to construction of the NGT Project</u>, NEXUS should file with the Secretary, for review and written approval by the Director of OEP, evidence of landowner concurrence with the site-specific residential construction plans for all locations in appendix K-2 of the draft EIS where NGT Project construction work areas would be within 10 feet of a residence.**

During initial discussions with landowners, NEXUS identified a total of 65 septic systems within 150 feet of the NGT Project, including 52 systems in Ohio and 13 systems in Michigan. Table 4.9.3-1 lists the known septic systems by county, tract, and milepost. Prior to construction, NEXUS would verify the locations of septic systems. NEXUS would attempt to avoid septic systems. If avoidance is not possible, NEXUS would relocate the septic system prior to construction or provide a replacement system. In the event of damage during construction, NEXUS would provide a temporary repair of the septic system. Permanent repairs would occur as soon as practicable during the backfill/rough clean-up phase of construction. NEXUS would continue to work with landowners prior to construction to identify and verify the locations of septic systems.

TABLE 4.9.3-1

Septic Systems Crossed by the NGT Project [a]

State, Facility, County	Milepost Start [b]	Milepost End [b]	Tract Number(s)
OHIO			
Mainline			
Columbiana	5.5	5.6	OH-CO-046.0010
	6.3	6.4	OH-CO-055.0100
Stark	18.4	18.6	OH-ST-047.0000
	18.6	18.6	OH-ST-049.0000
	28.1	28.2	OH-ST-110.0000
	31.1	31.4	OH-ST-130.0000
Summit	44.8	44.9	OH-SU-143.0000
Wayne	52.9	52.9	OH-WA-020.0000
	54.4	54.5	OH-WA-036.0000
	55.7	55.7	OH-WA-046.0000
	56.4	56.5	OH-WA-053.0000
	56.5	56.6	OH-WA-054.0000
Medina	59.2	59.3	OH-ME-017.0000
	59.3	59.4	OH-ME-018.0000
	68.3	68.3	OH-ME-110.0000
	71.4	71.8	OH-ME-144.0000, OH-ME-144.0000-PAR-3-71.8, ME-144.0000-HTAR-2
	71.8	71.9	OH-ME-144.0010, OH-ME-144.0010-HTAR-2
	71.9	72.5	OH-ME-147.0000, OH-ME-147.0000-AB-2
	72.6	72.6	OH-ME-149.0000
	72.6	72.6	OH-ME-150.0000
	72.6	72.7	OH-ME-151.0000
	72.7	72.8	OH-ME-153.0000
	73.4	73.7	OH-ME-161.0000
	73.9	74.0	OH-ME-165.0000
	76.3	76.5	OH-ME-181.0010

TABLE 4.9.3-1 (cont'd)

Septic Systems Crossed by the NGT Project [a]

State, Facility, County	Milepost Start [b]	Milepost End [b]	Tract Number(s)
Lorain	82.6	82.7	OH-LO-015.0000
	83.8	83.9	OH-LO-024.0000
	84.4	84.5	OH-LO-027.0000
	88.1	88.2	OH-LO-050.0010
	89.1	89.2	OH-LO-060.0000
	100.4	100.6	OH-LO-128.0000
Erie	125.7	125.8	OH-ER-135.0000
	125.8	125.8	OH-ER-136.0000
	125.8	125.9	OH-ER-138.0000
	125.8	125.9	OH-ER-139.0000
	126.3	126.3	OH-ER-144.0010
	128.8	129.2	OH-ER-160.0000, OH-ER-160.0000-TAR-14-128.9, OH-ER-160.0000-CS, OH-ER-000.0001-SA-8-SPRD2
Sandusky	150.3	150.5	OH-SA-122.0000
	155.8	155.9	OH-SA-159.0020
	157.6	157.7	OH-SA-170.0000
	162.8	162.9	OH-SA-208.0000
	163.7	163.7	OH-SA-217.0010
Wood	169.3	169.4	OH-WO-041.0010
	170.9	171.2	OH-WO-053.0000, OH-WO-053.0000-TAR-4-171.2
	171.5	171.7	OH-WO-058.0000
	173.5	173.6	OH-WO-078.0000
Lucas	189.1	189.3	OH-LC-063.0010
Fulton	193.7	193.8	OH-FU-015.0000
	194.3	194.8	OH-FU-019.0000
	196.2	196.7	OH-FU-029.0000
	200.9	201.4	OH-FU-057.0000
	204.9	205.3	OH-FU-079.0000
MICHIGAN			
Mainline			
Lenawee	210.5	211.0	MI-LE-012.0000
	218.4	218.9	MI-LE-042.0000
	225.7	226.1	MI-LE-091.0000
	229.9	230.1	MI-LE-113.0000
Monroe	233.2	233.3	MI-MR-028.0000
	234.3	234.6	MI-MR-035.0000
	236.3	236.4	MI-MR-046.0010
Washtenaw	243.3	243.3	MI-WA-042.0010
	247.1	247.4	MI-WA-067.0000, MI-WA-000.0001-SA-5-SPRD4, MI-WA-067.0000-MLV-17, OH-WA-067.0000-PAR-1-247.4
	247.4	247.6	MI-WA-068.0010
	248.2	248.2	MI-WA-081.0020
	248.7	248.7	MI-WA-094.0010
	252.0	252.0	MI-WA-118.0000

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a NEXUS identified the approximate location of septic systems located within 150 feet of the NGT Project centerline through landowner consultation, field survey data for properties where landowners have granted access for survey, and review of aerial photography and Lidar imagery for properties where landowner permission has not been granted.

b Mileposts are approximate.

TEAL Project

The TEAL Project does not cross any residential or commercial areas and is not within 50 feet of any residential or commercial building or septic system.

Impacts and Mitigation

Temporary impacts on residential areas would include inconveniences caused by noise and dust generated by construction equipment; disruption to access of homes and businesses; increased localized traffic from transporting workers, equipment, and materials to the work site; disturbance of lawns, landscaping, gardens, and visual character caused by the removal of soil, turf, shrubs, trees, and/or other landscaping between residences and businesses and adjacent rights-of-way; potential damage to existing septic systems, wells, and other utilities; and removal of aboveground structures such as fences, sheds, playgrounds, or trailers from within the construction right-of-way.

NEXUS would use special construction methods while working in residential areas to minimize disruptions and to reduce impacts during construction. Specialized construction techniques such as the stove-pipe or drag-section may be used through residential areas to minimize impacts. The stove-pipe construction method is used when the pipeline is to be installed in very close proximity to existing structures. The drag-section technique is another method to reduce the width of the construction right-of-way. Special construction methods are described in more detail in section 2.3.2.

NEXUS developed *Residential Construction Plans* (*RCP*) for residential and commercial structures within 50 feet of the construction workspace (see appendix E-5). These *RCPs* include a dimensioned drawing depicting each residence and structure in relation to the pipeline construction, workspace boundaries, the proposed permanent right-of-way, and other nearby residences, structures, roads, and miscellaneous features (e.g., other utilities, playgrounds, catch basins, and sewers).

As discussed in the *E&SCP*s and/or shown in the *RCPs*, NEXUS and Texas Eastern would implement the following general measures to minimize construction-related impacts on residential areas:

- Notify landowners of planned construction activities prior to construction, including any scheduled disruption of household utilities. The duration of the interruption would be kept as brief as possible. Local utility companies would be invited to be on site during construction when necessary.
- Maintain access to homes except for the brief periods essential for laying the new pipeline, which would be coordinated with landowners.
- Install safety fence at the edge of the construction right-of-way for a distance of 100 feet on either side of a residence or business establishment.
- For a distance of 100 feet on either side any residence or business establishment, maintain a minimum distance of 25 feet between any structure and the edge of the construction work area.
- Attempt to leave mature trees and landscaping intact within the construction work area unless the trees and landscaping interfere with the installation techniques or present unsafe working conditions, or as specified in landowner agreements.

- Accommodate any special concerns regarding private landscaping and compensate landowners for unavoidable impacts.

- Minimize the time the trench is left open.

- Control dust in accordance with NEXUS' and Texas Eastern's *Fugitive Dust Plans*.

- If crushed stone/rock access pads are used in residential areas, place rock on non-woven synthetic geotextile fabric to facilitate rock removal after construction.

- Restore residential areas in accordance with landowner agreements, including landscaping, fences, driveways, stone walls, sidewalks, and water supply and septic systems.

- Remove all construction debris.

We have reviewed the site-specific *RCPs* and generally find them acceptable. However, **we encourage the owners of each of these residences to provide us comments on the *RCP* specific for their property.**

We note that certain information is omitted that should be included on two of the *RCPs* (HANO-P-8004-1B at MP 6.3, and WADS-P-8033-1B at MP 113.2), such as distances from structures such as pools, and incorrect distances between structures and the construction workspace and pipeline centerline in areas where the pipeline route has changed since NEXUS filed their application in November 2015. Because these *RCPs* are incomplete, we recommend that:

- **<u>Prior to the end of the draft EIS comment period</u>, NEXUS should provide revised *RCPs* that accurately show the distance and direction from the construction workspace and pipeline centerline of all structures on Drawings HANO-P-8004-1B (MP 6.3) and WADS-P-8033-1B (MP 113.2).**

Construction would typically occur between 7:00 a.m. and 6:00 p.m. (6 days a week), with the exception of HDD crossings, hydrostatic testing, and pipeline commissioning activities. Where the pipeline centerline is within 25 feet of a residence, NEXUS and Texas Eastern would not excavate the trench until the pipe is ready for installation and would backfill the trench immediately after pipe installation or place temporary steel plates over the trench to maintain landowner access. Other activities such as tree trimming, clearing activities, and right-of-way restoration activities would be completed in accordance with state and federal timing restrictions and weather permitting.

Following construction, landowners would continue to have use of the permanent right-of-way provided it does not interfere with the easement rights granted to NEXUS and Texas Eastern for operation and maintenance of the pipeline facilities. For example, no structures would be allowed on the permanent right-of-way, including houses, decks, playgrounds, tool sheds, garages, poles, guy wires, catch basins, swimming pools, trailers, leach fields, septic tanks, or other structures not easily removed. Semi-permanent structures that would be permitted to be used on the permanent right-of-way include items such as swing sets, sporting equipment, miniature swimming pools, doghouses, and gardens that are easily removed.

In addition, NEXUS and Texas Eastern have prepared *Issue Resolution Plans*. The plans identify a toll-free Landowner Hotline through which landowners can contact project representatives with questions, concerns, and complaints during construction. NEXUS and Texas Eastern personnel would staff the hotline Monday through Friday from 7:00 a.m. to 5:00 p.m., and Saturday from 7:00 a.m. to 12:00 p.m. After hours, an answering machine would be available to receive calls. If the identified issue cannot be immediately responded to, NEXUS and/or Texas Eastern personnel would attempt to contact the caller the same business day and no later than 24 hours after the initial call. Once documented, NEXUS and/or Texas Eastern personnel would work with the landowner until the issue is resolved. In the event NEXUS' and/or Texas Eastern's response is not satisfactory to the landowner, the landowner would have the opportunity to contact FERC's Landowner Helpline.

We conclude that with implementation of NEXUS' proposed construction methods, revised site-specific *RCPs*, *Issue Resolution Plan*, and our recommendations, construction impacts on residents and landowners would be minimized to the greatest extent practicable, and would mostly be temporary.

4.9.4.2 Planned Developments

NEXUS and Texas Eastern contacted local and county officials in the affected municipalities, conducted research of publically available websites, and coordinated with local landowners to identify planned residential, commercial, or industrial developments within 0.25 mile of the proposed project facilities. The developments that were identified are discussed below.

NGT Project

Based on consultations with landowners and local officials, the NGT Project would be located within 0.25 mile of 62 planned or ongoing residential and commercial/industrial developments. Appendix K-3 describes the identified ongoing or planned developments and provides the status of construction or completion. These include:

- 33 residential developments, 11 commercial/industrial developments, 3 recreational areas, 2 protected natural areas, 2 mixed-use developments, 2 roadway projects, 2 wetlands/ ponds, 2 airport expansions, 2 mining operations, an orchard, a sewage line, and an unknown development;
- 29 developments have no plans on file or are in the pre-planning stage;
- 24 developments have no status given;
- 5 development plans are in process or approved but construction start dates are unknown;
- 3 development plans are in process or approved and the construction start date is known; and
- 1 development is constructed.

We received comments concerning project impacts on planned developments. These included general concerns about precluding future development on private landowners' properties and identification of specific planned developments. The primary impact that a pipeline project could have on a proposed development would be to place permanent right-of-way on lots set aside for development, which could affect the constructability of the lots. Depending on the number and location of affected lots, the developer could choose to redesign the affected portion of the development. Depending on the stage of the development, this redesign could require additional review and approval by local permitting officials, which could delay the development. The pipeline project could also impact approved and proposed developments if the construction schedules for the project and development projects coincide.

Temporary impacts on commercial areas would include inconveniences caused by noise and dust generated by construction equipment; disruption to access of homes and businesses; increased localized traffic from transporting workers, equipment, and materials to the work site; disturbance of lawns, landscaping, gardens, and visual character caused by the removal of soil, turf, shrubs, trees, and/or other landscaping between businesses and adjacent rights-of-way; potential damage to existing septic systems, wells, and other utilities; and removal of aboveground structures such as fences, sheds, or trailers from within the right-of-way.

Impacts due to construction and operation of the NGT Project would vary depending upon the stage of the planned developments, ownership of the parcels, and status of easement negotiations at the time of construction. In any situation, NEXUS would obtain the appropriate state or county permits (rezoning, development plan, etc.), and would either purchase the property or negotiate an easement from the current landowner in order to construct and operate the NGT Project.

While NEXUS has provided information on planned developments, we have reviewed the information in appendix K-3 and find that certain information is omitted that should be included, such as proximity of some planned developments to the most recent recently proposed construction workspace. Therefore, **we recommend that:**

- **<u>Prior to construction of the NGT Project</u>, NEXUS should provide an update on consultations with developer(s) regarding development construction timing and any requested mitigation measures for any planned developments that are crossed by the NGT Project and listed in Appendix K-3 of the EIS.**

NEXUS would also implement the mitigation measures contained in its *E&SCP* and any additional measures as arranged with specific landowners. We conclude that implementation of the identified mitigation measures would minimize or mitigate the impacts of pipeline construction on planned residential and commercial developments to less than significant levels. Operational impacts would be limited to the encumbrance of a permanent right-of-way, which would prevent the construction of permanent structures within the right-of-way.

TEAL Project

No planned residential or commercial developments were identified within 0.25 mile of the TEAL Project.

4.9.5 Agricultural Areas

4.9.5.1 Organic Farm Lands and Specialty Crops

NGT Project

The NGT Project would cross land that supports four certified organic farms and several tracts of land supporting specialty crops. Farms can be certified organic by the USDA if they fulfill a set of standards outlined as part of the National Organic Program (NOP). Organic farms produce products using methods that preserve the environment and avoid most synthetic materials, such as pesticides and antibiotics. Organic farmers, ranchers, and food processors must follow a defined set of standards to produce organic food and fiber (USDA, 2016b). The Specialty Crops Competitiveness Act of 2004 (7 USC 1621 note) and amended under section 10010 of the Agricultural Act of 2014, Public Law 113-79 (the Farm Bill) defines specialty crops as “fruits and vegetables, tree nuts, dried fruits, horticulture, and nursery crops (including floriculture).” Eligible plants must be cultivated or managed and used by people for food, medicinal purposes, and/or aesthetic gratification to be considered specialty crops (USDA AMS, 2016).

Table 4.9.3-2 lists the organic farms and specialty crop lands that the NGT Project would cross. Specialty crops that would be crossed in Ohio include alfalfa, oats, rye, spelt, clover, strawberries, assorted vegetables including corn (some of which is used to produce popcorn and seed corn), bell and hot peppers, tomatoes, pumpkins, squash, cucumbers (some of which are used to produce pickles), cabbage, asparagus, zucchini, beets, beans, peas, elderberry, apiaries used to produce honey, and apple, peach, plum, and Christmas trees. Specialty crops that would be crossed in Michigan include alfalfa, cauliflower, soybeans (for oil), and sunflowers. Construction would affect 305.2 acres of specialty crops, of which 291.0 acres occur in Ohio and 14.2 acres occur in Michigan. NGT Project operation would affect 96.8 acres of specialty crops, of which 92.2 acres occur in Ohio and 4.6 acres occur in Michigan.

TABLE 4.9.3-2

Organic Farm Lands and Specialty Crops Crossed by the NGT Project

State, Facility, County	MP Start	MP End	Crop Type	Acres Affected	
				Construction [a]	Operation [b]
OHIO					
TGP Interconnecting Pipeline					
Columbiana	0.1	0.2	Alfalfa	6.1	1.0
Mainline					
Columbiana	0.1	0.3	Alfalfa	5.3	1.8
Columbiana	1.3	1.5	Alfalfa	95.7	28.7
Columbiana	2.1	2.2	Alfalfa/Elderberry	0.3	0.0
Columbiana	2.5	2.8	Alfalfa	5.1	1.9
Columbiana	2.8	2.9	Alfalfa	1.3	0.5
Columbiana	2.9	3.1	Alfalfa	3.5	1.4
Columbiana	4.3	4.7	Peach Trees	5.4	2.0
Columbiana	4.3	4.7	Peach Trees	1.7	0.0
Columbiana	4.7	4.8	Peach Trees	1.5	0.7
Columbiana	4.9	5.0	Alfalfa	1.7	0.6
Columbiana	5.0	5.0	Alfalfa	0.8	0.2
Columbiana	5.0	5.1	Alfalfa	1.2	0.4
Columbiana	5.1	5.3	Alfalfa	3.0	1.0
Columbiana	5.9	5.9	Alfalfa	1.2	0.5
Columbiana	7.6	7.7	Strawberries	1.7	0.4
Columbiana	7.7	7.9	Honey, Peach, Plum, Apple, Pear Trees	2.7	0.9
Stark	23.7	24.2	Asparagus, Peppers, Zucchini, Beets, several types of Beans and Peas, Cabbage	8.4	3.1
Summit	41.6	41.5	Honey	0.7	0.4
Wayne	54.2	54.3	Alfalfa	2.5	0.8
Wayne	54.6	54.8	Peaches, Plum, Apple Trees, Alfalfa	2.1	0.7
Wayne [c]	55.1	55.6	Spelt, Corn, Corn/Oat and Pea, Pasture/Grass/Hay, Small Grain/Hay, Dairy Cattle, Milk	7.3	2.7
Wayne [d]	55.6	55.7	Organic spelt	1.8	0.6
Wayne [e]	55.8	56.1	Organic spelt	4.6	1.7
Medina	59.3	59.4	Alfalfa	2.4	0.8
Medina	59.5	59.7	Apple and Peach Trees	2.5	0.9
Medina	72.8	72.9	Christmas Trees	2.2	0.6
Medina	72.9	72.9	Christmas Trees	0.1	0.0

TABLE 4.9.3-2 (cont'd)

Organic Farm Lands and Specialty Crops Crossed by the NGT Project

State, Facility, County	MP Start	MP End	Crop Type	Acres Affected Construction [a]	Operation [b]
Erie	108.0	108.0	Apple Trees	0.2	0.0
Erie	108.0	108.4	Apple Trees	6.4	2.4
Erie	110.3	110.3	Honey - 3-4 hives located in SW part of property	8.0	1.8
Erie	110.8	110.9	Apple and Peach Trees	4.0	1.3
Erie	111.1	111.4	Fruit Trees	4.6	1.5
Erie	111.7	111.8	Honey	1.6	0.7
Erie	111.9	111.9	Honey	0.2	0.1
Erie	117.2	117.7	Rye	11.6	2.7
Erie	117.7	118.1	Rye	10.4	2.7
Erie	118.3	118.4	Popcorn	2.5	0.7
Erie	118.9	119.2	Popcorn	4.4	1.5
Erie	122.0	122.0	Popcorn	0.5	0.1
Erie	122.3	122.5	Clover	3.0	1.2
Erie	124.9	125.4	Seed Corn	6.6	2.6
Erie	129.7	130.0	Bell Peppers, Tomatoes, Pumpkins	6.3	2.4
Erie	130.1	130.2	Squash, Cucumbers, Cabbage	2.3	0.8
Sandusky	136.9	137.4	Cabbage, Pumpkins, Squash, Cucumbers, Peppers (Jalapeños, Bell, and Banana)	8.1	3.0
Sandusky	137.4	137.5	Cabbage, Pumpkins, Squash, Cucumbers, Peppers (Jalapeños, Bell, and Banana)	1.9	0.4
Sandusky	142.2	142.5	Strawberries	4.1	1.6
Sandusky	142.5	142.6	Strawberries	1.5	0.7
Sandusky	142.6	142.7	Strawberries	1.7	0.5
Sandusky	160.3	160.4	Peppers, Pickles	2.4	0.7
Sandusky	160.4	160.8	Peppers, Pickles	5.8	2.3
Sandusky	160.8	160.8	Peppers/Pickles	0.9	0.4
Wood [f]	164.7	164.9	Organic grains and produce	4.2	1.6
Wood	177.8	178.1	Oats/Alfalfa	4.1	1.6
Wood	178.1	178.3	Oats/Alfalfa	3.9	1.5
Wood	178.3	178.4	Oats/Alfalfa	1.0	0.4
Fulton	202.8	203.0	Alfalfa	2.0	0.8
Fulton	202.9	203.2	Alfalfa	4.0	1.6
			Ohio Total	**291.0**	**92.2**
MICHIGAN					
Mainline					
Lenawee	219.5	219.6	Cauliflower	2.5	0.8
Monroe	233.2	233.3	Alfalfa	2.0	0.6
Washtenaw	245.8	246.3	Soybean (for oil)	9.6	3.2
Washtenaw	247.4	247.4	Sunflowers	0.1	0.0
			Michigan Total	**14.2**	**4.6**
			Project Total	**305.2**	**96.8**

TABLE 4.9.3-2 (cont'd)

Organic Farm Lands and Specialty Crops Crossed by the NGT Project

State, Facility, County	MP Start	MP End	Crop Type	Acres Affected	
				Construction [a]	Operation [b]

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a Land affected during construction for pipeline facilities is comprised of the permanent right-of-way, temporary workspace, and ATWS where applicable.

b Land affected during operation of the pipeline includes only the permanent right-of-way.

c Sunbeam Organic Farm is certified in organic crops (corn, corn/oat and pea, pasture/grass/hay, and small grain/hay) and in livestock (dairy cattle, milk). Specialty crops include spelt.

d Koger organic farm grows organic spelt.

e Sauer/Stauffer organic farm grows organic spelt.

f Hirzel Farms is certified in organic crops (cabbage, rye seed, soybeans, spelt, spring wheat, and yellow corn) and in handling (broker: yellow corn, cereals, cleaning and bagging of grains, clover, dry beans, oats, oilseeds, rye seed, soybeans, spelt, sunflowers, vetch, wheat). Specialty crops include organic grains and produce.

Based on a review of the NOP's 2014 list of certified organic operations in Ohio and Michigan as well as NEXUS' landowner consultations, the NGT Project would cross four organic farms (see table 4.9.3-2) and would be within 1.0 mile of six others within Ohio: Toledo Alfalfa Mills, Joe Curfman Farm, White Oak Farm, Infinite Garden Farm, Weihl Farm, and Naked and Happy Eggs.

No certified organic farms were identified within 1.0 mile of the NGT Project in Michigan.

The organic certification process involves developing and implementing an individualized Organic System Plan. The Organic System Plan outlines the practices and procedures to be performed and maintained, a list of each substance to be used as a production or handling input, a description of monitoring practices, the record-keeping systems, and management practices and physical barriers established to prevent commingling and contact with prohibited substances (7 CFR 205.201). Organic System Plans are proprietary in nature.

To promote continued participation in the NOP, NEXUS would coordinate with certified organic farm operators to identify construction and operations practices that are consistent with organic farm certification practices. In addition to the general construction measures identified in NEXUS's *E&SCP*, mitigation measures specific to organic farms may include the following:

- Coordinate with landowners to maintain access to fields, storage areas, structures, and other agricultural facilities during construction;
- Maintain irrigation and drainage systems that cross the right-of-way;
- Protect active pasture land by installing temporary fencing, using alternative locations for livestock to cross the construction workspace, and/or alternating feeding arrangements, as negotiated with the landowner;
- Segregate and store topsoil such that only topsoil from the organic farm is replaced; and
- Use landowner-approved seed during restoration.

NEXUS would work with affected landowners to avoid and minimize potential impacts on specialty crops. NEXUS would compensate landowners for any project-related damages and lost production on organic farms and specialty crop lands. NEXUS would compensate organic farm landowners for any damages resulting from construction of the NGT Project.

NEXUS has provided site-specific crossing plans for the Sunbeam Organic Dairy Farm and Hirzel Farm. These plans consist of notes for wash station and entry locations to minimize potential for invasive species infestations; references to restoration being conducted in accordance with an environmental management plan and landowner stipulations for prohibited substances; use of standard soil handling techniques; and environmental monitors to be used on organic farms during construction. We conclude these plans may require additional measures based on consultation with affected farm owners. It is possible that herbicides used during operations could drift or runoff into an organic farm, or that seeding used in immediately adjacent areas could transfer to an organic farm. Because consultations are ongoing with organic farm landowners, including those for which we have received draft plans, and because site-specific mitigation for these areas have not been finalized, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period</u>, NEXUS should file with the Secretary site-specific *Organic Farm Protection Plans* developed in coordination with organic farm landowners and applicable certifying agencies for each certified organic farm that would be crossed or immediately adjacent to the Project that has the potential to experience direct and indirect effects as a result of construction or operation (e.g., pesticide drift, water migration, weeds). The plans should, at a minimum, identify:**

    a) prohibited substances (both during construction and operation);

    b) soil handling procedures;

    c) buffer zones;

    d) noxious invasive species control;

    e) erosion control;

    f) off right-of-way water migration;

    g) restoration methods, including seeding and preventing introduction of disease vectors; and

    h) operation and maintenance practices, including avoidance of herbicides or other agency or landowner approved methods.

    The plan should also describe how properties would be monitored for compliance with the provisions of the plan (e.g., use of an agricultural monitor) during construction.

Following construction, organic farming and specialty crop production would resume within the permanent right-of-way, with the exception of tree and shrub specialty crops such as Christmas trees or apple trees, in accordance with landowner agreements.

We conclude that with implementation of NEXUS' proposed construction methods, the creation of site-specific Organic Farm Protection Plans, implementation of NEXUS's *E&SCP*, and our recommendations, impacts on organic farms and specialty crop lands would be minimized to the greatest extent practicable and would not be significant.

TEAL Project

The TEAL Project does not cross any certified organic farms or specialty crop lands.

4.9.5.2 Forest and Agricultural Management Programs

The State of Ohio has two voluntary programs that offer tax reductions to landowners for qualifying forest and agricultural lands. The Current Agricultural Use Value (CAUV) program offers tax relief to landowners for qualifying agricultural lands containing 10 or more acres that are devoted exclusively to commercial production of crops and animals, or commercial agricultural lands under 10 acres that meet the minimum yearly gross income requirements (State of Ohio, 2016). Lands enrolled in the CAUV program are appraised based on production capacity of the soil and the market value. Thus, the value is dependent upon the soil type, region, slope, and erosion factors of the land.

Similarly, the Ohio Forest Tax Law (OFTL) program provides tax relief to landowners for qualifying forestland that is devoted exclusively to forestry with a primary object of timber production and may include, but is not limited to, maple syrup production, wildlife conservation, recreation, and aesthetics. Eligible land that meets the definition of forestland and landowners who meet the program requirements in order to have land certified under the OFTL. Eligible land must be 10 or more contiguous acres and not less than 120 feet wide, and must include the minimum number of approved trees or square footage for plantations (ODNR, 2016d). Commercial orchards and Christmas tree plantations do not qualify as forestland under the OTFL.

Additionally, landowners can enroll their land into conservation easements. Conservation easements constitute a legally binding agreement that limits certain types of uses or prevents development from taking place on the land in perpetuity while the land remains in private ownership. Conservation easements protect land for future generations while allowing owners to retain many private property rights, live on and use their land, and potentially providing landowners with tax benefits (Nature Conservancy, 2016).

NGT Project

The NGT Project pipeline would cross several parcels of land enrolled in the CAUV/OFTL forest management programs or protected by conservation easements. The total acreage of these parcels amounts to 182.4 acres.

As listed in table 4.9.3-3, construction of the NGT Project would affect 13.0 acres of enrolled land and operations would affect 5.2 acres.

TABLE 4.9.3-3

Forest Management Program and Conservation Easement Enrolled Lands Crossed by the NGT Project

County	Approximate Milepost Range	Program Name	Parcel Size (acres)	Total Construction	Total Operation
Stark	33.6 – 34.0	CAUV / OFTL	21.4	4.8	2.4
Summit	38.8 – 38.8	Conservation Easement	19.4	1.2	0.5
Summit	38.8 – 39.0	Conservation Easement	78.9	3.0	0.8
Lorain	95.4 – 95.5	Conservation Easement	54.0	2.1	0.7
Lorain	95.5 – 95.6	Conservation Easement	8.7	1.9	0.8
		Total	**182.4**	**13.0**	**5.2**

NEXUS would work with landowners to determine how the NGT Project crossing of CAUV/OFTL and conservation easements affects the continued participation in the program by landowners. NEXUS would compensate landowners for damages during construction and maintenance of the NGT Project, including lost incentives based on the specific terms of the easement or related agreements as negotiated between the parties, or determined by a court.

We conclude that with implementation of NEXUS' proposed mitigation measures and *E&SCP*, impacts on forest management programs and conservation easements would be minimized to the greatest extent practicable.

TEAL Project

Texas Eastern has not identified if any lands crossed by the TEAL Project are enrolled in forest management programs or conservation easements, and specific mitigation for such areas has not yet been identified. In order to assess the impacts on any potential areas, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period</u>, Texas Eastern should file with the Secretary a list by milepost of the forest management program or conservation easements that would be crossed by the TEAL Project, along with construction and operation impacts (acres), discussion of mitigation measures specific to each area crossed that Texas Eastern would use to restore the right-of-way and compensate for lost incentives, and discussion of how construction and operation of the TEAL Project would affect landowners' status pertaining to these programs or easements.**

4.9.5.3 Conservation Reserve Program and Conservation Reserve Enhancement Program

The Conservation Reserve Program (CRP) is a land conservation program administered by the USDA's Farm Service Agency (FSA). In exchange for a yearly rental payment, landowners enrolled in the program agree to remove environmentally sensitive land from agricultural production and plant species that would improve environmental health and quality. The long-term goal of the program is to re-establish valuable land cover to help improve water quality, prevent soil erosion, and reduce loss of wildlife habitat. The Conservation Reserve Enhancement Program (CREP), which is a subset of the CRP and also administered by the FSA, is focused on targeting high-priority conservation issues identified by local, state, or tribal governments or non-governmental organizations (FSA, 2015).

CRP lands occur primarily in agricultural areas and, therefore, the impacts and mitigation measures NEXUS would implement on these lands would be similar to those described for general agricultural areas (see section 4.9.2) and described in its *E&SCP*.

NGT Project

As listed in appendix K-4, construction of the NGT Project would affect a total of 524.5 acres of FSA-enrolled lands, including 292.4 acres in Ohio and 232.1 acres in Michigan. Operation of the NGT Project would affect a total of 185.6 acres of FSA-enrolled lands, including 104.8 acres in Ohio and 80.8 acres in Michigan.

Following construction, NEXUS would restore the right-of-way to meet the long-term objectives for the land enrolled in this program. However, some enrolled lands may have provisions for tree plantings that overlap the permanent right-of-way. Construction of the pipeline would not change the general use of the land but trees would be not allowed to be maintained within the permanent right-of-way. As such, if the right-of-way is currently maintained with trees, the program agreement may need to be altered to accommodate the pipeline. On FSA-enrolled lands where tree clearing is necessary, NEXUS would reimburse the landowner for lost yearly rental payments, plus related penalties (if applicable). Also, NEXUS is currently working with landowners and local FSA and NRCS officials to determine how the crossing of enrolled lands by the NGT Project affects the continued participation in the program by landowners.

Because tree removal within the permanent right-of-way could preclude enrollment in the program, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period,</u> NEXUS should file with the Secretary a discussion of how construction and operation of the NGT Project would affect landowners' continued participation in the *Conservation Reserve Program*.**

While NEXUS has provided information on FSA-enrolled lands, our review of the information in appendix K-4 shows that the information does not reflect changes in the proposed pipeline route as represented in supplemental filings submitted to the FERC after the November 2015 application. Therefore, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period</u>, NEXUS should file a revised FSA-enrolled lands table and ensure the table includes the mileposts, tract number, type of program, and acres affected. For any FSA-enrolled lands crossed, provide an update on NEXUS' consultations with landowners and local FSA and NRCS officials regarding the landowners' continued participation in the program, and any requested mitigation measures.**

We conclude that with implementation of NEXUS' updated proposed construction and mitigation measures, such as its *E&SCP*, impacts on FSA-enrolled lands that consists of non-forest land uses, would be minimized to the greatest extent practicable and would not be significant. An impact conclusion for forested FSA-enrolled lands is pending NEXUS' response to our recommendation.

TEAL Project

Because consultations are ongoing with the landowners to determine if any lands crossed by the TEAL Project are enrolled in FSA lands, and specific mitigation for these areas has not yet been identified, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period</u>, Texas Eastern should file with the Secretary a list of the FSA lands that would be crossed by the TEAL Project by milepost, along with construction and operation impacts (acres), discussion of mitigation measures specific to each FSA Program parcel crossed that Texas Eastern would use to restore the right-of-way, and discussion of how construction and operation of the TEAL Project would affect landowners' status pertaining to the FSA Program.**

4.9.5.4 Agricultural Drain Tiles and Irrigation Structures

NGT Project

NEXUS developed a *Drain Tile Mitigation Plan* (see appendix E-3) that provides a general overview of the types of drain tile systems potentially encountered during construction, and describes NEXUS' drain tile mitigation strategy during pre-construction, construction, and post-construction. The *Drain Tile Mitigation Plan* describes how NEXUS would communicate with landowners, perform preliminary drain tile assessments, identify existing drain tiles, repair damaged drain tiles, and monitor the NGT Project. We reviewed the plan and find it acceptable.

We received comments regarding concerns over damage to existing drain tiles as a result of construction. Concerns focused on issues of crop loss as a result of disrupting the drainage system, flooding, timing of and procedures for drain tile repair and replacement, loss of prime farmland, and landowner compensation.

Known agricultural drain tiles crossed by the NGT Project are listed in appendix K-5. Based on the information provided by NEXUS, the Project would not cross any known irrigation systems. Construction activities such as trenching could have the potential to damage these systems. To avoid cutting or damaging these systems, NEXUS would work with individual landowners prior to construction to identify and mark drain tile systems. Existing systems would be checked for pre-existing damage. If damaged during construction, NEXUS would temporarily repair the drain tile(s) until the pipe is lowered into the trench and permanent repairs can be completed and hydrology restored. System interruptions would typically last one day. NEXUS would compensate the landowner for the costs associated with repairing drain tile damages directly related to construction.

Following construction, the depth of cover over the new pipelines would be sufficient to avoid interference with the drain tile systems. Repairs and restoration to these systems conducted by NEXUS would be monitored for 3 years, or until restoration is considered successful, to ensure the system functions properly.

We received comments during the scoping period concerning installation criteria and mitigation requests for specific tracts of land with drain tile. In addition to the general measures listed above and committed to in NEXUS' *Drain Tile Mitigation Plan*, landowners have the opportunity during easement negotiations to request that site-specific factors and/or development plans for their property be considered, and that specific measures be taken into account.

We conclude that with implementation of NEXUS' proposed construction and mitigation measures, such as NEXUS' *Drain Tile Mitigation Plan* and *E&SCP*, impacts on drain tile systems would be minimized to the greatest extent practicable.

TEAL Project

There are no agricultural drain tiles or irrigation/drainage structures crossed by the TEAL Project.

4.9.6 Roadways and Railroads

The NGT and TEAL Projects would cross 362 public roads and 112 private roads. Of these, 242 would be crossed using the bore method, 202 would be crossed using the open-cut method, and 30 would be crossed using the HDD method. A description of each crossing method is provided in section 2.3.2.6.

Potential effects associated with roadway crossings include temporary disruption of traffic flow, disturbance of existing underground utilities (i.e., water and sewer lines), and hindrance of emergency vehicle access. During construction, NEXUS and Texas Eastern would maintain passage of emergency vehicles by creating temporary travel lanes or placing of steel plate bridges to allow continued traffic flow during open trenching. Traffic lanes and residential access would be maintained throughout construction, except for the temporary periods essential for pipeline installation, which would be coordinated with the landowner. Construction debris including mud would be kept off paved roads at access points used by construction equipment. See section 4.10.7 for a discussion on transportation and traffic-related impacts.

NGT Project

Table 4.9.6-1 summarizes the number of roads that would be crossed by the NGT Project in each county. Of the 468 roads crossed, 379 are in Ohio and 89 are in Michigan. These roads range from maintained dirt and gravel to paved county and township roads, state highways, and interstate highways. Appendix K-6 identifies all roadways (public and private) crossed by the NGT Project along with the associated crossing method. There are no anticipated permanent effects on existing uses of the roadways crossed by the NGT Project.

In areas where traffic volumes are high or other circumstances (e.g., congested areas) exist, NEXUS would obtain the assistance of law enforcement to ensure traffic flow and the safety of pedestrians and vehicles. NEXUS would obtain the necessary permits to access, modify, and/or work within road rights-of-way in coordination with the Ohio and Michigan state and county transportation departments.

TABLE 4.9.6-1

Summary of Roadways Crossed by the NGT Project

State, County	Number of Roadways Crossed		Total Number of Roadways Crossed
	Private	Public	
OHIO			
Columbiana	21	20	41
Stark	13	33	46
Summit	13	24	37
Wayne	7	12	19
Medina	4	32	46
Lorain	2	21	23
Huron	0	4	4
Erie	13	30	43
Sandusky	7	49	56
Wood	3	21	24
Lucas	4	12	16
Henry	0	1	1
Fulton	1	22	23
Ohio Total	**98**	**281**	**379**
MICHIGAN			
Lenawee	1	27	28
Lenawee/Monroe	0	1	1
Monroe	1	10	11
Washtenaw	11	38	49
Michigan Total	**13**	**76**	**89**
Project Total	**111**	**357**	**468**

The NGT Project would cross 24 active railroads (18 in Ohio and 6 in Michigan) and 4 inactive railroads (3 in Ohio and 1 in Michigan), which would be crossed using the conventional bore or HDD method (see table 4.9.6-2). Use of bore and HDD methods would avoid impacting the normal operation of the active railroads during construction.

TABLE 4.9.6-2

Railroads Crossed by the NGT Project

State, County	Approx. Milepost	Name	Active/ Inactive	Proposed Construction Method
OHIO				
Columbiana	11.2	Norfolk Southern Corporation	Active	Bore
Stark	18.6	Norfolk Southern Corporation	Active	Bore
Stark	28.1	Wheeling & Lake Erie Railway Company	Active	Bore
Summit	34.3	Metro Regional Transit Authority RR (Cuyahoga Valley Scenic Railroad)	Inactive (Until 2019)	Bore
Summit	48.2	CSX Transportation Inc.	Active	HDD
Medina	56.8	Wheeling & Lake Erie Railway Company	Active	Bore
Medina	69.5	CSX Transportation, Inc.	Active	Bore
Medina	72.8	Wheeling & Lake Erie Railway Company	Active	Bore
Medina	73.6	CSX Transportation, Inc.	Active	Bore
Medina	75.5	CSX Transportation, Inc.	Active	Bore
Lorain	87.1	CSX Transportation, Inc.	Active	Bore
Lorain	96.3	Lake Shore Railway Association Inc. (Amherst-Wellington Connector)	Inactive	Bore
Erie	115.9	Norfolk And Western RR	Active	Bore
Erie	128.4	Norfolk And Western RR	Active	Bore
Sandusky	147.6	Norfolk Southern Corporation	Active	Bore
Sandusky	159.5	Northern Ohio & Western RR	Active	Bore
Wood	166.8	CSX Transportation, Inc.	Active	Bore
Wood	173.9	CSX Transportation, Inc.	Active	Bore
Wood	179.1	CSX Transportation, Inc.	Active	Bore
Lucas	182.1	Toledo Lake Erie Western RR	Inactive	Bore
Fulton	197.8	Norfolk Southern Corporation	Active	Bore
MICHIGAN				
Lenawee	210.0	Genesee & Wyoming Railroad Services Inc.	Active	Bore
Lenawee	217.1	Adrian & Blissfield RR	Active	Bore
Monroe	233.0	Norfolk & Western RR	Active	Bore
Washtenaw	238.5	Omega Rail Management	Active	Bore
Washtenaw	249.7	Norfolk Southern Corporation	Inactive	Bore
Washtenaw	254.3	Norfolk Southern Corporation	Active	HDD
Washtenaw	254.3	Amtrak RR (Michigan Department of Transportation [MDOT] Owned)	Active	Bore

We conclude that with implementation of NEXUS' proposed construction and mitigation measures as well as its *E&SCP*, impacts on roadways and railroads would be minimized to the greatest extent practicable and would not be significant. Additionally, NEXUS would obtain the necessary permits and approvals from federal, state, and local agencies.

TEAL Project

As listed in appendix K-7, the TEAL Project would cross five public roads and one private road; no railroads would be crossed.

Similar to the NGT Project, Texas Eastern would obtain the assistance of law enforcement to ensure traffic flow and the safety of pedestrians and vehicles in areas where traffic volumes are high or other circumstances (e.g., congested areas) exist. Texas Eastern would obtain the necessary permits to access, modify, and/or work within road rights-of-way in coordination with the Ohio state and county transportation departments.

We conclude that with implementation of Texas Eastern's proposed construction and mitigation measures as well as its *E&SCP*, impacts on roadways and railroads would be minimized to the greatest extent practicable and would not be significant. Additionally, Texas Eastern would obtain the necessary permits and approvals from federal, state, and local agencies.

4.9.7 Recreation and Special Interest Areas

The NGT Project would not cross any national or state-designated Wild and Scenic Rivers, or lands managed by or associated with the U.S. Bureau of Land Management, Wetland Reserve Program, Emergency Conservation Program, Grassland Reserve Program, national forests, national parks, or Indian Reservations. However, it would cross or be located within 0.25 mile of public and private lands that support recreation or special interests. Features directly affected include trails, conservation and recreation areas, sports facilities, places of worship, a cemetery, scenic and historic byways, a scenic river, state parks and forests, nature areas/preserves, a national heritage area, and municipal parks, as listed in table 4.9.7-1. Waterbodies crossed and included on the NRI are discussed in section 4.3.2.1.

The TEAL Project would not cross or be located within 0.25 mile of any public or private lands that support recreation or special interests. Therefore, with the exception of general recreation (e.g., hunting) discussed below, it is no longer addressed in this section.

The primary concern when crossing recreation and special interest areas is the impact of construction on the purpose for which the area was established (e.g., the recreational activities, public access, and resources the area aims to protect). Construction would temporarily limit recreational use in a specific area; could generate dust and noise, which could be a nuisance to recreational users; and could interfere with or diminish the quality of the recreational experience by affecting wildlife movements or disturbing trails and their users. Construction could also alter visual aesthetics by removing existing vegetation and disturbing soils.

In general, project impacts on recreational and special interest areas occurring outside of forest/woodland would be minor and temporary (limited to the period of active construction), which typically would last only several days to several weeks in any one area. These impacts would primarily be minimized by implementing NEXUS' *E&SCP*, which describes topsoil and subsoil segregation, erosion control measures, waterbody and wetland crossings, etc. In addition, NEXUS has proposed specific mitigation measures as described below for some of the recreation and special interest areas that would be affected.

Following construction, most land uses disturbed would be restored and able to revert to their former uses. Forest/woodland affected by construction within the temporary right-of-way and ATWS areas, however, would experience long-term impacts because of the time required for the forest/woodland to regenerate to its pre-construction condition, and forest/woodland within the permanent right-of-way would experience permanent impacts because it would be precluded from being reestablished at the site or within the maintained portion of the right-of-way.

TABLE 4.9.7-1

Recreation and Special Interest Areas Crossed by the NGT Project

State, Agency	Facility	County	MP Start	MP End	Name of Area	Land Ownership / Land Management	Crossing Method	Acreage Affected by Construction	
								Con.	Op.
OHIO									
Federal									
Federal Highway Administration									
	Mainline	Summit	47.9	47.9	Ohio & Erie Canalway America's Byway	Federal Highway Administration	HDD	<0.1 [a]	0.0
State									
Ohio Department of Natural Resources									
	Mainline	Wood / Lucas	181.4	181.5	Maumee State Scenic River	ODNR	HDD	<0.1 [a]	0.0
	Mainline	Lucas	181.5	181.7	Missionary Island Wildlife Area	ODNR	HDD	<0.1 [a]	0.0
	Mainline	Lucas	181.7	181.8	Maumee State Scenic River	ODNR	HDD	<0.1 [a]	0.0
	Mainline	Summit	41.0	41.2	Portage Lakes State Park (Nimisila Reservoir)	ODNR	HDD	<0.1 [a]	0.0
	Mainline	Summit	41.6	41.7	Portage Lakes State Park (Nimisila Creek)	ODNR	Flume or Dam and Pump	2.6	0.9
	Mainline	Henry	190.0	190.3	ODNR Property (adjacent to Maumee State Forest)	ODNR	Open-Cut	3.9	1.4
	Mainline	Fulton	190.3	190.5	ODNR Property	ODNR	Open-Cut	5.2	1.6
	Mainline	Fulton	193.3	193.7	Maumee State Forest	ODNR	Open-Cut	4.7	2.8
Ohio Department of Transportation									
	Mainline	Columbiana	2.0	2.0	Lincoln Highway Historic Byway (Ohio State Route 9/U.S. Route 30)	ODOT	Bore	0.2	0.1
	Mainline	Wood	181.2	181.2	Maumee Valley Scenic Byway (West River Road)	ODOT / Maumee Valley Heritage Corridor	HDD	<0.1 [a]	0.0
	Mainline	Lucas	181.8	181.8	Maumee Valley Scenic Byway (South River Road)	ODOT / Maumee Valley Heritage Corridor	HDD	<0.1 [a]	0.0
County/Municipal									
Stark County Park District									
	Mainline	Stark	16.2	16.2	Stark Farmland Trail (proposed)	Stark County Park District	Bore	0.1	<0.1
	Mainline	Stark	17.0	17.0	Iron Horse Trail	Stark County Park District	Open-Cut	<0.1	<0.1
	Mainline	Stark	18.3	18.3	Stark Electric Railway Trail (proposed)	Stark County Park District	Bore	0.1	<0.1
	Mainline	Stark	27.2	27.2	Upper Middle Branch Trail (proposed)	Stark County Park District	Bore	0.1	<0.1
Summit County Metro Parks									
	Mainline	Summit	48.2	48.2	Ohio & Erie Canal / Towpath Trail	Summit Metro Parks / Private Landowners	HDD	<0.1 [a]	0.0
Medina County Park District									
	Mainline	Medina	68.8	68.8	Chippewa Rail Trail	Medina County Park District	Open Cut	0.2	0.1

TABLE 4.9.7-1 (cont'd)

Recreation and Special Interest Areas Crossed by the NGT Project

State, Agency	Facility	County	MP Start	MP End	Name of Area	Land Ownership / Land Management	Crossing Method	Acreage Affected by Construction	
								Con.	Op.
	Mainline	Medina	68.9	69.0	Chippewa Lake Nature Area	Medina County Park District / Western Land Conservancy	Open Cut	0.7	0.3
	Mainline	Medina	69.6	69.7	Chippewa Lake Nature Area	Medina County Park District	Open Cut	7.8	2.6
	Mainline	Medina	70.3	70.6	Chippewa Lake Nature Area	Medina County Park District	Open Cut	6.8	2.8
	Mainline	Medina	70.8	70.8	Chippewa Inlet Trail	Medina County Park District	Open Cut	<0.1	<0.1
	Mainline	Medina	71.1	71.3	Buckeye Woods Park / Schleman Nature Preserve	Medina County Park District	HDD	<0.1 [a]	0.0
					Lorain County Metro Parks				
	Mainline	Lorain	98.1	98.1	North Coast Inland Trail	Lorain County Metro Park District	Open Cut	0.2	0.1
Sandusky County Park District									
	Mainline	Sandusky	151.2	151.3	North Coast Inland Trail	Sandusky County Park District	Open Cut	0.2	0.1
	Mainline	Sandusky	153.2	153.4	Creek Bend Farm	Sandusky County Park District	Open Cut	3.0	1.3
Metroparks of the Toledo Area									
	Mainline	Lucas	181.7	181.8	Farnsworth Metropark / Towpath Trail	Metroparks of the Toledo Area	HDD	<0.1 [a]	0.0
City of Green									
	Mainline	Summit	35.3	35.4	Ariss Park	City of Green	Open Cut	3.1	0.9
	Mainline	Summit	35.5	35.6	Ariss Park / Hwy 77	City of Green	Open Cut / Bore	1.7	0.6
	Mainline	Summit	37.1	37.1	Greensburg Park	City of Green	Open Cut	<0.1	<0.1
Private/Other									
	Mainline	Columbiana	3.5	3.5	North Country National Scenic Trail (on Buffalo Road)	Private Landowners / Hanover Township, Columbiana County Board of Trustees	Open Cut	0.3	0.1
	Mainline	Columbiana	8.0	8.0	Statewide Bike Routes- J	Columbiana County Engineer	HDD	<0.1 [a]	0.0
	Mainline	Stark	33.0	33.0	Buckeye Trail	Private Landowners	Open Cut	0.1	<0.1
	Mainline	Summit, Stark	33.4	35.4	Ohio & Erie Canalway National Heritage Area	Private Ownership / NPS Management	Open Cut	35.3	12.2
	Mainline	Stark	34.0	34.0	Buckeye Trail	Private Landowners	Bore	0.1	<0.1
	Mainline	Summit	34.3	34.3	Cuyahoga Valley Scenic Railroad	Metro Regional Transit Authority	Bore	0.0	<0.1
	Mainline	Summit	38.8	39.0	Singer Lake Bog	Cleveland Museum of Natural History	Open Cut	3.9	1.3
	Mainline	Summit	41.2	41.2	Buckeye Trail	Private Landowners	HDD	<0.1 [a]	0.0
	Mainline	Summit	41.5	49.6	Ohio & Erie Canalway National Heritage Area	Private Ownership / NPS Management	Open Cut	128.3	49.3
	Mainline	Summit	47.9	47.9	Buckeye Trail / Ohio to Erie Trail	Private Landowners	HDD	<0.1 [a]	0.0
	Mainline	Medina	68.0	68.0	Chippewa Lake Baptist Church	Private Landowners	Open Cut	0.9	0.9
	Mainline	Medina	68.3	68.3	State Wide Bike Route- C	Lafayette Township, Board of Trustees	Bore	<0.1	<0.1
	Mainline	Medina	78.0	78.0	Buckeye Trail	Private Landowners / York Township, Board of Trustees	Bore	0.1	<0.1

TABLE 4.9.7-1 (cont'd)

Recreation and Special Interest Areas Crossed by the NGT Project

State, Agency	Facility	County	MP Start	MP End	Name of Area	Land Ownership / Land Management	Crossing Method	Acreage Affected by Construction	
								Con.	Op.
	Mainline	Lorain	83.9	84.4	Western Reserve Land Conservancy	Private Landowners/ Western Reserve Land Conservancy	Open Cut	7.8	3.0
	Mainline	Lorain	95.4	95.6	Western Reserve Land Conservancy (also encompasses Black Swamp Woods)	Private Landowners/ Western Reserve Land Conservancy	Open Cut	4.1	1.5
	Mainline	Lorain	96.3	96.3	Amherst-Wellington Connector	Lake Shore Railway Association	Bore	0.1	<0.1
	Mainline	Erie	110.2	110.2	Statewide Bike Route- N	Erie County Engineer	HDD	<0.1 [a]	0.0
	Mainline	Erie	116.3	116.3	Statewide Bike Routes N-CP	Erie County Engineer	Bore	0.1	<0.1
	Mainline	Erie	118.5	118.8	Erie County Conservation League	Erie County Conservation League	Open Cut	4.6	1.7
	Mainline	Erie	122.0	122.0	St. John's United Church of Christ Milan Ohio Inc.	Private Landowners	Open Cut	0.5	0.1
	Mainline	Erie	128.8	128.8	Statewide Bike Route N-CP	Groton Township, Board of Trustees	Bore	0.1	<0.1
	Mainline	Sandusky	151.7	151.7	Buckeye Trail	Private Landowners / Sandusky County Engineers	Bore	0.1	<0.1
	Mainline	Sandusky	162.4	162.4	Buckeye Trail	Private Landowners / Sandusky County Engineers	HDD	<0.1 [a]	0.0
	Mainline	Wood	177.3	177.3	Statewide Bike Route E	Middleton Township	Bore	0.1	<0.1
	Mainline	Wood	178.1	178.1	Bowling Green- Perrysburg Connector (proposed)	Middleton Township	Bore	0.1	<0.1
	Mainline	Wood	179.9	179.9	Buckeye Trail	Private Landowners / ODOT	HDD	<0.1 [a]	0.0
	Mainline	Wood	180.8	180.8	Riverby Hills Golf Club	Private Landowners	Open Cut	0.1	<0.1
	Mainline	Lucas	181.8	181.8	Highland Memory Gardens Cemetery	Private Landowners	HDD	<0.1 [a]	0.0
	Mainline	Lucas	183.1	183.1	Statewide Trail A	Various county, city or township offices	Bore	0.1	<0.1
	Mainline	Henry	190.0	190.0	North Country National Scenic Trail; Wabash Cannonball Trail	Northwestern Ohio Rails To Trails Association, Inc.	Open Cut	0.1	<0.1
	Mainline	Fulton	195.9	195.9	North Country National Scenic Trail; Wabash Cannonball Trail	Northwestern Ohio Rails To Trails Association, Inc.	Bore	0.1	<0.1
							Ohio Total	**226.9**	**86.1**
MICHIGAN									
	Mainline	Washtenaw	249.1	249.1	Community Free Will Baptist Church	Private Landowners	Open Cut	0.8	0.4
	Mainline	Washtenaw	250.3	250.3	South Hydro Park	Charter Twp of Ypsilanti	Staging Area	0.4	0.0
	Mainline	Washtenaw	250.9	251.1	North Hydro Park	Charter Twp of Ypsilanti	HDD	<0.1 [a]	0.0
	Mainline	Washtenaw	251.2	251.4	The Ponds at Lakeshore Disc Golf Course	Private Landowners	Open Cut	3.1	1.1
							Michigan Total	**4.3**	**1.5**
							NGT Project Total	**231.2**	**87.6**

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a Construction and operation impacts <0.1 acre represent minor hand cutting of brush to lay a guide wire for the HDD, which may consist of a pathway measuring a few feet in width in densely vegetated areas..

NEXUS would work with the landowners of the recreational and special interest areas to avoid, minimize, or mitigate impacts on these areas, as requested. Each recreational or special interest area is discussed below, along with any site-specific measures that NEXUS would adopt to avoid or minimize construction-related impacts on the feature. NEXUS would attempt to maintain access to the areas during construction of the pipeline. NEXUS would compensate landowners for any loss of crop or timber for any area disturbed during construction. In addition to the areas directly affected, table 4.9.7-2 lists the recreational and special interest areas that are within 0.25 mile of the NGT Project.

TABLE 4.9.7-2

Recreation and Special Interest Areas within 0.25 Mile of the NGT Project

State, Facility, County	Ownership/Management	Name of Area	Distance in feet and Direction from Nearest Point of Construction ROW
OHIO			
Mainline			
Stark	Stark County Park District	Stark Farmland Trail (proposed)	267 East from Access Road; 760 West from MP 14.8
Stark	Private Landowners	Sportsman's Rod & Gun Club	112 South from MP 25.4
Stark	Multiple Landowners	Statewide Bike Route	988 Southwest from MP 27.3
Stark	Private Landowners	Lake O' Pines Park	881 North from MP 30.2
Summit	City of Green	Green Youth Sports Complex	697 East from MP 36.8
Summit	City of Green	Boettler Park and Southgate Park	353 Southeast from MP 38.0
Summit	Cleveland Museum of Natural History	Singer Lake Bog	1,158 South from MP 38.2
Summit	Private Landowners	Loyola Retreat House	500 Northwest from MP 40.4
Summit	Private Landowners	Camp Y-NOAH (YMCA)	38 South from Access Road; 942 South from MP 40.9
Summit	Private Landowners	Spring Hills Golf and Tennis Club	311 South from MP 49.3
Wayne	Village of Doylestown	Doylestown Park	1,054 South from MP 53.4
Medina	Private Landowners	Romeyn Recreational Enterprises Inc.	575 West from MP 65.1
Medina	Medina County Park District	Chippewa Lake Nature Area	368 West from MP 69.0
Medina	Medina County Park District	Chippewa Lake Nature Area	544 South from MP 69.5
Medina	Private Landowners	Medina Country Club	369 East from MP 69.2
Lorain	Private Landowners	Gordon Blackhall Memorial Range	966 Southwest from MP 81.2
Lorain	Lorain County Metro Park District	Midview Soccer League Complex	213 South from MP 86.0
Lorain	Lorain County Metro Park District	Indian Hollow Reservation and Sheldon Woods	562 Northeast from MP 87.7
Lorain	Multiple Landowners	Statewide Bike Route	560 North from MP 90.8
Lorain	Lorain County Metro Park District	Carlisle Preservation	0' West from MP 91.4
Lorain	City of Oberlin	Oberlin Recreational Complex	369 North from MP 94.6
Erie	Private Landowners	Western Reserve Land Conservancy	230 East from MP 110.1
Erie	Erie County Metro Parks Board	Edison Woods Preserve	17 Northeast from MP 112.1
Sandusky	State of Ohio	Wildlife Habitat Restoration Program Murray, P.	530 North from MP 144.2
Sandusky	Private Landowners	Black Swamp Conservancy, Placemark	438 North from MP 153.8
Sandusky	Private Landowners	Black Swamp Conservancy, CBR Farms	429 North from MP 154.2
Sandusky	Private Landowners	Black Swamp Conservancy, Toledo Alfalfa Mills Farm	0' North from MP 155.6
Sandusky	Private Landowners	Black Swamp Conservancy, Chet Mauch Farm	49 South from MP 156.6

TABLE 4.9.7-2 (cont'd)

Recreation and Special Interest Areas within 0.25 Mile of the NGT Project

State, Facility, County	Ownership/Management	Name of Area	Distance in feet and Direction from Nearest Point of Construction ROW
Wood	Private Landowners	Tanglewood Golf Course	724 North from MP 173.2
Henry	ODNR	Maumee State Forest	817 South from MP 189.3
Henry	ODNR	Maumee State Forest	670 Southwest from MP 190
Fulton	Private Landowners	White Pine Golf Course	207 Southwest from MP 190.5
Fulton	ODNR	Maumee State Forest	416 Northeast from MP 191.7
Fulton	ODNR	Maumee State Forest	696 East from MP 192.8
Fulton	ODNR	Maumee State Forest	634 East from MP 193.3
Fulton	State of Ohio	Fulton Pond Wildlife Area	8 East from MP 198.8
Aboveground Facilities			
Columbiana	ODOT	Lincoln Highway Historic Byway	1,171 Northwest from Hanoverton Compressor Station boundary
Erie	Multiple Landowners	Statewide Bike Route N-CP	206 East from MR05 boundary
Lucas	Private Landowners	Statewide Trail A	529 East from Waterville Compressor Station boundary
MICHIGAN			
Mainline			
Washtenaw	Washtenaw County Parks and Recreation	Draper-Houston Meadows Preserve & Nature Park	47 East from MP 237.4

Direct effects would not occur on areas located within 0.25 mile of the NGT Project and outside of the construction right-of-way. However, during pipeline construction, indirect impacts from noise and visual impacts would occur; these would be temporary and limited to the time of construction. During operation, moderate and permanent visual and noise impacts would result from clearing of trees from the permanent right-of-way and, if applicable, the placement of permanent facilities such as compressor stations or MLVs within proximity to the recreation and special interest areas. NEXUS would implement the measures outlined in its *E&SCP* to prevent disturbance to off-site areas.

No public hunting or game management areas would be crossed by the NGT or TEAL Projects. However, construction of the Projects may affect general recreational activities such as hunting and fishing. For example, construction of the pipeline may affect hunting activities that occur on private land if the hunting season occurs within the construction time frame. Hunting seasons in Ohio and Michigan vary depending by species. For example, deer hunting is allowed between September and February; turkey hunting is allowed between September and November and April and May; and most small game species hunting is allowed between September and January (ODNR Division of Wildlife, 2016a; MDNR, 2016). Currently, construction of the TEAL Project is planned from March 2017 through October 2017. Construction of the NGT Project is planned from March 2017 through November 2017. To minimize conflicts with hunting activities, NEXUS and Texas Eastern would notify adjacent landowners prior to construction.

In addition, recreational fishing occurs in the NGT and TEAL Project areas. Common fish species occurring in the waterbodies affected by the Projects are discussed in section 4.7.1 and listed in table 4.7.1-1. Sections 4.3.2.2 and 4.7.2.1 discuss construction methods proposed at waterbodies and project-related impacts on waterbodies and fisheries, respectively.

The following discussions describe recreational and special interest areas designated by federal, state, and county/municipal entities, and the opportunities available at each area crossed by the NGT Project. As stated above, no federal, state, or county/municipal designated recreational or special interest areas would be crossed by the TEAL Project. NEXUS has proposed general mitigation measures and provided site-specific crossing plans that are being completed in consultation with the applicable landowner or managing agency (see appendix P). Site-specific crossing plans have not been provided for Chippewa Lake Baptist Church, St. John's United Church of Christ Milan, and the Community Free Will Baptist Church. Because some of these plans have not been completed, we are recommending in the following discussions that NEXUS file outstanding site-specific crossing plans for certain features. We have included draft versions of the available site-specific crossing plans in appendix E-5. **We encourage the owners/managers of each recreation and special interest area to provide us comments on the plan(s) specific to their property of ownership or management during the draft EIS comment period.**

While NEXUS has provided site-specific crossing plans for most recreational and special interest areas, similar plans have yet to be provided for trails where closure would be required during construction. Because construction could limit recreational users' access to and use of trails, **we recommend that:**

- **<u>Prior to construction of the NGT Project</u>, NEXUS should file with the Secretary for review and written approval by the Director of OEP, site-specific crossing plans for trails that would be closed during construction that show where a detour or portage would be placed, shows where signage would be placed warning recreationalists of the detour or portage, and provide documentation that the plan was developed in coordination with the landowner or land-managing agency.**

4.9.7.1 Federal

Federal Highway Administration

Ohio & Erie Canalway America's Byway

The Ohio & Erie Canalway America's Byway is a 110-mile route that was designated in 1996 as a State Scenic Byway by the ODOT and designated as Ohio & Erie Canalway America's Byway in 2000 by U.S. Secretary of Transportation. Ohio & Erie Canalway America's Byway is a collection of 150 roads that recognize certain roads as All-American Roads or National Scenic Byways based on one or more archeological, cultural, historic, natural, recreational and scenic qualities. The Ohio & Erie Canalway America's Byway is recognized as a National Scenic Byway, and is administered by the Federal Highway Administration of the DOT (Ohio & Erie Canal Association, 2016a). The Ohio & Erie Canalway America's Byway travels through the Ohio & Erie Canal National Heritage Area (NHA).

As listed in table 4.9.7-1, the NGT Project would cross Ohio & Erie Canalway America's Byway at MP 47.9 (Van Buren Road at this location) using the HDD method, as described in section 2.3.2.6. Land use on either side of the byway crossing consists of open land, agricultural land, and residential land. This crossing also includes crossing of the Tuscarawas River and the Ohio-to-Erie Trail (Buckeye Trail at this location). The trails are discussed individually below.

Direct impacts would be avoided; however, byway travelers may experience temporary visual and noise impacts associated with construction personnel and equipment and HDD activities. Also, as a result of the HDD method, tree clearing and vegetation maintenance within the permanent right-of-way on either side of the crossing would not be necessary, thus avoiding permanent visual impacts on recreational users. Recreational uses of the byway would not be affected by operations.

4.9.7.2 State

Ohio Department of Natural Resources

Maumee State Scenic River

The Maumee State Scenic River is located in northwestern Ohio and flows northeasterly through portions of Paulding, Defiance, Henry, Wood and Lucas Counties. Scenic rivers are classified according to the outstanding qualities a stream possesses including the stream's length, adjacent forest cover, biological characteristics, water quality, present use, and natural conditions. Ohio’s Scenic Rivers Act provides three categories for river classification: wild, scenic and recreational (ODNR Division of Watercraft, 2016). The ODNR Division of Watercraft administers the state scenic rivers program.

As listed in table 4.9.7-1, the NGT Project would cross the Maumee State Scenic River at two locations between MPs 181.4 and 181.8 using the HDD method. The Maumee State Scenic River is designated as a "recreational river” at this crossing. A recreational river includes those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past (State of Ohio, 2016). Land use at this crossing consists of forest/woodland (Missionary Island Wildlife Area and along the river banks) and open water (Maumee River). Project-related impacts would be similar to those described for other areas crossed using the HDD method. Recreational uses of the river would not be affected by operations.

Missionary Island Wildlife Area

The Missionary Island Wildlife Area includes 296 acres of land located along the Maumee River in Lucas and Wood Counties, and is owned and managed by the ODNR Division of Wildlife. Recreational opportunities include wildlife watching, hunting, trapping, fishing, and boating (ODNR Division of Wildlife, 2016b).

As listed in table 4.9.7-1, the NGT Project would cross the Missionary Island Wildlife Area between MPs 181.5 to 181.7 using the HDD method. Land use at this crossing consists of forest/woodland. Project-related impacts would be similar to those described for other areas crossed using the HDD method. Recreational uses of the wildlife area would not be affected by operations.

Portage Lakes State Park

Portage Lakes State Park is a 411-acre state park located in Summit County and is owned and managed by the ODNR Division of Parks and Recreation. The park offers recreational experiences such as boating, swimming, hunting and fishing, and wildlife viewing (ODNR Division of Parks and Recreation, 2016).

As listed in table 4.9.7-1, the NGT Project would cross the southern portion of Portage Lakes State Park in two locations between MPs 41.0 and 41.2 and between MPs 41.6 and 41.7. The first crossing between MPs 41.0 and 41.2 consists of the Nimisila Reservoir and would be crossed using the HDD method. Land use at the first crossing consists of agricultural land, open water (Nimisila Reservoir), and forest/woodland.

Direct impacts would be avoided at the first crossing where the reservoir would be crossed using the HDD method; however, a small portion of ATWS associated with HDD entry/exit point at MP 40.9 is located within the park and would impact agricultural land. Where land use is agricultural, land uses would return to pre-construction conditions. Recreational users may experience temporary visual and noise impacts associated with construction personnel and equipment and HDD activities. Recreational uses of the park would not be affected by operations.

The second crossing between MPs 41.6 and 41.7 consists of Nimisila Creek, which would be crossed using the flume or dam and pump method, as described in section 2.3.2. Land use at the second crossing consists of forest/woodland, open water (Nimisila Creek), and open land. The open land portions of each crossing are associated with an existing utility right-of-way.

Construction would affect 2.6 acres and operations would affect 0.9 acre at the Nimisila Creek crossing. Project-related construction and operation impacts associated with the second crossing include clearing and tree removal of the construction workspace, and routine vegetation maintenance within the permanent right-of-way required during pipeline operation. As a result, the NGT Project would cause the conversion of forest/woodland to open land within the permanent right-of-way. Impacts associated with tree clearing and vegetation maintenance would be a long-term to permanent impact. Following construction, the area would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Additionally, NEXUS would compensate the land managing agency for the value of trees removed by construction and operation of the project. Recreational users would be temporarily affected by Project-related noise, dust, traffic, and visual impacts. These impacts would be limited to the time of construction. Recreational uses of the park would not be affected by operations; however, long-term impacts associated with tree removal would be visible.

ODNR Property

As listed in table 4.9.7-1, the pipeline crosses two parcels owned by the ODNR between MPs 190.0 and 190.3 and between MPs 190.3 and 190.5 using the open-cut method as described in section 2.3.1. This area is also within the Historic Oak Openings Region (see section 4.5.1.1) and adjacent to the Maumee State Forest. The first crossing at MP 190.0 coincides with the North Country National Scenic Trail and Wabash Cannonball Trail. Land use at the first crossing consists of forest/woodland and agricultural land. Land use at the second crossing consists of agricultural land and commercial/industrial (County Road A).

Construction would affect 9.1 acres and operations would affect 3.0 acres at the ODNR Property crossings. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Recreational uses of the trail would be allowed to continue; however, long-term impacts associated with tree removal would be visible.

An alternative route for the pipeline at the first crossing is under consideration as discussed in section 3.0. This alternative route would shift the pipeline east and bisect a contiguous portion of forest/woodland within the Maumee State Forest.

Maumee State Forest

The Maumee State Forest includes a combination of several parcels totaling 3,194 acres in Fulton and Henry Counties, and is owned and managed by the ODNR's Division of Forestry. Recreational opportunities offered by the forest include fishing, hunting, camping, hiking, biking, picnicking, winter recreation, wildlife observations, horseback riding, and all-purpose vehicle use (ODNR Division of Forestry, 2016a). The Maumee State Forest is managed under the multiple-use concept including, but not limited to, timber, wildlife habitat, forestry research, demonstration of good forest management, soil and water protection, recreational use, and unique natural features (ODNR Division of Forestry, 2016b).

As listed in table 4.9.7-1, the NGT Project would cross the Maumee State Forest boundary between MPs 193.3 and 193.7 using the open-cut method. This portion of the Maumee State Forest is designated as land management area Compartment A2 and is located within the Historic Oak Openings Region (see section 4.5.1.1). Land use at this crossing consists of forest/woodland.

According to the Maumee State Forest 2016 Work Plan, several areas within Compartment A2 are being considered for prescribed burning in 2016. These areas include the Stewardship Trail Demo Area, a phragmites (common reed grass) patch near Road 4, and the Rusin Tract Old Fields. The Stewardship Trail is approximately 650 feet west of the construction workspace, and the nearest facility, the Maumee State Forest office building, is approximately 665 feet west of the construction workspace.

Construction would affect 4.7 acres and operations would affect 2.8 acres at the state forest crossing. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Recreational uses of the forest would be allowed to continue; however, long-term impacts associated with tree removal would be visible.

Ohio Department of Transportation

Lincoln Highway Historic Byway (Ohio State Route 9/U.S. Route 30)

The 241-mile-long Lincoln Highway Historic Byway in Ohio was established in March 2004 after being awarded the state-designated byway status through the ODOT (Ohio Lincoln Highway Heritage Corridor, 2016; ODOT, 2016a). The byway is also referred to as Ohio State Route 9 and U.S. Route 30. Much of U.S. Route 30 has been rebuilt as a four-lane divided highway, but several original brick paved sections still exist (Lincoln Highway Association, 2016). The ODOT manages the Lincoln Highway Historic Byway and partners with organizations to preserve, protect, and enhance the intrinsic resources of the byway.

As listed in table 4.9.7-1, the NGT Project would cross the Lincoln Highway Historic Byway at MP 2.0 using the bore method, as described in section 2.3.2.6. At this crossing, the byway is a two-lane divided paved road. Land use on either side of the byway crossing consists of open land and open water (Sandy Creek). Direct impacts on the byway would be avoided through use of the bore method and traffic would continue during construction; however, scenic travelers may experience temporary visual and noise impacts associated with construction personnel and equipment and bore activities. Following construction, recreational uses of the byway would not be affected by operations. The ATWS associated with the bore crossing would result in minor and temporary residential tree removal.

Maumee Valley Scenic Byway (West and South River Roads)

The Maumee Valley Scenic Byway is part of Ohio Scenic Byway Program. The nearly 90-mile route begins on the north side of the Maumee River in Defiance and follows River Road until it ends in Maumee. On the south side of the Maumee River, the byway starts at Napoleon and ends in Rossford (ODOT, 2016b).

As listed in table 4.9.7-1, the NGT Project would cross the Maumee Valley Scenic Byway in two locations at MP 181.2 and MP 181.8 using the HDD method. The first crossing at MP 181.2 (West River Road in this location) is a two-lane divided paved road. Land use at the first crossing consists of agricultural and forest/woodland. The second crossing at MP 181.8 (South River Road in this location) is also a two-lane divided paved road. Land use at the second crossing consists of open land. The byway segments crossed by the NGT Project are managed by the Maumee Valley Heritage Corridor (Maumee Valley Heritage Corridor, 2016).

Project-related impacts would be similar to those described for other areas crossed using the bore method. Recreational uses of the byway would not be affected by operations. The access road associated with the HDD crossing would require minor tree removal along West River Road.

4.9.7.3 County/Municipal

Stark County Park District

Stark Farmland Trail (Proposed)

The Stark Farmland Trail is a proposed on-road trail that would provide a north-south connection between Alliance and Minerva using rural roadways, and would be an alternate to the Iron Horse Trail (Stark County Park District, 2016a). According to the Stark County Transportation Plan (Stark County Area Transportation Study, 2013), the proposed Stark Farmland Trail would be completed in 2040. The Stark County Park District would own and manage the Stark Farmland Trail. As listed in table 4.9.7-1, the NGT Project would cross a future segment of the Stark Farmland Trail at MP 16.2R (Beechwood Ave NE at this location) using the bore method. Land use on either side of the road/future trail consists of agricultural land.

Project-related impacts would be the same as those described throughout this section for agricultural land, and those that would be crossed using the bore method. Following construction, vehicular uses of the road and future uses of the trail would not be affected by operations.

Iron Horse Trail

The Iron Horse Trail is a former railroad right-of-way that once connected Alliance to Minerva (Stark County Park District, 2016b). Recreational activities along the natural surface trail include hiking and walking. The Stark County Park District owns and manages the Iron Horse Trail. As listed in table 4.9.7-1, the NGT Project would cross the Iron Horse Trail at MP 17.0 using the open-cut method. Land use on either side of the trail consists of forest/woodland.

Construction would affect 0.04 acre and operations would affect 0.03 acre at the Iron Horse Trail crossing. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Recreational uses of the trail would not be affected by operations.

Stark Electric Railway Trail (Proposed)

The Stark Electric Railway Trail is a proposed recreational trail that would connect Canton, Louisville and Alliance. According to the Stark County Transportation Plan (Stark County, 2013), the Stark Farmland Trail would be completed in 2030. The Stark County Parks District would own and manage the Stark Electric Railway Trail. As listed in table 4.9.7-1, the NGT Project would cross a future segment of the Stark Electric Railway Trail at MP 18.3 (Easton Street NE in this location) using the bore method. Land use on either side of the trail consists of open land and residential land.

Project-related impacts would be similar to those described for other areas crossed using the bore method. Following construction, vehicular uses of the road and future uses of the trail would not be affected by operations.

Upper Middle Branch Trail (Proposed)

The proposed Upper Middle Branch Trail would become a primary north-south connector within the center of Stark County. It would connect Hartville to Canton at Riverside Park. Much of the route would parallel the Middle Branch of the Nimishillen Creek (Stark County Park District, 2016c). As listed in table 4.9.7-1, the NGT Project would cross the proposed Upper Middle Branch Trail at MP 27.2 (Gans Avenue NE at this location) using the bore method. Land use on either side of the road/future trail consists of open and agricultural land.

Project-related impacts would be similar to those described for other areas crossed using the bore method. Following construction, vehicular uses of the road and future uses of the trail would not be affected by operations.

Summit County Metro Parks

Ohio & Erie Canal Towpath Trail

The Ohio & Erie Canal Towpath Trail is one of Ohio's longest and most popular scenic bikeways. The "towpath," as it is more commonly known, is part of the larger Ohio-to-Erie Trail (Ohio Bikeways, 2016) and the Buckeye Trail system. About 41 miles of the towpath trail are in Summit County and managed by Summit Metro Parks. The trail segment crossed by the NGT Project is on land leased by Metro Parks from PPG Industries (Summit Metro Parks, 2016).

As listed in table 4.9.7-1, the NGT Project would cross the trail at MP 48.2 using the HDD crossing method. Land use adjacent to the trail crossing consists of open water (Tuscarawas River) and forest/woodland. The crossing of the trail is adjacent to and parallel with overhead wires. Project-related impacts would be similar to those described for other areas crossed using the HDD method. Recreational uses of the wildlife area would not be affected by operations. Recreational uses of the trail and river would not be affected by operations.

Medina County Park District

The Medina County Park District owns and manages more than 6,300 acres of land, including 17 open parks and preserves and 12 additional sites set aside for future development (Medina County Park District, 2016a). As listed in table 4.9.7-1, the NGT Project would cross several tracts of Medina County Park District land from MPs 68.8 to 71.3 including the Chippewa Rail Trail, Chippewa Lake Nature Area, Chippewa Inlet Trail, and Buckeye Woods Park/Schleman Nature Preserve. Each of these areas are described individually below.

Chippewa Rail Trail

The Chippewa Rail Trail is a former railroad line that was purchased by the Medina County Park District in 1992. Funds from an ODOT grant were used to develop the Chippewa Rail Trail from Chippewa

Road to Wycliffe Drive in Lafayette Township. The 10-foot-wide by 2.75-mile-long asphalt trail offers hiking, biking, and rollerblading (Medina County Park District, 2016b).

As listed in table 4.9.7-1, the NGT Project would cross the Chippewa Rail Trail at MP 68.8 using the open-cut method. Land use on either side of the trail consists of forest/woodland.

Construction would affect 0.2 acre and operations would affect 0.1 acre at the Chippewa Rail Trail crossing. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Recreational uses of the trail would not be affected by operations. The ATWS associated with the bore crossing would be located such that tree removal would be required starting about 30 feet from each side of the trail.

Chippewa Lake Nature Area

The Chippewa Lake Nature Area is located south of Buckeye Woods Park and on the west and north side of Chippewa Lake. As listed in table 4.9.7-1, the NGT Project would cross the Chippewa Lake Nature Area in three locations between MPs 68.9 and 69.0, MPs 69.6 and 69.7, and MPs 70.3 and 70.6 using the open-cut method. The first crossing between MPs 68.9 and 69.0 includes a parcel that was acquired through a partnership with the Western Reserve Land Conservancy (Western Reserve Land Conservancy, 2016). This parcel is located between the Chippewa Rail Trail and Lake Road. Land use at this crossing consists of agricultural land and forest/woodland. Land use at the second crossing (MPs 69.6 and 69.7) and third crossing (MPs 70.3 and 70.6) consists of open land and forest/woodland.

Construction would affect 15.3 acres and operations would affect 5.7 acres at the Chippewa Lake Nature Area crossings. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Recreational uses of the areas would be allowed to continue; however, long-term impacts associated with tree removal would be visible.

Chippewa Inlet Trail

The 3.95-mile Chippewa Inlet Trail runs north-south along the western edge of Buckeye Woods and connects Buckeye Woods Park and the Chippewa Lake Nature Area (Medina County Park District, 2016c). As listed in table 4.9.7-1, the NGT Project would cross the Chippewa Inlet Trail at MP 70.8 using the open-cut method. Land use on either side of the trail crossing consists of open land and open water (The Inlet).

Construction would affect <0.1 acre and operations would affect less than 0.1 acre at the Chippewa Inlet Trail crossing. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Recreational uses of the trail would not be affected by operations.

Buckeye Woods Park / Schleman Nature Preserve

Buckeye Woods Park is the largest park in the Medina County park system and includes the Schleman Nature Preserve. The preserve, located along the western boundary of Buckeye Woods Park, was donated to the Medina County Park District to remain undeveloped for the enjoyment of nature and wildlife viewing. Recreational trails within the preserve include the 1.5-mile Green Trail and the 1.0-mile Yellow Trail. The Green Trail connects to the Chippewa Inlet Trail in Buckeye Woods Park (Medina County Park District, 2016c).

As listed in table 4.9.7-1, the NGT Project would cross the Schleman Nature Preserve between MPs 71.1 and 71.3 using the HDD method. Land use at this crossing consists of forest/woodland. Project-related impacts would be similar to those described for other areas crossed using the HDD method.

We received several comments from Medina County Park District during scoping that expressed concern over impacts on the Schleman Nature Preserve and a wetland mitigation area, as well as crossing the Chippewa Rail and Chippewa Inlet Trails. More specifically, Medina County Park District noted the long-term impacts of clearing trees within, and north of, the Schleman Nature Preserve; potential impacts to a wetland mitigation project that was constructed and currently maintained by Medina County Park District; steep slopes near the Chippewa Rail Trail crossing that would make it difficult to construct within and repair the slopes; and due to the proximity of the Chippewa Inlet Trail to the Chippewa Inlet (a waterbody), the Park District is opposed to an aboveground crossing of the Inlet waterbody, and has requested the trails remain open during construction.

Regarding the crossing of Schleman Nature Reserve and the private forested land north of the preserve, NEXUS proposes to cross the area using the HDD method to avoid impacts (see table 4.9.7-1). Regarding the wetland mitigation area, NEXUS has rerouted the NGT Project to avoid impacts to the wetland mitigation area. Wetlands and the Inlet waterbody crossings are discussed in sections 4.3 and 4.4. Regarding the crossing of the trails, NEXUS proposes to cross the Chippewa Rail Trail and Chippewa Inlet Trail using the open-cut method. NEXUS has indicated it is reviewing the Park District's request to keep the trails open to the general public during construction.

Because consultations are ongoing, the feasibility of using the bore method at the Chippewa Rail Trail and Chippewa Inlet Trail has yet to be determined, and the trails would be temporarily closed and specific migration measures such as detour have not yet been identified, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period,</u> NEXUS should file with the Secretary an evaluation of the feasibility of crossing the Chippewa Rail Trail and Chippewa Inlet Trail using the bore method. If the bore method is not feasible, NEXUS should file a site-specific alternate crossing plan that identifies the location(s) of a detour, public notification, signage, and consideration of avoiding days of peak usage.**

Lorain County Metro Parks and Sandusky County Park District

North Coast Inland Trail

The 65-mile North Coast Inland Trail is a 12-foot-wide asphalt paved trail that was built over abandoned railroad tracks and extends from Elyria to Toledo. The NGT Project would cross the trail at two locations in Lorain and Sandusky Counties. Lorain County Metro Parks manages a 13-mile segment from Elyria to Kipton (Lorain County Metro Parks, 2016), and Sandusky County Park District manages a 28-mile segment from Bellevue to Elmore (Sandusky County Park District, 2016a).

As listed in table 4.9.7-1, the NGT Project would cross the North Coast Inland Trail twice using the open-cut method. The first crossing at MP 98.1 is located in Lorain County. Land use on either side of the first trail crossing consists of forest/woodland. The second crossing at MP 151.2 is located in Sandusky County and coincides with the Buckeye Trail at this location. Land use on either side of the second trail crossing consists of open land and forest/woodland.

Construction would affect 0.4 acre and operations would affect 0.2 acre. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Recreational uses of the trail would not be affected by operations. The ATWS associated with the bore crossing appear to be located such that tree removal would not be required.

Sandusky County Park District

Creek Bend Farm

Creek Bend Farm is located along a 2-mile stretch of Muddy River in Sandusky County. The 310-acre park includes grass walking trails, food plots, Muddy Creek, a tree farm, farm grounds and buildings, and a pasture. The park also includes the recently constructed Wilson Nature Center. The property, listed on the National Register of Historic Places, was the home of Fran Roush and Bob Roush, former Sandusky County Commissioner (Sandusky County Park District, 2016b). Creek Bend Farm is managed by Sandusky County Park District.

As listed in table 4.9.7-1, the NGT Project would cross the Creek Bend Farm between MPs 153.2 and 153.4 using the open-cut method. Land uses at the crossing include forest/woodland, open land (warm season grasses and a grass trail), and open water (Muddy Creek).

Construction would affect 3.0 acres and operations would affect 1.3 acres of the farm crossing. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. To minimize impacts associated with construction and creation of a new right-of-way, the NGT Project would parallel an existing cleared utility right-of-way at this crossing. Following construction, recreational uses of the grass trail and farm land would be allowed to continue; however, long-term impacts associated with tree removal would be visible.

We received comments from Sandusky County Park District during scoping expressing concern over impacts on the Muddy Creek Corridor, which runs through Creek Bend Farm and is part of ongoing research and monitoring programs, trail use during construction, proposed crossing methods, and an existing deed restriction on Creek Bend Farm. More specifically, Sandusky County Park District requested that NEXUS consider using the bore method to cross the North Coast Inland Trail and Creek Bend Farm to accommodate continued recreational use of the area during construction, and noted that there are development restrictions on Creek Bend Farm that prohibit granting of utility easements.

Regarding the Muddy Creek Corridor crossing, NEXUS would use the flume or dam and pump method to cross Muddy Creek, as described in sections 2.3.2.1. Comments received regarding wetland crossings within Creek Bend Farm have been addressed in section 4.4.3.1. Regarding the use of the bore method to cross North Coast Inland Trail and Creek Bend Farm, NEXUS has indicated it is currently reviewing the feasibility of this request. Regarding utility easement restrictions, NEXUS indicated there are no special interest areas that prohibit pipeline and other utility easements impacted by the NGT Project.

Because consultations are ongoing, the feasibility of using the bore method at the North Coast Inland Trail and Creek Bend Farm has yet to be determined, and the trail would be temporarily closed and specific migration measures such as detour have not yet been identified, **we recommend that:**

- **Prior to the end of the draft EIS comment period, NEXUS should file with the Secretary an evaluation of the feasibility of crossing the North Coast Inland Trail and Creek Bend Farm using the bore method. If the bore method is not feasible, NEXUS should file a site-specific alternate crossing plan that identifies the location(s) of a detour, public notification, signage, and consideration of avoiding days of peak usage.**

Metroparks of the Toledo Area

Farnsworth Metropark and Towpath Trail

Farnsworth Metropark is a narrow park located along the Maumee River that includes the Towpath Trail, a boat launch, fishing, a playground, picnic shelters, and primitive camping sites. The 8.3-mile-long Towpath Trail is part of the Buckeye Trail system and follows the remains of the Miami and Erie Canal. The trail connects Farnsworth, Bend View, and Providence metroparks. Metroparks of the Toledo Area owns and manages Farnsworth Metropark and the Towpath Trail (Metroparks of the Toledo Area, 2016).

As listed in table 4.9.7-1, the NGT Project would cross the park and trail between MPs 181.7 and 181.8 using the HDD method. Land use at this crossing consists of forest/woodland, open land, and commercial/industrial (parking lot). Project-related impacts would be similar to those described for other areas crossed using the HDD method. Recreational uses of the park and trail would not be affected by operations.

City of Green

Ariss Park

Ariss Park is owned and maintained by the City of Green and is located east and west of Interstate Highway 77 on Wise Road. The 80-acre park includes a 0.5-mile limestone walking trail loop, three tackle football fields, two flag football fields, restrooms, a concession stand, and a press box (City of Green, 2016a).

As listed in table 4.9.7-1, the NGT Project would cross Ariss Park in two locations using the open-cut and bore methods. The first crossing is along the southern border of Ariss Park between MPs 35.3 and 35.4 and would be crossed using the open-cut method. Land use at the first crossing consists of a mix of forest/woodland and active agricultural fields. The pipeline would cross approximately 1,200 feet south and southeast of the closest playing field and parking area.

The second crossing between MPs 35.5 and 35.6 includes Interstate Highway 77 and would be crossed using the bore method across the highway and the open-cut method from MP 35.6 to the park boundary. Land use at the second crossing consists of commercial/industrial (Interstate Highway 77), forest/woodland, and open land associated with an existing utility right-of-way.

Construction would affect 4.8 acres and operations would affect 1.5 acres of the park. At the first crossing, Project-related construction and operation impacts would be similar to those described in section

4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas using the open-cut method. At the second crossing, Project-related impacts would be the same as those described for other areas crossed using the bore and open-cut methods. Following construction, these areas would be restored and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Where land use is open and agricultural at the crossing, land uses would be allowed to return to pre-construction conditions.

To minimize impacts associated with construction and creation of a new right-of-way at the second crossing (MPs 35.5 and 35.6), the pipeline would be co-located with an existing electric transmission line right-of-way. However, clearing and tree removal of the Project workspace would still be required during construction, and routine vegetation maintenance of forested areas within the permanent right-of-way would be required during pipeline operations. As a result, the NGT Project would require the conversion of forest land to open land within the permanent right-of-way. Impacts associated with tree clearing and vegetation maintenance would be long term to permanent as well as incremental to and consistent with the existing co-located right-of-way features. Following construction, recreational uses of the park would be allowed to continue; however, long-term impacts associated with tree removal would be visible.

While the bore method would result in avoiding direct impacts on Interstate Highway 77 and park facilities, the construction right-of-way and ATWS at the west end of the bore as currently planned would be located in forest/woodland. To further reduce impacts on forest/woodland, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period,</u> NEXUS should file with the Secretary an evaluation of the feasibility of extending the bore further west to avoid impacting forest/woodland on the west side of Highway 77.**

We received comments from the City of Green during scoping expressing concern over past contamination within the park. Specifically, when the City of Green first developed the park for fields and parking, the Ohio EPA required soil testing for all disturbed areas based on reports of illegal dumping of industrial waste from Akron Rubber in the 1960s. To date, test results have not detected soil contamination. In the event contaminated media is encountered during construction, NEXUS would stop work and contact the appropriate state and federal agencies and would develop a site-specific Hazardous Waste Management Plan in consultation with applicable agencies to address management and disposal of hazardous materials in accordance with applicable regulations.

Greensburg Park

Greensburg Park is owned and maintained by the City of Green and is located south of Greensburg Road on Massillon Road. The 27.9-acre park includes a pavilion, playground, soccer and baseball fields, batting cages, and a concession stand (City of Green, 2016b).

As listed in table 4.9.7-1, the NGT Project would cross the southeastern corner of the park at MP 37.1 using the open-cut method. Land use at this crossing consists of forest/woodland. The construction right-of-way would be located approximately 75 feet southeast of the closest baseball field.

Construction would affect <0.1 acre and operations would affect <0.1 acre of the park. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Recreational uses of the park would be allowed to continue; however, long-term impacts associated with tree removal would be visible.

4.9.7.4 Private and Other

Ohio

North Country National Scenic Trail

The North Country National Scenic Trail (NCNST) crosses seven states, beginning in New York and ending in North Dakota (NPS, 2016). Much of the NCNST in Ohio is followed through roaded rural areas, and on or adjacent to roaded areas (North Country Trail Association, 2016). The trail is administered by the NPS in cooperation with other government agencies, private organizations, and individual landowners. The North Country Trail Association is a neutral non-profit organization that works in partnership with the NPS to build, maintain, and promote the NCNST. Because numerous public agencies and private interests are participating in the NCNST's development, the type of trail, available support facilities, and rules and regulations governing the use of the trail vary from segment to segment (ODNR, 2005).

As listed in table 4.9.7-1, the NGT Project would cross the NCNST at three locations:

- MP 3.5, Buffalo Road would be crossed using the open-cut method;
- MP 190.0, coincides with the Wabash Cannonball Trail and an existing utility right-of-way and is located within the Historic Oak Openings Region, would be crossed using the open-cut method; and
- MP 195.9, coincides with the Wabash Cannonball Trail and is located within the Historic Oak Openings Region, would be crossed using the bore method.

Land uses on either side of the trail at these crossings consists of open land, agricultural land, and forest/woodland.

Construction at MPs 3.5 and 190.0 would affect 0.4 acre and operations would affect 0.1 acre of land. Where land use is forest/woodland (MPs 3.5 and 190.0), clearing and tree removal would be required during construction, and routine vegetation maintenance of forest/woodland within the permanent right-of-way would be required during pipeline operations. Project-related construction and operation impacts at MPs 3.5 and 190.0 would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. To reduce impacts on the scenic trail, the NGT Project would cross an existing electric transmission line right-of-way at MP 190.0.

Project-related impacts at MP 195.5 would be similar to those described for other areas crossed using the bore method. Following construction, recreational uses of the trail would not be affected by operations.

The crossing at MP 3.5, which is Buffalo Road, would require a temporary trail closure due to the use of the open-cut crossing method. NEXUS has indicated that hikers of the NCNST at MP 3.5 could walk along the side of Buffalo Road during construction. While NEXUS would coordinate with local officials to have traffic safety personnel on hand during periods of construction, they have not committed to establishing a detour or posting construction warning signs. Due to safety concerns, we conclude that additional mitigation is necessary. Because the trail at MP 3.5 would be temporarily closed and specific mitigation measures, such as a detour, have not yet been identified, **we recommend that:**

- **<u>Prior to construction of the NGT Project</u>, NEXUS should file with the Secretary a site-specific crossing plan for the NCNST at MP 3.5 that identifies the location(s) of a detour, public notification procedures, signage, and consideration of avoiding days of peak usage. The crossing plan shall be developed in consultation with the landowner and trail managing agencies.**

Statewide Bike Routes

As listed in table 4.9.7-1, the NGT Project would cross the following state-designated bike routes:

- Statewide Bike Route J at MP 8.0, Knox School Road, which would be crossed using the HDD method;
- Statewide Bike Route C at MP 68.3, Ryan Road at this location, which would be crossed by the bore method;
- Statewide Bike Route N at MP 110.2, Main Road, which would be crossed by the HDD method;
- Statewide Bike Routes N-CP at MP 116.3, River Road, which would be crossed by the bore method;
- Statewide Bike Route N-CP at MP 128.8, Billings Road, which would be crossed by the HDD method;
- Statewide Bike Route E at MP 177.3, Pargillis Road, which would be crossed by the bore method; and
- Statewide Trail A at MP 183.1, Noward Road at this location, which would be crossed by the bore method.

Where NEXUS would use the HDD crossing method (Statewide Bike Routes J and N), direct impacts on the bike routes would be avoided and use would be allowed to continue throughout construction. However, recreational users may experience temporary visual and noise impacts associated with construction personnel and equipment and HDD activities. Recreational uses of the bike route would not be affected by operations. Also, because the bike routes would be crossed by the HDD method, tree clearing and vegetation maintenance within the permanent right-of-way on either side of the crossing would not be necessary, thus avoiding permanent visual impacts on recreational users.

Where NEXUS would use the bore crossing method (Statewide Bike Routes C, N-CP, E, and Statewide Trail A), direct impacts on the bike routes would be avoided and use would be allowed to continue throughout construction. However, recreational users may experience temporary visual and noise impacts associated with construction personnel and equipment and bore activities. Recreational users of Bike Routes N-CP may experience temporary and permanent visual and noise impacts from the proposed M&R station (MR05) along Billings Road and the proposed mainline valve (MLV-9) remote blowoff facility. Following construction, recreational uses of the bike routes would continue throughout project operation.

ATWS and access roads associated with the trail crossings appear to be located such that no tree removal would be required adjacent to the trails, with the exception of the crossing at MP 68.3 (State Bike Route C) where minor tree removal appears to be required along Chippewa Road, about 75 feet east of Ryan Road.

Buckeye Trail

The Buckeye Trail was first envisioned in the 1950s as a trail from the Ohio River to Lake Erie. Today, the Buckeye Trail is over 1,444 miles long and forms a loop through 49 of Ohio's 88 counties. The Buckeye Trail is a dedicated, recognized, and protected route that is developed and maintained by the Buckeye Trail Association. Because numerous public agencies and private interests host portions of the trail, ownership varies from segment to segment (Buckeye Trail Association, 2016).

As listed in table 4.9.7-1, the NGT Project would cross the Buckeye Trail in nine locations. Of these crossings, two (MP 34.0 and MP 47.9) are located within the Ohio & Erie Canalway NHA. Land uses at the trail crossings consist of forest/woodland, agricultural land, commercial/industrial, and open land.

Construction would affect 1.0 acre and operations would affect <0.1 acre of land at the MP 33.0 crossing. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Where the trail would be crossed using the HDD or bore methods, NGT Project-related impacts would be similar to those described for other areas crossed using the HDD or bore methods, respectively. ATWS and access roads associated with all but one of the bike route crossings appear to be located primarily in agricultural land with no tree removal required adjacent to the trails. The trail crossing at MP 151.7 appears to include tree removal within the construction workspace, about 25 feet east of the trail. Recreational uses of the trail would not be affected by operations.

Erie Canalway National Heritage Area

In 1996, Congress designated the Ohio & Erie Canalway as an NHA to help preserve the rails, trails, landscapes, towns, and sites along the first 110 miles of the canal. Recreational opportunities within the NHA include birding and hiking along the Ohio & Erie Canal Towpath Trail or riding on the Cuyahoga Valley Scenic Railroad. While the federal government designated this area as a NHA, the Ohio & Erie Canalway NHA is independently managed and operated through local organizations and receives technical assistance from the Cuyahoga Valley National Park (Ohio & Erie Canalway Association, 2016b). The Ohio & Erie Canalway Association is the official management entity for the heritage area (Ohio & Erie Canalway Association, 2009).

As listed in table 4.9.7-1, the NGT Project crosses the Ohio & Erie Canalway NHA at two locations between MPs 33.4 and 35.4 in Stark and Summit Counties, and between MPs 41.5 and 49.6 in Summit County. The first crossing between MPs 33.4R and 35.4R includes the Buckeye Trail and Cuyahoga Valley Scenic Railroad. The second crossing between MPs 41.5 and 49.6 includes Portage Lakes State Park, the Ohio to Erie Trail, the Buckeye Trail/Ohio to Erie Trail, the Ohio & Erie Canalway America's Byway, and the Towpath Trail. Crossing methods and impacts along the NHA would vary and are discussed by individual feature below.

In total, NGT Project construction for all features crossed within the NHA would affect 163.5 acres of forest/woodland, agricultural land, open land, open water, commercial/industrial land, and residential land. In general, construction impacts and mitigation measures that NEXUS would implement would be similar to those described for the land uses discussed in section 4.9.2. Following construction, permanent impacts in the NHA would total 61.5 acres as a result of the conversion of the existing forest/woodland to open land within the permanent right-of-way. These areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Forest/woodland clearing required along the NHA would result in a change to the surrounding visual character.

Cuyahoga Valley Scenic Railroad

The Cuyahoga Valley Scenic Railroad (CVSR) is one of the oldest tourist excursion railways in the country. CVSR operates on 51 miles of track from Independence south through Cuyahoga Valley National Park to Akron and Canton on the Sandyville Line. The CVSR offers regularly scheduled excursions, events and tours throughout the year. The Akron Metro Regional Transit Authority owns the rail line (Ohio & Erie Canalway Association, 2016c).

As listed in table 4.9.7-1, the NGT Project would cross the scenic railroad at MP 34.3 using the bore crossing method. Land use at this crossing consists of open land and forest/woodland. Project-related impacts would be similar to those described for other areas crossed using the bore method. Tree clearing associated with the bore method would primarily be limited to the ATWS needed to complete the crossing.

Singer Lake Bog

The 344-acre Singer Lake Bog is owned and protected by the Cleveland Museum of Natural History in partnership with the City of Green. The preserve includes 50 acres of leatherleaf-bog and a 5-acre kettle lake. Many rare wildlife and plant species are located within the bog.

As listed in table 4.9.7-1, the NGT Project would cross the preserve between MPs 38.8 and 39.0, about 230 feet northeast of the bog within the preserve property; the bog itself would not be crossed. The preserve would be crossed using the open-cut method. Land use at this crossing consists predominantly of agricultural land and smaller areas of forest/woodland associated with the ATWS.

Construction would affect 3.9 acres and operations would affect 1.3 acres at the preserve crossing. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Recreational uses of the preserve would be allowed to continue; however, long-term impacts associated with tree removal would be visible.

An alternative route for the pipeline in this area is under consideration that would avoid impacts on the Singer Lake Bog as discussed in section 3.0.

Comments received during the scoping period expressing concern over impacts to the bog and nearby forested wetlands are addressed in section 4.5.

Chippewa Lake Baptist Church

The Chippewa Lake Baptist Church holds church and prayer services, Sunday school, and various adult and child-oriented services, as well as a youth camp (Chippewa Lake Baptist Church, 2016).

As listed in table 4.9.7-1, the southern half of the parcel owned by Chippewa Lake Baptist Church would be crossed by the NGT Project pipeline at MP 68.0 using the open-cut method. Land use at this crossing consists of open land. The proposed pipeline is located south of church structures and associated parking lot by approximately 620 feet and 515 feet, respectively.

Construction would affect 0.9 acre and operations would affect 0.9 acre at this crossing. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. A sparsely wooded landscaped area is located between the pipeline and the church and would provide some visual screening.

Western Reserve Land Conservancy

The Western Reserve Land Conservancy works with landowners, communities, government agencies, park systems, and other nonprofit organizations to permanently protect natural areas and farmland. Created in 2006 by the merger of eight local land trusts, the Western Reserve Land Conservancy has grown to become the largest land trust in Ohio and one of the largest in the United States. The Land Conservancy's goal is to preserve about 400,000 acres in northern Ohio and to create an interconnected network of protected property throughout the region. About 200,000 acres have been preserved by park systems, other government agencies, and land trusts such as the Land Conservancy (Western Reserve Land Conservancy, 2016).

As listed in table 4.9.7-1, the NGT Project would cross privately owned lands between MPs 83.9 and 84.4 and MPs 95.4 and 95.6 using the open-cut method. Land use at the first crossing between MPs 83.9 and 84.4 is privately owned and land use consists of agricultural land, forest/woodland, and open land. The second crossing between MPs 95.4 and MP 95.6 is a private preserve and land use consists of agricultural land and forest/woodland.

Construction would affect 11.9 acres and operations would affect 4.5 acres at the crossing. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Following construction, land uses would be allowed to continue; however, long-term impacts associated with tree removal would be visible.

Amherst-Wellington Connector

The Amherst-Wellington Connector references the abandoned Lorain and West Virginia Railroad that connected the Wheeling and Lake Erie Railroad at Wellington, Ohio and the steel plants at Lorain on Lake Erie. Shipments of coal and steel started in 1906. When the railroad was purchased by Norfolk and Western in 1963, the route was used more as a connecter than for major product shipment. The 1969 flood severely damaged the track near Wellington, and the railroad was formally abandoned in 1979 (Abandoned Rails, 2016). Today, the Lake Shore Railway Association owns 20 miles of the abandoned railroad and manages a 6-mile segment, about 1.7 miles south of the NGT Project, as a tourist railroad between the City of Wellington and Hughes Road (Lake Shore Railway Association, 2016).

As listed in table 4.9.7-1, the NGT Project would cross an abandoned segment of the Amherst-Wellington Connector at MP 96.3 using the bore method. At this crossing, the railroad is inactive and abandoned. Land use on either side of the railroad crossing consists of forest/woodland and open land.

Project-related impacts would be similar to those described for other areas crossed using the bore method. Impacts associated with tree clearing would be long-term to permanent.

Erie County Conservation League

The Erie County Conservation League was founded in 1948 with the purpose of conserving soil, water, air, and wildlife; improving of hunting, fishing and outdoor recreational activities; and supporting firearms ownership and teaching safe, responsible use of firearms. The facilities include trap and skeet shooting ranges, an archery range, and several rifle shooting ranges of various distances (Erie County Conservation League, 2016). The Erie County Conservation League facilities are privately owned and managed.

As listed in table 4.9.7-1, the NGT Project would cross the parcel between MPs 118.5 and 118.8 using the open-cut method. Land use at this crossing consists of agricultural land, open land, and forest/woodland.

Construction would affect 4.6 acres and operations would affect 1.7 acres of land. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Recreational uses of the facilities would be allowed to continue; however, long-term impacts associated with tree removal would be visible.

St. John's United Church of Christ Milan Ohio Inc.

The St. John's United Church of Christ, Milan, Ohio, Inc. was established in 1865 and incorporated in 1998. The church property includes the church, cemetery, parking lot, a park with tennis, volleyball, and shuffleboard courts, a picnic shelter, and agricultural land (St. John's United Church of Christ, 2016).

As listed in table 4.9.7-1, the NGT Project would cross the southwestern corner of the church parcel at MP 122.0 using the open-cut method. The proposed pipeline is located southwest of church structures and associated parking lot by approximately 1,180 feet and 1,080 feet, respectively. Land use at the crossing is agricultural.

Construction would affect 0.5 acre and operations would affect 0.1 acre at this crossing. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*.

Bowling Green-Perrysburg Connector (Proposed)

The Bowling Green-Perrysburg Connector is a proposed non-motorized trail facility along Hull Prairie Road between River Road south and Hannah Road, that travels east to Brim Road, and then south to the Bowling Green bike network. Trail construction is scheduled between 2016 and 2025 (Toledo Metropolitan Area Council of Governments, 2016).

As listed in table 4.9.7-1, the NGT Project would cross the proposed Bowling Green-Perrysburg Connector trail at 178.1 (along Hull Prairie Road) using the bore method. Land use on either side of the road crossing consists of agricultural land and open land.

Project-related impacts would be similar to those described for other areas crossed using the bore method. Following construction, vehicular uses of the road and future uses of the trail would not be affected by operations.

Riverby Hills Golf Club

The Riverby Hills Golf Course in Bowling Green, Ohio is a privately run 18-hole golf course established in 1925 (Golf Link, 2016).

As listed in table 4.9.7-1, the NGT Project would cross the Riverby Hills Golf Course at MP 180.8 using the open-cut method. Land use at this crossing consists of open land and forest/woodland.

Construction would affect 0.6 acre and operations would affect 0.1 acre of land. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Following construction, recreational uses of the golf course would be allowed to continue; however, long-term impacts associated with tree removal adjacent to the southern boundary would be visible.

Wabash Cannonball Trail

The Wabash Cannonball Trail is one of Ohio's longest rail-trails, covering 63 miles in Northwest Ohio. The multi-use recreational trail provides non-motorized access to hikers, bikers, equestrians, and cross-country skiers. The trail is owned by several partners within Fulton, Henry, Lucas, and Williams Counties and administered by the Northwestern Ohio Rails-to-Trails Association, Inc. in the areas crossed by the NGT Project. The land-owning partners of the Wabash Cannonball Trail are Lucas County, the city of Maumee, Northwestern Ohio Rails-to-Trails Association, Inc., the Metropark District of the Toledo Area, the city of Wauseon, and the village of Whitehouse. Portions of the trail are also certified segments of the North Country National Scenic Trail.

As listed in table 4.9.7-1, the NGT Project would cross the Wabash Cannonball Trail in two locations at MP 190.0 and MP 195.9 using the open-cut method. The Wabash Cannonball Trail coincides with the North Country National Scenic Trail at these two locations. The first trail crossing would occur at MP 190.0 where the pipeline crosses an existing electric transmission line. The second trail crossing would occur at MP 195.9 where the trail is located on an old railroad bed within a linear forest/woodland surrounded by agricultural land. The crossings are located in the Historic Oak Openings Region (see section 4.5.1.1). Land uses adjacent to these crossings consist of forest/woodland, open land, and agricultural land.

Project-related impacts would be similar to those described above for the North Country National Scenic Trail.

Highland Memory Gardens Cemetery

Highland Memory Gardens Cemetery is a privately owned cemetery located adjacent to the Maumee Valley Scenic Byway (South River Road).

As listed in table 4.9.7-1, the NGT Project would cross the southwest corner of the cemetery at MP 181.8 using the HDD method. The pipeline would not cross burial plots. Additionally, the pipeline would be installed below the depth typically required for burial plots (about 6 feet). Land use at this crossing consists of open land.

Project-related impacts would be similar to those described for other areas crossed using the HDD method.

Michigan

Community Free Will Baptist Church

Community Free Will Baptist Church was founded in 1987 and has been at the current location since 2000 (Community Free Will Baptist Church, 2016).

As listed in table 4.9.7-1, the Community Free Will Baptist Church be crossed by the NGT Project pipeline at MP 249.1 using the open-cut method. The proposed pipeline is located in an open field east of church and associated parking lot by approximately 750 feet and 630 feet, respectively. Land use at this crossing consists of open land.

Construction would affect 0.8 acre and operations would affect 0.4 acre of land. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*.

South Hydro Park

The 2.8-acre South Hydro Park is located on Textile Road east of the Ford Lake Dam and south of the Huron River in Washtenaw County. The undeveloped park offers opportunities for fishing and canoe/kayak launching.

As listed in table 4.9.7-1, the NGT Project would cross the park at MP 250.3 using the open-cut method. The pipeline would not cross South Hydro Park, however, a temporary staging area is partially within an open area of the park near MP 250.3. Land use within the temporary staging area is agricultural.

Construction would affect 0.4 acre and operations would not affect the property. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. Recreational use of the temporary staging area would be allowed to continue during construction. After construction, the staging area would be seeded and allowed to revegetate with no further maintenance or disturbance associated with the pipeline. The ATWS associated with the staging area appears to be located such that minor tree removal would be required adjacent to the existing access road, outside the park boundary.

North Hydro Park

The 46.6-acre North Hydro Park is located east of the Ford Lake Dam and on the north shores of the Huron River in Washtenaw County. The park was recently renovated and includes a boardwalk, paved trails, interpretive signage, a canoe/kayak launch, fishing, a pavilion, several picnic areas, and natural features (Ypsilanti Township Parks and Recreation, 2016).

As listed in table 4.9.7-1, the NGT Project would cross the park between MPs 250.9 and 251.1 using the HDD method. Land use at this crossing consists of forest/woodland, open land, and open water (Huron River). Project-related impacts would be similar to those described for other areas crossed using the HDD method. Following construction, recreational uses of the park would be allowed to continue. The ATWS associated with the HDD crossing appears to be located such that tree removal would be required outside the park boundary, east of the river.

The Ponds at Lakeshore Disc Golf Course

The Ponds at Lakeshore Disc Golf Course in Ypsilanti, Michigan is a privately run, 30-hole disc golf course established in 2009 on a former ball golf course and is open to the public.

As listed in table 4.9.7-1, the NGT Project would cross the disc golf course between MPs 251.2 and 251.4 using the open-cut method. Land use at this crossing consists of open land with interspersed trees, and forest/woodland along the southern property boundary.

Construction would affect 3.1 acres and operations would affect 1.1 acres of land. Project-related construction and operation impacts would be similar to those described in section 4.9.2, depending on the specific land use type affected throughout the area, and to those described for other areas crossed using the open-cut method. Following construction, these areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in accordance with NEXUS' *E&SCP*. The ATWS associated with the crossing appears to avoid tree clearing within the forest/woodland. Recreational uses of the facility would be allowed to continue; however, long-term impacts associated with tree removal would be visible.

4.9.7.5 Conclusion

In general, recreation areas and special use areas crossed by the NGT Project are expected to experience some temporary impacts during construction, such as clearing of trees, noise, dust, and limited access, which may prevent or curtail recreational activities. Users of these areas, such as hikers, wildlife enthusiasts, sightseers, bikers, and other recreationalists, may be prevented from use of the immediate area around the temporary right-of-way during construction. Nearby recreation areas and special use areas are expected to experience similar temporary impacts as areas are crossed, but as the distance from the construction work area increases, these impacts would generally decrease.

NEXUS would continue to consult with the appropriate federal, state, and managing agencies to develop and implement measures to mitigate and reduce impacts on these areas as needed. Direct access to some entry points within these areas may be temporarily limited or restricted due to increased traffic or road closures during construction. For further discussion of transportation impacts and mitigation measures, refer to section 4.9.4.

4.9.8 Coastal Zone Management Areas

In 1972, Congress passed the Coastal Zone Management Act to "preserve, protect, develop, and where possible, to restore or enhance, the resources of the nation's coastal zone for this and succeeding generations" and to "encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone" (16 USC 1452, Section 303 (1) and (2)).

Section 307 (c)(3)(A) of the Coastal Zone Management Act states that "any applicant for a required federal license or permit to conduct an activity, in or outside the coastal zone, affecting any land or water use or natural resource of the coastal zone of that state shall provide a certification that the proposed activity complies with the enforceable policies of the state's approved program and that such activity would be conducted in a manner consistent with the program." In order to participate in the Coastal Zone Management Program, a state is required to prepare a program management plan for approval by the National Oceanic and Atmospheric Administration's (NOAA) Office of Ocean and Coastal Resource Management (OCRM). Once the OCRM has approved a state's plan, including its enforceable program policies, the state program gains "federal consistency" jurisdiction. This means that any federal action (e.g., a project requiring federally issued licenses or permits) that takes place within the state's coastal zone must be found to be consistent with state coastal policies before the action can take place.

NGT Project

Portions of the NGT Project are subject to a federal Coastal Zone Consistency Review because it would: 1) involve activities within the coastal zone of Ohio; and 2) require several federal permits and approvals (see permits listed in table 1.5-1). The NGT Project would not cross or be located within 0.25 mile of a designated coastal zone in Michigan. Ohio has approved CZMPs administered by the ODNR. A description of the Ohio program, the applicable NGT Project activities, and information provided by NEXUS regarding consistency of the NGT Project with state policies is provided below.

The ODNR, through the Office of Coastal Management, is the lead agency for administering the Ohio Coastal Management Program (OCMP), as approved by NOAA in 1997 and updated through subsequent filings. This program provides ODNR with the authority to review federal projects affecting the Ohio coast to ensure consistency with state policies.

The Lake Erie CZMA includes portions of nine counties bordering Lake Erie and its tributaries. The NGT Project pipeline crosses about 9,342 feet (1.8 miles) of the Lake Erie CZMA that includes the Sandusky River.

NEXUS plans to cross the Sandusky River using the HDD method, from MP 145.7 to 146.1, to avoid impacts on aquatic resources. NEXUS filed its Federal Consistency review with ODNR on March 17, 2016. To ensure the NGT Project is consistent with the Coastal Zone Management Act, **we recommend that:**

- **<u>Prior to construction of the NGT Project</u>, NEXUS should file with the Secretary documentation of concurrence from the ODNR that the NGT Project is consistent with the Coastal Zone Management Act.**

TEAL Project

The TEAL Project would not cross or be located within 0.25 mile of a designated coastal zone.

4.9.9 Contaminated Sites

NGT Project

Based on database research, NEXUS identified 112 sites listed as potential or known sources of contamination within 0.25 mile of the NGT Project pipeline and aboveground facilities. The extent and magnitude of contamination at several of the sites have not been determined, as discussed below.

One of the sites, the former Willow Run Powertrain Plant, would be crossed between MPs 253.3 and 254.1 using the HDD method. The plant was originally constructed by Henry Ford for the production of B-24 bombers during World War II. After World War II the plant was used to produce automobiles, C-119 and C-123 military aircraft, automobile transmissions as well as the machining, cleaning, and painting of metal parts and products. General Motors renovated the main building in 2005 but ceased operations at the plant in December 2010. In March 2011, Revitalizing Auto Communities Environmental Response (RACER) Trust acquired the property as part of a national program to rehabilitate former General Motors plants and has since been responsible for maintaining and rehabilitating the property. The site is being administered under the EPA's Resource Conservation Recovery Act and overseen by the MDEQ.

There have been numerous environmental assessments of the Willow Run site during the past 30 years and a number of concerns have been identified (University of Michigan, 2013):

- Oil accumulation underneath portions of the main plant building;
- Presence of light non-aqueous phase liquid containing low levels of polychlorinated biphenyls (PCB) and some metals in soil around the site;
- Chlorinated volatile organic compounds (VOC) were found on-site, particularly in areas where parts cleaning units once operated; however, recent surveys suggest that the levels of these compounds are low and are not detected in perimeter monitoring wells; and
- Historic soil and groundwater suggest the presence of benzene, aluminum, mercury, and others pollutants.

Based on NEXUS' preliminary evaluation of readily available analytical data, and conversations with RACER representatives, NEXUS would now avoid the site by installing the pipeline using the HDD method. Extra workspace areas associated with HDD entry and exit points would be located outside the known parameters of the RACER site.

In addition to the RACER site, NEXUS identified 11 other sites where file reviews were recommended to assess the potential for existing contamination on soil and groundwater resources that could impact the NGT Project. Because information regarding the extent and degree of contamination is pending, in order to determine if project construction and operation could encounter contamination, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period,</u> NEXUS should file with the Secretary results of file reviews for the 11 other sites identified by NEXUS and site-specific plans to properly manage any contaminated soil or groundwater in compliance with applicable regulations, if necessary.**

If needed, NEXUS would develop a site-specific Hazardous Waste Management Plan, which would include measures that would be implemented in the event contaminated media is encountered during construction.

We received comments regarding illegal dumping near the intersection of Grill Road and Hametown Road, about 0.3 mile north of the pipeline near MP 51.2. Specifically, landowners were concerned that construction of the NGT Project would impact buried barrels of unknown contaminants that may be leaching and impacting drinking water supplies on nearby farms. **We recommend that:**

- **<u>Prior to construction of the NGT Project,</u> NEXUS should coordinate with the landowner(s) near MP 51.2, where the dumping of unknown contaminants occurred, and file with the Secretary a site-specific plan to properly manage any contaminated soil or groundwater in compliance with applicable regulations or demonstrate that a site-specific plan is not needed.**

Section 4.9.7.3 discusses comments received from the City of Green expressing concern over past dumping at Ariss Park.

TEAL Project

Based on field and database research, there are no properties within 0.25 mile of the TEAL Project facilities that are listed as potential or known sources of contamination.

4.9.10 Visual Resources

Visual resources refers to the composite of basic terrain features, geologic features, hydrologic features, vegetation patterns, and anthropogenic features that influence the visual appeal of an area for residents or visitors. The visual quality or character of the landscape is the baseline against which the visual impacts of a proposed action or its alternatives is measured. Existing visual character is used as a point of reference to determine if a proposed project would be compatible or inconsistent with the exiting visual character of an area.

The proposed Projects would cross federal, state-, county-, and privately owned lands in Ohio and Michigan. The Projects would cross federal lands that include one designated national scenic trail administered by the NPS and the American Byway administered by the FHWA. The Projects would also cross a national scenic trail administered by the NPS.

Visual impacts to non-designated areas are discussed in section 4.9.7.

4.9.10.1 Pipeline

Visual resources within the Projects are a function of geology, climate, and historical processes, and include topographic relief, vegetation, water, wildlife, land use, and human uses and development. Portions of the NGT Project and all of the TEAL Project would be co-located or adjacent to existing pipeline and/or utility rights-of-way. As a result, the visual resources along those portions of the Project routes have been previously affected by other similar activities.

The width of the construction right-of-way would vary depending on the size of the pipe, the number of pipes to be installed, and the topography and land use type of the area. Construction right-of-way widths would vary from 75 to 145 feet. NEXUS and Texas Eastern would maintain 50-foot-wide permanent rights-of-way during operations.

Visual impacts associated with the construction right-of-way and extra workspaces include the removal of existing vegetation and the exposure of bare soils, as well as earthwork and grading scars associated with heavy equipment tracks, trenching, blasting (if required), and machinery and tool storage. Other visual effects could result from the removal of large individual trees that have intrinsic aesthetic value, the removal or alteration of vegetation that may currently provide a visual barrier, or landform changes that introduce contrasts in visual scale, spatial characteristics, form, line, color, or texture.

Visual impacts would be greatest where the pipeline route parallels or crosses roads and the construction right-of-way may be seen by passing motorists, from residences where vegetation used for visual screening or for ornamental value is removed, and where the pipeline is routed through forested areas. The duration of visual impacts would depend on the type of vegetation that is cleared or altered and would be shortest in open areas where the re-establishment of vegetation following construction would be relatively rapid (generally less than 5 years). The duration would be greater in forested land, which would take many years or decades to regenerate. The greatest potential visual impact would result from the removal of large specimen trees, which would take longer than other vegetation to regenerate and would be prevented from re-establishing within the permanent right-of-way.

The area crossed by the pipelines is predominately agricultural land and forested lands. While trees cleared within temporary construction workspace would be allowed to regenerate to pre-construction conditions following construction, impacts on forest resources within these areas would last for many years. The forested setting would help to minimize the number of visual receptors along the forested portion of the right-of-way. The visual effect of the pipeline would also be mitigated by the HDD crossings, where surface impacts and impacts on visual resources between the entry and exit holes would be avoided. After construction, all disturbed areas would be restored, and areas outside of the permanent right-of-way would be returned to pre-construction conditions in compliance with federal, state, and local permits; landowner agreements; and NEXUS' and Texas Eastern's easement requirements, with the exception of aboveground facility sites.

4.9.10.2 Aboveground Facilities

A total of 5 new compressor stations (with associated communication towers), 5 new meter stations, 17 mainline valves, and 6 launcher/receiver facilities would be constructed for the NGT and TEAL Projects. Adjacent residents and motorists would be able to view construction equipment and personnel during the construction phase, as well as view some of the facilities while in operation.

NEXUS would construct four new compressor stations for the NGT Project. Texas Eastern would construct one new compressor station and upgrade an existing station. Compressor station sites typically include several buildings, piping, meter stations, mainline valves, exhaust stacks, and pig launcher/receiver facilities. Each site would be enclosed by slatted chain-link fencing. Comments received during scoping identified concerns regarding the visual impacts associated with the construction and operation of compressor stations.

Construction of NEXUS' Hanoverton Compressor Station (CS1) would impact a total of 93.3 acres of mainly open and agricultural land during construction. A total of and 27.7 acres would be used during operations. There are several residences west of the site, including the community of Kensington; however, the site is well-screened by forested land between these residences and the compressor station, which would limit visual impacts on residents. The closest residence is located 360 feet east of the station. Slatted fencing would also be installed around the perimeter of the station, further reducing visual impacts.

NEXUS' Wadsworth Compressor Station (CS2) would be located in open and agricultural land. A total of 60.0 acres would be affected during construction and 22.0 acres during operations. Vegetation would screen the southern and eastern sides of compressor station from view. Occupants of the homes adjacent to the western side of the station (along Guilford Road) may be able to view construction activities as well as several of the structures and fencing at the compressor station. A communication tower would also be constructed at the Wadsworth Compressor Station. These factors would represent a minor, but permanent impact on the viewshed of the adjacent residences and users of Guilford Road.

NEXUS' Clyde Compressor Station (CS3) would be constructed on 59.6 acres of open and agricultural land, with 37.2 acres impacted by operations. The site is open with no vegetative buffer. The nearest residence is located 340 feet south of the station and could potentially experience some visual impacts. During construction, residents would likely be able to view construction vehicles and workers. Though NEXUS would install slatted fencing, the compressor station and associated communication tower would be visible during operations from Interstate 80/90, N County Road 294, and State Highway 101 East. These impacts are anticipated to be a minor but permanent.

Construction of NEXUS' Waterville Compressor Station (CS4) would take place primarily within agricultural lands, but also affecting a small amount of open land and industrial/commercial land. A total of 37.3 acres would be impacted during construction, with 33.0 acres permanently impacted during operations. The nearest residence is located approximately 600 feet east of the station, across U.S. Highway 24 and could potentially experience some visual impacts. During construction, residents would likely be able to view construction vehicles and workers. Though NEXUS would install slatted fencing, the compressor station and associated communication tower would be visible during operations and would also be visible from U.S. Highway 24. As such, these impacts are anticipated to be a minor but permanent.

NEXUS has designed aboveground facilities to preserve existing tree buffers within purchased parcels to the extent practicable. To further mitigate visual impacts, NEXUS would install perimeter fences, directionally controlled lighting, and slatted fencing at its compressor station sites. Several residents expressed concern about the visual impacts of the Hanoverton, Wadsworth, and Waterville Compressor Stations and a review of the sites indicate there is a direct line of sight between a number of homes and each of the compressor stations; therefore, **we recommend that:**

- **<u>Prior to the end of the draft EIS comment period</u>, NEXUS should file with the Secretary visual screening plans developed for the Hanoverton, Wadsworth, and Waterville Compressor Stations that would provide screening to nearby residences from the stations.**

Texas Eastern's Salineville Compressor Station would be constructed on 41.0 acres of open land, agricultural land, and industrial/commercial land. A total of 11.5 acres would be impacted by operations. The site is open with no vegetative buffer. The nearest residence is located 470 feet north of the station and could potentially experience some visual impacts. During construction, residents would likely be able to view construction vehicles and workers. Texas Eastern would install colored slatted fencing and plant vegetative screening if needed. As such, visual impacts are anticipated to be a minor but permanent.

The Colerain Compressor Station is an existing aboveground facility that would be upgraded as a part of the TEAL Project. A total of 62.0 acres would be used during construction, but no additional area would be added to the existing footprint during operations. No further visual impacts are anticipated.

The NGT Project would require construction of five new M&R stations. These facilities are primarily located in agricultural land and would affect 7.8 to 10.3 acres during construction. During operations, M&R stations would affect 1.0 to 5.2 acres. Of these meter stations, the Kensington M&R Station and the Texas Eastern M&R Receipt Station would be built adjacent to the existing Kensington Processing Plant, with existing disturbance to the local viewshed. Visual impacts resulting from the construction of the new M&R stations is expected to be minimal but permanent. Similarly, the Willow Run M&R station would be constructed adjacent to the existing DTE Gas Company facility and a rail yard. Due to the existing visual impact to this area, visual impacts resulting from the construction of the new M&R station are expected to be minimal but permanent. The TGP M&R Station would be constructed in an agricultural field. Some existing vegetative buffer would be left in place and there are relatively few residences in the area. As such, visual impacts from construction of the TGP M&R Station would be minor but permanent. The Dominion East Ohio M&R Station would be constructed in an agricultural field with no existing vegetation buffer. The station would be visible from the I-80/I-90 corridor located 300 feet to the south. The nearest residence would be located 200 feet to the west. Though slatted fencing would be installed, residents and passing motorists could potentially experience some visual impacts. These impacts would be moderate and permanent.

Pig launchers and pig receivers would be constructed within M&R site boundaries. Visual impacts resulting from construction and operation of these facilities are included with the M&R discussions above.

A total of 17 MLVs would be constructed for the NGT Project. Impacts on visual resources resulting from the construction and operation of the MLVs would be minimal as each site is small (typically less than 0.1 acre) and would be operated within the permanent right-of-way or within an aboveground facility (e.g., compressor or meter station site). Mainline valves along the permanent right-of-way would be painted to blend in with the surrounding landscape and if needed, vegetative buffers would be planted. As such, visual impacts are expected to be minor but permanent.

The TEAL Project would require modifications of a regulator site and a launcher/receiver site. No land use modifications would be made and no additional visual impacts would be created. Additionally, one launcher/receiver site would be removed and the landscape restored, reducing the visual impact in the area.

4.9.10.3 Pipe/Contractor Yards and Staging Areas

With the exception of 1.1 acre, pipe/contractor yards and staging areas would be located on lands classified as agricultural, open, and industrial/commercial. With the possible exception of minor grading activities and surfacing (e.g., gravelling), soils at the pipe/contractor yards and staging areas would not be disturbed. As a result, there would be no permanent impacts on visual resources associated with the use of these sites. The only impacts at the sites would be temporary when trailers, vehicles, pipe, and other construction-related materials are stored at these sites during construction.

4.9.10.4 Access Roads

The NGT Project would require use of 115 roads for access to the pipeline rights-of-way and associated facilities during construction, of which 26 would be for access to the permanent right-of-way and aboveground facilities during operation. Of the access roads, 68 are existing roads that are currently paved, graveled, or have dirt surfaces; would require minor improvements; and would not have a significant impact on visual resources. Alternatively, 51 temporary access roads and 22 permanent access roads would be newly constructed. Construction of these roads would require some tree clearing in addition to grading and graveling, impacting 68.9 acres. After construction, temporary access roads would be returned to pre-construction conditions unless another arrangement is mutually agreed upon with the landowner. The permanent access roads retained for operation would result in the creation of 4.0 acres of roadway.

Similarly, the TEAL Project would require use of six roads for access to the pipeline rights-of-way and associated facilities during construction, of which two would be for maintained for access to the permanent right-of-way and aboveground facilities during operation. These are existing roads that are currently paved, graveled, or have dirt surfaces; would require minor improvements; and would not have a significant impact on visual resources. Modification of these roads would require some tree clearing in addition to grading and graveling, impacting 4.9 acres. The permanent access roads retained for operation would also result in the creation of 4.9 acres of roadway.

4.9.10.5 Agricultural Lands and Open Land

About 44 percent of the NGT Project and 100 percent of the TEAL Project would be collocated or adjacent to existing rights-of-way for pipelines, electric transmission lines, or railroads. Approximately 89 percent of the NGT and TEAL Projects would affect agricultural and open land uses. Visual impacts associated with pipeline construction in agricultural and open land areas along the route would be temporary and would result from the presence of construction equipment and post-construction visual scarring. In agricultural land, any visual scarring would remain within the right-of-way until new crops are planted. After replanting crops, any remaining visual impact from pipeline construction would be minor, but visual evidence of construction may last for a few years.

4.9.10.6 Forested Land

Approximately 8 percent of The NGT and TEAL Projects would affect forested land during construction. Trees within the construction right-of-way would be cleared but allowed to re-grow following construction; however, larger trees likely would not grow to maturity within the construction right-of-way for many decades. The permanent right-of-way would be periodically mowed thereby preventing regeneration of trees for the life of the NGT and TEAL Projects. Removal of trees along both the permanent and construction rights-of-way in otherwise forested areas would leave a corridor that would persist for the duration of pipeline operation and that would be visible from some vantage points in the NGT and TEAL Projects area. As identified by scoping comments, the removal of trees related to pipeline construction may result in visual impacts to residences from adjacent non-pipeline sources (e.g., such as roads, buildings). Overall, the visual impacts related to the construction right-of-way would be long term, but minor and localized, while the visual impact related to the permanent right-of-way would be permanent, but relatively minor and localized.

4.9.10.7 Scenic Byways

At MP 47.9, the NGT Project would cross the Ohio & Erie Canalway America's Byway, which is administered by the DOT Federal Highway Administration. This Scenic Byway is discussed in further detail in section 4.9.7.1. Land use on either side of the byway crossing consists of open land, agricultural land, and residential land. NEXUS proposes to use the HDD crossing method at this location. During construction, byway travelers may experience temporary visual impacts associated with personnel, equipment, and HDD activities. As a result of using the HDD crossing method, tree clearing and vegetation maintenance within the permanent right-of-way on either side of the crossing would not be necessary, thus avoiding permanent visual impacts on recreational uses of the byway.

The NGT Project would cross the Ohio-designated Lincoln Highway Historic Byway at MP 2.0. This ODOT-managed byway is discussed in more detail in section 4.9.7.2. The byway would be crossed using the bore method. At this crossing, the byway is a two-lane divided paved road and land use on either side consists of open land and open water. Direct impacts on the byway would be avoided through use of the bore method and traffic would continue during construction; however, scenic travelers may experience temporary visual impacts associated with construction personnel and equipment, as well as bore activities. Following construction, recreational uses of the byway would not be affected by operations.

The NGT Project would also cross the Maumee Valley Scenic Byway in two locations: MPs 181.2 and 181.8. Both crossings of the byway would be completed using the HDD crossing method. Direct impacts would be avoided; however, scenic travelers may experience temporary visual and noise impacts associated with construction personnel and equipment, as well as HDD activities. Also, as a result of the HDD method, tree clearing and vegetation maintenance within the permanent right-of-way on either side of the crossing would not be necessary, thus avoiding permanent visual impacts on scenic travelers. Recreational uses of the byway would not be affected by operations. The access road associated with the HDD crossing would require minor and temporary tree removal along West River Road.

4.9.10.8 North Country National Scenic Trail

The NGT Project would cross the NCNST at three locations. The crossings at MP 3.5 and 190.0 would be constructed using the open-cut method, and the crossing at MP 195.9 would be constructed using the bore method. Visual impacts associated with pipeline construction at these crossing locations would be temporary and would include construction vehicles and workers. The crossing at MP 190 would affect open and agricultural land uses, resulting in minor visual impacts after construction, until the right-of-way is revegetated to pre-construction conditions. The crossings at MPs 3.5 and 190.0 would occur through forested land use. Clearing and tree removal would be required during construction, and routine vegetation maintenance of forest/woodland within the permanent right-of-way would be required during pipeline operations. This would result in moderate and permanent visual impacts. To reduce impacts on the scenic trail, the NGT Project would cross an existing electric transmission line right-of-way at MP 190.0.

4.9.10.9 Maumee State Scenic River

The Maumee State Scenic River is located in Henry, Wood, and Lucas Counties. Ohio’s Scenic Rivers Act provides three categories for river classification: wild, scenic, and recreational (ODNR Division of Watercraft, 2016). The ODNR Division of Watercraft administers the state scenic rivers program. The NGT Project would cross the Maumee State Scenic River at two locations between MPs 181.4 and 181.8 using the HDD method. The Maumee State Scenic River is designated as a "recreational river” at this crossing. A recreational river includes those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past (State of Ohio, 2016). The HDD entry and exit points would be located in agricultural areas on either side of the river. Impacts to scenic travelers would be temporary. Also, as a result of the HDD method, tree clearing and vegetation maintenance within the permanent right-of-way on either side of the crossing would not be necessary, thus avoiding permanent visual impacts on scenic travelers.

4.9.10.10 Cuyahoga Valley Scenic Railroad

The Cuyahoga Valley Scenic Railroad (CVSR) operates on 51 miles of track from Independence south through Cuyahoga Valley National Park to Akron and Canton on the Sandyville Line. The NGT Project would cross the scenic railroad at MP 34.3 using the bore crossing method. Land use at this crossing consists of open land and forest/woodland. Tree clearing associated with the bore method would primarily be limited to the ATWS needed to complete the crossing. Direct impacts on the railroad would be avoided through use of the bore method and use would continue during construction; however, rail users may experience temporary visual impacts associated with construction personnel and equipment, as well as bore activities.

4.9.10.11 The Abbott Page House

The Abbott-Page House is located in Huron, Ohio. This historic place is located approximately 330 feet south of the proposed permanent right-of-way for the NGT Project. The Abbott-Page House is currently under NRHP review for an amendment to expand the site from a listed property to a historic district. Fries' Landing was located on the Page property along the Huron River in the 1870s and was the center of shipbuilding and shipping local goods to markets via the Milan Canal. NEXUS proposes to install the NGT pipeline via an HDD that would extend from the west side of Mudbrook Road to the east side of the Huron River. As a result of the HDD method, tree clearing and vegetation maintenance within the permanent right-of-way on either side of the crossing would not be necessary, thus avoiding permanent visual impacts on scenic resources associated with the Abbott Page House.

4.9.10.12 Conclusion

Based on our review of the potential impacts on visual resources as described in this section, we conclude that visual impacts would be greatest where the pipeline route parallels or crosses roads and the construction right-of-way may be seen by passing motorists, from residences where vegetation used for visual screening or for ornamental value is removed, and where the pipeline is routed through forested areas. The duration of visual impacts would depend on the type of vegetation cleared or altered and would be shortest in open areas where the re-establishment of vegetation following construction would be relatively rapid (i.e., generally less than 5 years). The duration would be greater in forested land, which would take many years or decades to regenerate. The greatest potential visual impact would result from the removal of large specimen trees, which would take longer than other vegetation to regenerate and would be prevented from re-establishing within the permanent right-of-way. Construction and operation of aboveground facilities would result in adjacent residents and motorists impacted by a view of construction equipment and personnel during the construction phase, as well as view some of the facilities while in operation.

NEXUS proposes to use the HDD crossing method for the America's Byway, Maumee Valley Scenic Byway, Maumee State Scenic River, and Abbott Page House. During construction, users may experience temporary visual impacts associated with personnel, equipment, and HDD activities. As a result of using the HDD crossing method, tree clearing and vegetation maintenance within the permanent right-of-way at these crossings would not be necessary, thus avoiding permanent visual impacts on recreational uses. The Lincoln Highway Historic Byway, Cuyahoga Valley Scenic Railroad, and NCNST would be crossed using the bore method. Use of the features would continue during construction; however, scenic travelers may experience temporary visual impacts associated with construction personnel and equipment. Depending upon land use adjacent to the crossings, tree clearing in the permanent right-of-way may result in minor but permanent visual impacts.

4.10 SOCIOECONOMICS

Several socioeconomic effects could occur in the region of influence during construction of the NGT and TEAL Projects. These include fluctuations of population levels or local demographics, increased employment opportunities, increased demand for housing and public services, transportation impacts, and an increase in government revenue associated with sales and payroll taxes. Potential socioeconomic effects associated with operation of the NGT and TEAL Projects could include ongoing local expenditures by the operating company and an increased tax base. Section 4.10.10 contains the environmental justice review.

The socioeconomic study area that we considered for this analysis includes counties containing project facilities. We have also identified communities within a 10-mile radius centered on the pipeline centerline and major aboveground project facilities, which we have determined to be a reasonable driving distance to neighboring communities where services and goods may need to be obtained because many parts of the NGT and TEAL Projects are located in rural areas. We also recognize that some workers may have a greater threshold for commuting, which we have identified as 100 miles, due to the temporary nature of the construction phase. However, this analysis focuses on the counties where project facilities are located and the economic impacts would be concentrated.

4.10.1 NGT Project Study Area

The NGT Project area is comprised of 13 counties in Ohio and 3 counties in Michigan, including several communities within a 10-mile radius, which would contain project facilities and therefore make up the socioeconomic study area. A detailed project description can be found in section 2.1.1. Table 4.10.1-1 identifies the counties crossed by and communities within 10 miles of the NGT Project.

TABLE 4.10.1-1

Counties Crossed and Communities within 10 Miles of the NGT Project

Facility, State, Site [a]	Milepost	County	Communities within 10 Miles of the NGT Project [b]
PIPELINES			
Ohio			
Mainline	0.0 - 12.5	Columbiana	Butler, Center, Elkrun, Franklin, Hanover, Knox, Madison, Perry, Salem, Washington, Wayne, West
	12.5 - 34.2	Stark	Alliance, Canton (City and Township), Jackson, Lake, Lawrence, Lexington, Louisville, Marlboro, Massillon, Nimishillen, Osnaburg, Paris, Perry, Plain, Tuscarawas, Washington
	34.2 - 50.4	Summit	Akron, Barberton, Bath, Clinton, Copley, Coventry, Fairlawn, Green, Lakemore, Mogadore (Village), New Franklin, Norton, Springfield, Tallmadge
	50.4 - 56.5, 57.3 - 57.7	Wayne	Baughman, Canaan, Chippewa, Congress, Green, Milton, Norton, Rittman, Sugar Creek, Wayne
	56.5 - 57.3, 57.7 - 80.5	Medina	Brunswick, Brunswick Hills, Canaan, Chatham, Chippewa Lake, Gloria Glens Park, Granger, Guilford, Harrisville, Hinckley, Homer, Lafayette, Litchfield, Liverpool, Lodi, Medina, Medina City, Montville, Rittman, Seville Village, Sharon, Spencer (Village and Township), Wadsworth (City and Township), Westfield, Westfield Center, York
	80.5 - 101.3	Lorain	Amherst (City and Township), Brighton, Brownhelm, Camden, Carlisle, Columbia, Eaton, Elyria (City and Township), Grafton (Village and Township), Henrietta, Huntington, LaGrange, Lorain, New Russia, North Ridgeville, Oberlin, Penfield, Pittsfield, Rochester, Wellington
	101.3 - 104.7	Huron	Bellevue (City), Bronson, Clarksfield, Fitchville, Hartland, Lyme, New London, Norwalk (City and Township), Peru, Ridgefield, Sherman, Townsend, Wakeman
	104.7 - 131.5	Erie	Bellevue, Berlin, Florence, Groton, Huron, Margaretta, Milan, Oxford, Perkins, Sandusky, Vermilion (City and Township)
	131.5 - 163.7	Sandusky	Ballville, Bellevue, Clyde, Fremont, Green Creek, Green Springs, Jackson, Madison, Rice, Riley, Sandusky, Scott, Townsend, Washington, Woodville, York
	163.7 - 181.4	Wood	Bowling Green, Center, Freedom, Grand Rapids, Lake, Liberty, Middleton, Milton, Montgomery, Northwood, Perrysburg (City and Township), Plain, Portage, Rossford, Troy, Washington, Webster, Weston
	181.4 - 189.3	Lucas	Harding, Maumee, Monclova, Oregon, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Toledo, Waterville
	189.3 - 190.2	Henry	Damascus, Harrison, Liberty, Richfield, Washington
	190.2 - 208.3	Fulton	Amboy, Chesterfield, Clinton, Dover, Fulton, Pike, Royalton, Swan Creek, York
	NA	Jefferson [c]	Brush Creek
	NA	Carroll [c]	Augusta, Brown, East, Fox, Harrison, and Washington
	NA	Mahoning [c]	Goshen, Sebring, and Smith

TABLE 4.10.1-1 (cont'd)

Counties Crossed and Communities within 10 Miles of the NGT Project

Facility, State, Site [a]	Milepost	County	Communities within 10 Miles of the NGT Project [b]
Mainline (cont'd)	NA	Portage [c]	Atwater, Brimfield, Deerfield, Mogadore, Randolph, Rootstown, Suffield, and Tallmadge
	NA	Cuyahoga [c]	North Olmsted, Olmsted, Olmsted Falls, and Strongsville
	NA	Seneca [c]	Adams, Green Springs, Liberty, Pleasant, and Thompson
	NA	Ottawa [c]	Allen, Bay, Benton, Carroll, Clay, Danbury, Erie, Harris, Portage, Port Clinton, and Salem
Interconnecting Pipeline	0.0 - 0.9	Columbiana	Butler, Center, Elkrun, Franklin, Hanover, Knox, Madison, Perry, Salem, Washington, Wayne, West
Michigan			
Mainline	208.3 - 230.4	Lenawee	Adrian (City and Township), Blissfield, Clinton, Deerfield, Fairfield, Franklin, Macon, Madison, Ogden, Palmyra, Raisin, Ridgeway, Riga, Tecumseh (City and Township)
	230.4 - 236.9	Monroe	Ash, Dundee, Exeter, Ida, London, Milan (City and Township), Petersburg, Raisinville, Summerfield, Whiteford
	236.9 - 254.5, 255.1 - 255.2	Washtenaw	Ann Arbor (City and Charter Township), Augusta, Bridgewater, Lodi, Milan, Northfield, Pittsfield, Salem, Saline (City and Township), Superior, York, Ypsilanti (City and Charter Township)
ABOVEGROUND FACILITIES			
Ohio			
TGP M&R Station (MR01)	TGP 0.0	Columbiana	Butler, Center, Elkrun, Franklin, Hanover, Knox, Madison, Salem, Washington, Wayne, West
Kensington M&R Station (MR02)	0.0	Columbiana	Butler, Center, Elkrun, Franklin, Hanover, Knox, Madison, Perry, Salem, Washington, Wayne, West
Texas Eastern M&R Station (MR03)	TGP 0.9	Columbiana	Butler, Center, Elkrun, Franklin, Hanover, Knox, Madison, Perry, Salem, Washington, Wayne, West
Hanoverton Compressor Station (CS1)	1.4	Columbiana	Butler, Center, Franklin, Hanover, Knox, Perry, Salem, Washington, Wayne, West
Wadsworth Compressor Station (CS2)	63.5	Medina	Canaan, Chatham, Chippewa Lake, Gloria Glens Park, Granger, Guilford, Harrisville, Lafayette, Lodi, Medina, Medina City, Montville, Rittman, Seville Village, Sharon, Wadsworth (City and Township), Westfield, Westfield Center, York
Dominion East Ohio M&R Station (MR05)	128.8	Erie	Bellevue, Groton, Huron, Margaretta, Milan, Oxford, Perkins, Sandusky
Clyde Compressor Station (CS3)	134.0	Sandusky	Ballville, Bellevue, Clyde, Fremont, Green Creek, Green Springs, Rice, Riley, Sandusky, Townsend, York
Waterville Compressor Station (CS4)	183.5	Lucas	Harding, Maumee, Monclova, Providence, Spencer, Springfield, Swanton, Toledo, Waterville
Michigan			
Willow Run M&R Station (MR04)	255.2	Washtenaw	Ann Arbor (City and Charter Township), Augusta, Northfield, Pittsfield, Salem, Superior, York, and Ypsilanti (City and Charter Township)

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[a] Unless noted, other project-related facilities, such as MLVs, pig launchers/receivers, pipe/contractor yards, staging areas, and access roads, would be within the same socioeconomic study area as the counties and communities listed for the pipeline.

[b] Communities within 10 miles of the NGT Project were provided by NEXUS in its FERC application.

[c] County is not directly affected by project facilities but contains communities within 10 miles of the NGT Project and are therefore included in the area of analysis.

4.10.2 TEAL Project Study Area

The TEAL Project would cross Columbiana, Monroe, and Belmont Counties in Ohio. Table 4.10.2-1 identifies the portions of pipeline by milepost and facilities proposed for construction in relation to the counties crossed by and communities within 10 miles of the TEAL Project.

TABLE 4.10.2-1

Counties Crossed and Communities within 10 Miles of the TEAL Project

Facility, Site [a]	Milepost	County	Communities within 10 Miles of TEAL Project [b]
PIPELINES			
Connecting Pipeline	0.0 – 0.3	Columbiana	Butler, Center, Elkrun, Franklin, Hanover, Knox, Madison, Perry, Salem, Washington, Wayne, West
Proposed Pipeline Loop	0.0 – 4.4	Monroe	Adams, Center, Green, Lee, Malaga, Ohio, Perry, Salem, Sunsbury, Switzerland, Wayne
ABOVEGROUND FACILITIES			
Salineville Compressor Station	5.9	Columbiana	Butler, Center, Elkrun, Franklin, Hanover, Madison, Salem, Washington, Wayne, West, Yellow Creek
Colerain Compressor Station (additional compression and flow reversal)	49.9	Belmont	Colerain, Pease, Pultney, Richland, Smith, Wheeling
	NA	Carroll [c]	Augusta, Brown, East, Fox, Lee, and Washington
	NA	Jefferson [c]	Brush Creek, Ross, Saline, and Springfield
	NA	Harrison [c]	Athens, Green, Short Creek, Mount Pleasant, Smithfield, Warren, and Wells
	NA	Stark [c]	Paris

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a Counties and communities within close proximity to proposed piping modifications that are exclusively part of flow reversal work are not included in the socioeconomics analysis due to the limited scope of the modifications.

b Communities within 10 miles of the TEAL Project were provided by Texas Eastern in its application.

c County is not directly affected by project facilities but contains communities within 10 miles of the TEAL Project and, therefore, included in the area of analysis.

4.10.3 Population and Employment

Construction activities associated with the NGT and TEAL Projects would occur in rural areas generally, which the U.S. Census Bureau classifies as an area with a population less than 50,000 (2015). The 2010[1] population and population density of the 13 Ohio counties within the study area for the NGT Project range from 28,215 people in Henry County with a population of 67.8 people per square mile to 541,781 people in Summit County (where the Akron metropolitan area is located) with a population of 1,312.6 people per square mile (U.S. Census Bureau, 2010). The total estimated 2013 population of all 13 counties is 2,447,483 people or about 21 percent of the state population. The 2010 population and population densities for the Michigan counties within the study area range from 99,892 people in Lenawee County with 133.3 persons per square mile to 344,791 people in Washtenaw County with 488.4 persons per square mile.

Most of the counties within the NGT study area in Ohio saw a population decrease between 2000 and 2013 as well as between 2010 and 2013. Columbiana County, with a 2013 estimated population of 107,078, experienced the greatest population decrease (-4.5 percent) between 2000 and 2013. Other counties with population decreases between those years include Erie, Henry, Huron, Lucas, Sandusky,

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[1] The 2010 U.S. census data is presented here because the census is conducted every 10 years, which provides the official count of the population. Population counts provided by the American Community Survey (ACS) in between the decennial censuses are estimates. Both the 2010 census and ACS population estimates are appropriate to use to identify population trends.

Stark, and Summit. Medina County, with a 2013 estimated population of 173,252, experienced the greatest population increase (14.7 percent) during the same time period. Other counties in the study area with population increases during this time period were Fulton, Lorain, Wayne, and Wood.

Between 2010 and 2013, Columbiana County again saw the greatest population decrease at -0.7 percent. Other counties in the study area with population decreases during this time include Erie, Fulton, Henry, Huron Lucas, Sandusky, and Stark. Wood County, with a 2013 estimated population of 127,325, experienced the greatest population increase between 2010 and 2013 at 1.5 percent. Other counties in the study area that experienced population increases during this time period were Lorain, Medina, and Wayne. Summit County experienced less than -0.1 percent (effectively 0 percent) population growth between 2010 and 2013.

All three of the counties within the study area in Michigan saw a population increase between 2000 and 2013, except between 2010 and 2013 when Lenawee and Washtenaw Counties in Michigan experienced a minor population decrease of -0.4 percent. Washtenaw County, with a 2013 estimated population of 348,560, was the only county in the study area to experience a small population increase (1.1 percent) between 2010 and 2013. Table 4.10.3-1 presents existing population levels and trends for counties in the study area for the NGT Project.

TABLE 4.10.3-1

Existing Population Levels and Trends for the NGT and TEAL Projects' Socioeconomic Study Areas

Location	2000 Population [a]	2010 Population [b]	2013 Population Estimate [c]	2010 Population Density (persons/sq. mi.) [b]	2000-2013 Population Change (%)	2010-2013 Population Change (%)
FEDERAL						
U.S.	281,421,906	308,746,065	311,536,594	87.4	10.7	0.9
STATE						
Ohio	11,353,140	11,536,504	11,549,590	282.3	1.7	0.1
Michigan	9,938,444	9,883,706	9,886,095	174.8	-0.5	0.0
COUNTY						
Belmont, OH	70,226	70,400	69,990	132.3	-0.3	-0.6
Columbiana, OH	112,075	107,841	107,078	202.7	-4.5	-0.7
Erie, OH	79,551	77,079	76,634	306.4	-3.7	-0.6
Fulton, OH	42,084	42,698	42,601	105.3	1.2	-0.2
Henry, OH	29,210	28,215	28,164	67.8	-3.6	-0.2
Huron, OH	59,487	59,626	58,889	121.3	-1.0	-1.2
Lorain, OH	284,664	301,356	301,720	613.6	6.0	0.1
Lucas, OH	455,054	441,815	439,511	1,296.2	-3.4	-0.5
Medina, OH	151,095	172,332	173,252	409.0	14.7	0.5
Monroe, OH	15,180	14,642	14,646	32.1	-3.5	0.0
Sandusky, OH	61,792	60,944	60,619	149.2	-1.9	-0.5
Stark, OH	378,098	375,586	375,348	652.9	-0.7	-0.1
Summit, OH	542,899	541,781	541,592	1,312.6	-0.2	0.0
Wayne, OH	111,564	114,520	114,750	206.4	2.9	0.2
Wood, OH	121,065	125,488	127,325	203.3	5.2	1.5
Lenawee, MI	98,890	99,892	99,505	133.3	0.6	-0.4
Monroe, MI	145,945	152,021	151,408	276.7	3.7	-0.4
Washtenaw, MI	322,895	344,791	348,560	488.4	7.9	1.1

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a U.S. Census Bureau, 2000
b U.S. Census Bureau, 2010
c U.S. Census Bureau, 2013a

The 2010 population and population density of the Ohioan counties in the TEAL Project area range from 14,642 people in Monroe County with a population density of 32.1 people per square mile to 107,841 people in Columbiana County with a population density of 202.7 people per square mile. All counties in the TEAL Project area experienced a population decrease between 2000 and 2013 ranging from -0.3 percent to -4.5 percent, and two of the three (i.e., Belmont and Columbiana Counties) declined in population between 2010 and 2013 (-0.6 percent and -0.7 percent, respectively). Monroe County recorded no population change between 2010 and 2013. Table 4.10.3-1 presents existing populations and trends for the counties in the TEAL Project area.

Table 4.10.3-2 presents civilian workforce numbers, per capita incomes, unemployment rates, and the leading three industries for the United States, Ohio, Michigan, and the counties crossed by the NGT and TEAL Projects.

TABLE 4.10.3-2

Estimated Populations and Employment of Counties in the NGT and TEAL Projects Area

Location	Civilian Labor Force [a]	Per Capita Income ($) [a]	Unemployment Rate (%) [b]	Top Three Industries [a, c]
FEDERAL				
U.S.	157,113,886	28,155	9.7	E, R, P
STATE				
Ohio	5,849,339	26,046	10.0	E, M, R
Michigan	4,859,417	25,681	12.7	E, M, R
COUNTY				
Belmont, OH	32,528	22,380	9.0	E, R, A
Erie, OH	38,918	26,135	8.8	E, M, A
Fulton, OH	22,349	24,771	9.9	E, M, R
Henry, OH	14,487	23,347	9.4	M, E, R
Huron, OH	29,493	22,257	9.7	M, E, R
Lorain, OH	152,340	26,030	10.3	E, M, R
Lucas, OH	221,879	23,885	13.8	E, M, R
Medina, OH	92,664	30,707	6.3	E, M, R
Monroe, OH	6,074	21,487	6.7	E, R, C
Stark, OH	189,391	24,453	10.6	E, M, R
Summit, OH	283,418	27,818	10.3	E, M, R
Wayne, OH	57,592	23,061	6.8	E, M, R
Wood, OH	69,392	26,326	10.3	E, M, R
Lenawee, MI	48,056	22,395	11.9	E, M, R
Monroe, MI	75,223	25,939	11.4	E, P, M
Washtenaw, MI	188,014	33,231	9.1	E, M, R

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[a] U.S. Census Bureau, 2013a

[b] U.S. Census Bureau, 2013b

[c] A = arts, entertainment, and recreation, and accommodation and food services; E = educational, health and social services; M = manufacturing; P = professional, scientific, management, administrative and waste management services; R = retail trade.

Major industries in the states of Ohio and Michigan and the counties within the NGT Project area include educational, health, and social services; manufacturing; retail trade; and professional, scientific, management, administrative, and waste management services. According to 2013 American Community Survey (ACS) data, the civilian workforce in the Ohio counties within the NGT Project area is 1,253,831 people. The unemployment rate is 10.0 percent in Ohio, which is 0.3 percent higher than the national average. Unemployment rates within the Ohio counties in the NGT Project area vary between a high of 13.8 in Lucas County and low of 6.3 percent in Medina County. The civilian workforce in the Michigan counties within the NGT Project area is 311,293 people. The unemployment rate is 12.7 percent in

Michigan, which is 3.0 percent higher than the national average. Unemployment rates within the Michigan counties in the NGT Project area vary between a high of 11.9 in Lenawee County and low of 9.1 percent in Washtenaw County.

Based on 2013 ACS data, the primary industries in the Ohio counties the TEAL Project would cross are arts, entertainment, and recreation, and accommodation and food services; construction; educational, health, and social services; manufacturing; and retail trade. The total civilian workforce in these counties is 89,720 people. Unemployment rates within the counties in the TEAL Project area vary between a high of 10.8 percent in Columbiana County and low of 6.7 percent in Monroe County.

Ohio counties in the NGT Project area record the estimated per capita income in 2013 as ranging from $21,575 in Columbiana County to $30,707 in Medina County (U.S. Census Bureau, 2013b). Nine of the Ohio counties in the NGT Project area have lower per capita incomes than the state average of $26,046.

Michigan counties in the NGT Project area record the estimated per capita income in 2013 as ranging from $22,395 in Lenawee County to $33,231 in Washtenaw County (U.S. Census Bureau, 2013b). Lenawee County has a lower per capita income than the state average of $25,681. Average worker wages during construction of the NGT Project are estimated at approximately $275 per day or about $71,500 annually, thus overall wage rates for the counties in both Ohio and Michigan would be temporarily increased (Bowen et al., 2015).

The estimated per capita income in 2013 in Ohio counties in the TEAL Project area range from $21,487 in Monroe County to $22,380 in Belmont County. All three counties in the TEAL Project area have per capita incomes that are below the state per capita income of $26,046.

Construction of the NGT Project would take place between February and May 2017 and would require a total peak workforce of 3,360 construction workers with 2,770 in Ohio and 590 in Michigan. Population impacts as a result of construction of the NGT Project are expected to be temporary and, given the existing populations of counties in the study area, minor. The effect on population would include the influx of non-local construction workers and any family members accompanying them. Pipeline construction is mobile, of a short duration, and in our experience most non-local workers would not travel with their families to the NGT Project study area, thus minimizing temporary impacts on the local populations. Based on the county populations within the NGT Project area, in the event some construction workers do temporarily relocate to the area, the increase in population would not be significant. In addition, any temporary increase in population would be distributed throughout the NGT Project area and would not have a permanent impact on any one population.

During the operations and maintenance phase of the NGT Project, NEXUS estimates that 36 permanent employees would be employed in Ohio, of which 22 to 60 percent would be hired from the local area. As such, 8 to 22 people would be employed locally, with the remaining employment needs filled by non-local employees. Based on the county populations within the NGT Project study area and the limited number of new permanent employees required, we expect that the permanent population effects as a result of operation of the NGT Project would be minor even with non-local employees relocating with their families.

Construction of the TEAL Project would require a total direct workforce of 320 to 470 construction workers, of which Texas Eastern estimates 40 to 60 percent would be local hires (i.e., 128 to 282 local employees). Construction supervisory personnel and inspectors are positions that may need to be hired non-locally and those workers would temporarily relocate to the TEAL Project area. Temporary small increases to population levels in the TEAL Project area would be experienced. As a result of the relatively short length and construction period (4.4 miles total, over 5 to 6 months in 2017), non-local workers would likely not travel with their families to the TEAL Project area, thus minimizing some impacts on local populations. Monroe County has no facilities that would be constructed, thus any population increases would be experienced for approximately 6 months or less in 2017 only.

Construction of the new compressor station and upgrades to the existing compressor station in the TEAL Project area would take place in 2018 over 8 to 10 months. Slight population increases could be noticed in the counties, particularly in communities closest to the sites. Some impacts on affected counties or communities are unavoidable; however, they would be temporary and limited to the period of construction. Five employees are estimated to be hired locally for operation of the TEAL Project and, therefore, no effects on the population is anticipated and employment effects would be negligible.

We reasonably expect a temporary decrease in unemployment resulting from local hiring of construction workers and temporary increased needs for services. Indirect employment, including hiring additional staff in the retail and service industries to accommodate the influx of people to the area, as well as purchases made by non-local workers on food, clothing, lodging, gasoline, and entertainment, would have a temporary stimulating effect on local economies. These jobs would represent a temporary, minor increase in employment opportunities within the NGT and TEAL Projects area, as discussed in section 4.10.9.

4.10.4 Housing

Housing statistics for the NGT and TEAL Projects study area are listed in table 4.10.4-1. At least 284 hotels, motels, and campgrounds are available within the NGT Project study area and at least 455 hotels, motels, and campgrounds are available within the TEAL Project study area, along with thousands of rental housing units located in the affected counties. While the study area is concentrated to a 10-mile radius around the NGT and TEAL Projects, we expect some construction workers would commute up to 100 miles. Major metropolitan (metro) areas within 100 miles of the NGT Project include Detroit, Toledo, Sandusky, Akron, and Canton. These metro areas provide many options for hotels and motels if options are not available in smaller communities in the study area and would be sufficient to accommodate the estimated non-local construction workforce and non-local operations workforce.

TABLE 4.10.4-1

Available Housing in the NGT and TEAL Projects Area

Location	Total Housing Units [a]	Owner Occupied [a]	Renter Occupied [a]	Median Gross Rent [a] ($)	Rental Vacancy Rate [a] (%)	Vacant Housing Units	Hotels and Motels [b]	Campgrounds [c]
STATE								
Ohio	5,124,221	3,074,792	1,482,863	718	7.8	N/A	N/A	N/A
Michigan	4,529,311	2,757,062	1,066,218	768	7.8	N/A	N/A	N/A
COUNTY								
Belmont	32,327	21,143	7,186	533	6.0	3,998	0	0
Columbiana, OH	46,882	30,560	11,535	589	5.3	4,787	1	2
Erie, OH	37,767	22,063	9,909	696	5.7	5,795	>50	9
Fulton, OH	17,370	13,041	3,244	668	7.0	1,085	3	0
Henry, OH	11,918	8,738	2,268	673	3.1	912	2	0
Huron, OH	25,127	16,293	6,068	619	12.2	2,766	6	2
Lorain, OH	127,282	83,523	33,182	733	5.6	10,577	13	4
Lucas, OH	202,196	110,797	67,304	649	8.7	24,095	>100	0
Medina, OH	69,494	52,107	13,392	821	4.4	3,955	14	8
Monroe	7,523	4,830	1,281	506	10.4	1,412	0	0
Sandusky, OH	26,305	18,110	5,796	613	10.4	2,399	>50	4
Stark, OH	165,036	104,991	45,012	666	6.8	15,033	>100	2

TABLE 4.10.4-1 (cont'd)

Available Housing in the NGT and TEAL Projects Area

Location	Total Housing Units [a]	Owner Occupied [a]	Renter Occupied [a]	Median Gross Rent [a] ($)	Rental Vacancy Rate [a] (%)	Vacant Housing Units	Hotels and Motels [b]	Campgrounds [c]
Summit, OH	244,910	149,549	70,826	741	8.6	24,535	>100	1
Wayne, OH	45,781	31,103	11,384	665	4.1	3,294	0	0
Wood, OH	53,419	33,171	15,915	718	6.6	4,333	21	2
Lenawee, MI	43,390	29,336	8,388	710	5.0	5,636	7	2
Monroe, MI	63,089	46,471	12,231	777	9.8	4,387	5	2
Washtenaw, MI	147,978	82,851	53,219	910	4.9	12,178	33	0
LOCAL[d]								
Canton-Massillon, OH Metro Area	178,664	113,744	47,366	663	6.4	N/A	223	N/A
Weirton-Steubenville, WV-OH Metro Area	58,111	37,956	13,228	582	5.0	N/A	144	N/A
Wheeling, WV-OH Metro Area	69,311	44,903	16,021	530	7.0	N/A	87	N/A

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a U.S. Census Bureau, 2013a

b www.hotels.com, 2015

c Ohio.Camper.com 2015; RV Park Reviews, 2015

d Metropolitan Statistical Areas within approximately 50 miles of TEAL Project facilities

Note: Inventory of hotels, motels, and campgrounds was collected for only those counties where facilities are located and the pipeline crosses. Data was not collected for states.

N/A = Not applicable

A comment was received during scoping stating that www.hotels.com should not be considered a valid source for identifying the number of hotels in the NGT Project area. Housing data identified in this section such as total housing units, owner- and renter-occupied housing, median gross rent, and vacancy rates were identified using the 2013 5-year ACS data, which is a widely accepted and regularly used U.S. Census Bureau source. No such government-sponsored survey or data source exists maintaining a consistent inventory of hotels, motels, and campgrounds at a local level. Thus, we used www.hotels.com to compile a reasonable inventory in the NGT Project area, as it is a publicly available and reliable source that would be used to identify accommodations when traveling. The FERC acknowledges the number of hotels, motels, and campgrounds may vary from what is presented in table 4.10.4-1; however, we believe the table provides a reasonable indication of the temporary accommodations in the NGT Project area. In addition, other available temporary housing options such as bed and breakfasts, lodges, and seasonal or vacation properties available in these or neighboring counties within a reasonable commuting distance are not included. Thus, the actual availability of temporary housing is greater than what is presented in the table.

The availability of housing may vary and fluctuate during tourist seasons or local events, or as a result of demand for housing by other industries. Huron County, Ohio and Monroe County, Michigan have the highest rental vacancy rates (i.e., 12.2 percent and 9.8 percent, respectively) for each state, and Henry County, Ohio and Washtenaw County, Michigan have the lowest rates (i.e., 3.1 percent and 4.9 percent, respectively). The average vacancy rate is 6.7 percent throughout the NGT Project area. The counties included in the TEAL Project area have rental vacancy ranging from 10.4 percent in Monroe County to 5.3 percent in Columbiana County. See table 4.10.4-1 for the rental vacancy rates of each county in the NGT and TEAL Projects area.

NEXUS estimates that approximately 40 percent of the Ohio construction workforce and 25 percent of the Michigan construction workforce would be non-local. That equates to roughly 1,108 non-local workers in Ohio and 148 in Michigan, which would represent a demand for temporary housing from 1,256 non-local workers in the NGT Project study area. Using a conservative estimate of 25 units per hotel, motel, or campground, of which there are approximately 284 shown in table 4.10.4-1, we estimate that there are at least 7,100 rooms or sites available. Based on rental vacancy rates in the affected counties (3.1 percent to 12.2 percent), there were over 125,000 vacant rental units in the NGT Project area in 2013. Therefore, in counties where the number of hotels, motels, and campgrounds do not cover the estimated demand for 1,256 rooms or sites, there are sufficient vacant housing units.

Between 128 and 282 non-local construction personnel would use temporary housing. While there are very few identified hotels and motels in the TEAL Project area (i.e., two in Columbiana County), there are a substantial number in the three metro areas within approximately 50 miles of the TEAL Project facilities. There are approximately 454 hotels and motels in the three metro areas and, using a conservative estimate of 25 units per hotel/motel, we estimate there would be at least 11,350 rooms at the time of construction. In addition, based on 2013 Census data and rental vacancy rates of the affected counties, there were over 10,000 vacant housing units in the TEAL Project area in 2013 (U.S. Census Bureau, 2013a).

In the event that non-local workers prefer to house in a hotel, motel, or campground and the number identified in this analysis does not meet the need for that county, it can be reasonably expected that construction workers would house in nearby larger populated or metro areas. For instance, the Canton metro area can support non-local employees working in Columbiana County; Swanton in Lucas and Fulton Counties or the Toledo metro area are within reasonable commuting distances (i.e., 100 miles or less) for non-local employees working in Henry County; both Akron and Canton are within reasonable commuting distances for Wayne and Medina Counties; the Cleveland metro area (in Cuyahoga County, which is not crossed by the pipeline) can reasonably serve employees working in Medina and Lorain Counties; and the Toledo metro area can reasonably serve employees working in Wood, Lucas, and Fulton Counties. In Michigan, the Ann Arbor and Detroit metro areas can reasonably serve non-local employees working in Lenawee, Monroe, and Washentaw Counties.

The influx of non-local construction workers to both the NGT and TEAL Projects area could result in a temporary increase in demand for rental housing, hotel and motel rooms, and campground sites. While this would benefit the proprietors of the local motels, hotels, and other rental units through increased revenue, it could increase competition for units (and cost) and could decrease housing availability for tourists, recreationalists, and local renters or residents. While some construction activity would be conducted during the peak tourism season, sufficient temporary housing is still likely to be available; however, it may be more difficult to find (particularly on short notice) or more expensive to secure.

Based on the large number of accommodations in the NGT and TEAL Projects study area, we determined the housing accommodations along with hotels, motels, and campgrounds, would be sufficient to house the construction workforce without significantly displacing tourists, recreationalists, or local workers. The incremental housing, hotel, motel, and campground demand from construction workers during the NGT and TEAL Projects would be temporary and minor to moderate. In addition, we conclude that the estimated 14 to 28 non-local employees and 5 non-local employees needed for NGT and TEAL Projects operations, respectively, would not have a noticeable impact on housing availability in the area.

4.10.5 Public Services

Public services and facilities in the NGT and TEAL Projects study area include law enforcement, fire departments, medical facilities (e.g., hospitals and emergency services), and schools (see table 4.10.5-1). All counties in the NGT and TEAL Projects' study area have police or sheriff departments and fire stations. Nine (9) of the 13 counties in the NGT study area in Ohio, all of the counties in the study area in Michigan, and 1 of the 3 counties in the TEAL study area have a hospital or major medical facility.

In Ohio, 62 police or sheriff departments are located within 10 miles of the NGT Project, with the greatest number occurring in Lorain and Stark Counties, and the least in Henry and Fulton Counties. Approximately 231 fire stations are within the NGT Project study area, with Stark County having the most and Henry County the least (49 and 1, respectively). Stark and Summit Counties also contain the greatest number of hospitals or medical facilities within the NGT Project study area, while there are none within the study area in Henry, Columbiana, Wayne, and Fulton Counties. However, the NGT Project crosses a relatively small portion of these counties (typically along the edge or across a corner of the county) and personnel would be able to access nearby hospitals in neighboring counties. There are more than 750 public schools in the NGT Project study area, located primarily in Wayne and Summit Counties, with the least amount in Henry County.

In Michigan, 14 police or sheriff departments are within the NGT Project study area, with the greatest number occurring in Washtenaw County and the least in Monroe County. The number of local fire stations ranges from 19 in Washtenaw County to 4 in Monroe County, for a total of 33 within the NGT Project study area in Michigan. There are 11 medical facilities in Michigan in the NGT Project study area, primarily in Washtenaw County. The greatest number of public schools in the vicinity are in Washtenaw County and the least number in Lenawee County.

There are seven police or sheriff departments within 10 miles of the TEAL Project area, with the greatest number occurring in Belmont County and only one in Monroe County. Twenty-two (22) fire stations are located in the counties within the TEAL Project area, ranging from 14 in Belmont County to one in Monroe County. There are 71 public schools in the counties within the TEAL Project area, with the most in Belmont and Columbiana Counties and the fewest in Monroe County.

TABLE 4.10.5-1

Public Services Available within 10 Miles of the NGT and TEAL Projects

Location	No. of Police & Sheriff Dept. [a]	Dist. to Nearest Police or Sheriff Dept.	No. of Fire Stations [b]	Dist. to Nearest Fire Station	No. of Hospitals and Medical Facilities [c]	Distance to Nearest Hospital or Medical Facility	Number of Public Schools [d]
Belmont County, OH	4	5.3	14	1.3	3	5.4	23
Columbiana County, OH	2	8.2	7	0.5	0	N/A	39
Erie County, OH	4	0.4	16	0.3	2	6.5	26
Fulton County, OH	1	2.2	11	0.8	0	N/A	21
Henry County, OH	1	8.1	1	6.6	0	N/A	14
Huron County, OH	4	1.8	3	2.0	2	7.6	23
Lorain County, OH	8	1	20	0.3	3	1.4	94
Lucas County, OH	5	0.9	34	0.5	1	5.5	136
Medina County, OH	5	1.7	23	0.6	3	2.0	43
Monroe County, OH	1	8.4	1	3.8	0	N/A	9
Sandusky County, OH	5	1.5	11	1.2	3	4.0	23
Stark County, OH	8	2.8	49	0.1	5	2.8	108
Summit County, OH	7	1.6	30	1.0	5	3.5	144
Wayne County, OH	3	1.3	8	0.2	0	N/A	43
Wood County, OH	9	1.0	18	1.0	1	6.8	40
Lenawee County, MI	3	2.1	10	1.8	2	6.8	45
Monroe County, MI	1	1.3	4	1.3	1	6.3	49
Washtenaw County, MI	4	2.9	19	1.0	8	2.0	88

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a PoliceOne, 2015; USGS, 2015
b FireDepartment.net, 2015; U.S. Fire Administration, 2015; USGS, 2015
c American Hospital Directory, 2015; USGS 2015
d National Center for Education Statistics, 2015
NA = Not Applicable

Primary care Health Professional Shortage Areas (HPSA) and Medically Underserved Areas or Populations (MUA/P) are designated by the U.S. Department of Health and Human Services (DHHS). A HPSA is a geographic area, population group, or health care facility that has been designated by the federal government as having a shortage of health professionals. An MUA/P is an area or population designated by the federal government as having shortages of primary medical care, dental, or mental health providers. HPSAs and MUP/As are designated by geographic areas (e.g., census tracts, counties). One hundred MUA/P-designated census tracts are located within the NGT Project area in Columbiana, Erie, Lorain, Lucas, Medina, Sandusky, Stark, Summit, and Wood Counties in Ohio. Washtenaw and Monroe Counties in Michigan have 13 MUA/P-designated census tracts in the NGT Project area (DHHS, 2016a). There are four MUA/Ps within the TEAL Project area (DHHS, 2016a).

The HPSA database identified several primary care HPSA-designated areas in 8 of the 13 counties in the NGT Project area in Ohio, including Columbiana, Erie, Lorain, Lucas, Medina, Stark, Summit, and Wood Counties. None of the HPSA-designated census tracts are within the NGT Project area in Ohio. Within the NGT Project area in Michigan, five HPSAs for primary care were identified in Lenawee County, Michigan (DHHS, 2016b). Monroe County and one comprehensive health center are HPSAs in the TEAL Project area (DHHS, 2016b).

Access to medical services in the NGT Project study area is available in all counties except in Columbiana, Fulton, Henry, and Wayne Counties, Ohio and Monroe County, Michigan. Should a medical emergency occur during construction in these counties, we anticipate that medical services would be sought in communities in neighboring counties (e.g., Lucas, Wood, Medina, Summit, Stark, and Carroll Counties in Ohio, or Lenawee and Washtenaw Counties in Michigan, respectively). Belmont County is the only county that has hospitals or medical facilities in the TEAL Project area.

Based on the number and location of police departments, fire stations, hospitals, and schools, there is adequate public service infrastructure in the NGT and TEAL Projects study area to meet the temporary needs of non-local construction and long-term needs of non-local operations and maintenance workers. Further, NEXUS and Texas Eastern would require each of its contractors to have a health and safety plan, covering location- or work-specific requirements to minimize the potential for on-the-job accidents. Contractors and NEXUS' and Texas Eastern's site safety staff are responsible for monitoring compliance with the plans. In the event of an accident, police, fire, and/or medical services would be necessary; however, the anticipated demand for these services is not expected to exceed existing capabilities in the NGT and TEAL Projects study area.

Temporary increased demand on local public services may occur because police may be required to direct traffic during construction at road crossings or respond to emergencies associated with pipeline construction. Fire departments may have to respond to project-related fires or other emergencies, and medical services may be necessary for workforce personnel illnesses or injuries. NEXUS and Texas Eastern would work with local law enforcement, fire departments, and emergency medical services prior to construction to coordinate for effective emergency response. Due to the relatively short duration of project construction and workforce dispersion across multiple counties and states, significant effects on public services in the affected counties or communities would not be anticipated.

Most non-local construction workers are not expected to relocate their families temporarily during the construction period, and as such we do not anticipate that the NGT or TEAL Projects would increase demand for school-related services. As indicated previously, a small number (i.e., 14 to 28 for the NGT Project and 5 for the TEAL Project) of non-local permanent operations employees and potentially their families would relocate to areas in Ohio. We conclude there would not be significant increased demand for school-related services resulting from non-local operations employees relocating to the NGT and TEAL Projects area.

We received several comments about the safety of a high-pressure pipeline in or near population centers and/or near schools and child daycare and elderly facilities. As further discussed in section 4.13 (Reliability and Safety), NEXUS and Texas Eastern would construct, operate, maintain, and inspect the proposed facilities to meet or exceed PHMSA's safety requirements, which have pipeline design requirements that are dependent on the population levels and facilities crossed.

We received several comments where residents in Whitehouse and Waterville, Ohio (Lucas County) expressed concerns about the costs and ability for emergency public services to respond in the event of a catastrophic accident at the proposed Waterville Compressor Station or along the pipeline in Lucas County. As discussed in section 4.13, a catastrophic accident is unlikely based on statistical data. NEXUS would develop, maintain, and implement emergency response plans as required by applicable DOT regulations. NEXUS would also communicate regularly with the public who live and work near the pipelines and facilities about pipeline safety and emergency response plans. NEXUS employees would join local emergency response personnel for emergency drills to test staff readiness and identify improvement opportunities.

Concerning costs for improving local emergency services, NEXUS estimates $2.1 billion in property tax revenues would be generated in the first 60 years of service on the greenfield portion of the NGT Project. We expect government officials would allocate appropriate tax revenues to address community priorities.

4.10.6 Tourism

Tourism is defined as federal, state, and local special interest areas as well as businesses that depend on year-round or seasonal tourists. Both Ohio and Michigan offer year-round tourism attractions; however, the peak season is typically from the spring through fall (April through September) (Smartertravel.com, 2016). Tourism is not listed as a major economic industry for any of the counties in Ohio or Michigan within the NGT and TEAL Projects area. The counties within the NGT and TEAL Projects area generally offer similar tourist attractions, including recreational activities such as parks, golfing, and kayaking; shopping and eateries; various museums and historical attractions; winery, farm, and orchard tours; amusement and waterparks; and festivals. Notable major tourist attractions in the NGT Project area include the following:

- Pro Football Hall of Fame in Canton, Stark County (Stark County Convention and Visitor's Bureau, 2016);
- 33,000-acre Cuyahoga Valley National Park near Akron, which had over 2.2 million recreation visitors in 2015 in Summit County (National Park Service, 2015);
- Amish Country in Wayne County (Wayne County Convention and Visitors Bureau, 2016);
- Cedar Point Amusement Park in Erie County on the Lake Erie shore, which is the second oldest amusement park in North America and known as the Roller Coaster Capital of the World (Cedar Point, 2016);
- Toledo Zoo in Lucas County is recognized as one of the 10 best zoos in the United States (Toledo.com, 2016); and
- Lake Erie, offering a number of beaches and marinas, ferries and cruises, sightseeing and fishing charters, and recreational activities such as sailing, kayaking, boating, swimming, and fishing (Lake Erie Shores and Islands, 2016).

Notable major tourist attractions in the TEAL Project area include the following:

- Official state byways – Drovers' Trail, Historic National Road, and the Ohio River Scenic Byway;
- Shaeffer/Campbell Covered Bridge, the Underground Railroad Museum, and the Barkcamp State Park;
- Wheeling, West Virginia (6 miles southeast of the Colerain Compressor Station) offers many tourist attractions such as museums, a zoo, racetrack, casino, many parks, markets, and a year-round resort (Wheeling Convention and Visitors Bureau, 2016); and
- Weirton-Steubenville Metro Area is another nearby metro area to the Colerain Compressor Station that has historical sites, museums, a casino resort, recreation such as golf courses and parks, and wineries (Top of West Virginia Convention and Visitor's Bureau, 2016; Steubenville Visitor Center, 2016).

No major tourist attractions would experience restricted or denied access resulting from NGT or TEAL Project construction. There may be some recreational areas such as parks that experience temporary impacts on access resulting from construction, which is discussed in section 4.9.

Tables 4.10.6-1 and 4.10.6-2 summarize the tourism economies in the NGT and TEAL Projects area.

TABLE 4.10.6-1

Tourism Economy in the NGT Project Area [a]

County	Sales ($ million)	Wages ($ million)
Columbiana, OH	193.6	42.6
Stark, OH	1,600	280.5
Summit, OH	2,100	478.2
Wayne, OH	224.5	57.8
Medina, OH	486.2	123.6
Lorain, OH	499.4	154.1
Huron, OH	100.1	28.5
Erie, OH	1,500	255.2
Sandusky, OH	136	34.3
Wood, OH	446.5	129.2
Lucas, OH	1,800	421.8
Henry, OH	21.8	8.4
Fulton, OH	111.7	28.8
Lenawee, MI	114.7	52.9
Monroe, MI	212.9	88.6
Washtenaw, MI	684.5	391.0
NGT Project Area Total	**10,095.9**	**2,541.2**

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a Tourism Economics, 2014a; 2014b; 2014c; 2014d; 2014e; 2014f; 2014g; 2014i.

TABLE 4.10.6-2

Tourism Economy in the TEAL Project Area [a]

County	Sales ($ million)	Employment	Personal Income ($ million)	Tax Revenue ($ million)
Belmont, OH	187.2	2,376	49.3	24.8
Columbiana, OH	193.6	2,391	42.6	24.5
Monroe, OH	7.3	154	2.2	1.0
TEAL Project Area Total	**388.1**	**4,921**	**94.1**	**50.3**

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[a] Tourism Economics, 2014h

The influx of construction workers would be limited to the time of construction and dispersed across the NGT Project area throughout the relatively short construction period of February through May. The demand for temporary housing by non-local workers would not exceed the available number of hotels, motels, and campground units in the NGT Project area, but accommodations could experience some minor limited availability at the end of the planned construction in spring and early summer, which is the front end of the time period considered the peak tourism season in Ohio. These strains would be most likely experienced in the Lake Erie region, specifically in Erie and Sandusky Counties; however, sufficient temporary housing accommodations exist in these counties and in the metro areas where major tourism activities exist. Affected land uses would be restored and activities allowed to continue following construction and, depending on easement negotiations, landowners could be compensated for losses resulting from construction.

Effects on tourism resulting from the TEAL Project are unlikely as there are no tourist attractions that would experience restricted access as a result of project construction. Major tourist attractions are located in surrounding metro areas, which are 15 or more miles from the pipeline route and facilities locations; therefore, we do not expect construction activities would disrupt visitor experiences at tourist locations resulting from restricted access or safety concerns. Impacts on public enjoyment of the tourist attractions outside the TEAL Project area would be negligible and limited to the potential for the temporary non-local workforce contributing to increased demand for accommodations such as hotels, motels, and campgrounds; however, as discussed in section 4.10.4 and based on the number of hotels, motels, campgrounds, and vacant rental units in the TEAL Project area, the demand for temporary housing from non-local workers required for project construction would not exceed available supply.

Commenters voiced concerns during scoping that any negative effects on water quality in Lake Erie would negatively affect tourism in Ohio and Michigan. Specific water quality and fisheries and aquatic resources effects and mitigation are discussed in sections 4.3 and section 4.7. Effects to tourism on Lake Erie would likely not occur as a result of the NGT Project because there would not be restricted access to Lake Erie attractions, nor would temporary construction disrupt the visitor experience associated with tourism activities taking place on Lake Erie as the NGT Project is about 3 miles from the shoreline at its closest point.

4.10.7 Transportation

A daily total of 1,311 commuter vehicles (875 in Ohio and 436 in Michigan) is estimated to be used to transport the construction workforce to NGT Project sites. NEXUS also anticipates a daily total of 414 material and equipment delivery vehicles (275 in Ohio and 139 in Michigan) would make two round trips per day between pipe/contractor yards and the right-of-way. Vehicles would include stringing trucks, welding rigs, water trucks, fuel trucks, mechanic trucks, flatbed and lowboy trailer trucks, motor graders, hydrostatic equipment trucks, and contractor buses, as well as inspector, foreman, contractor, environmental monitor, and cultural monitor vehicles. NEXUS anticipates that some personnel would carpool to the construction area, thereby reducing passenger vehicle traffic on local roads. Vehicle use would primarily be confined to just before, during, and just after construction hours (i.e., typically 7:00 a.m. to 6:00 p.m., 6 days a week), with exceptions made for specific activities such as HDDs or hydrostatic testing. During construction, vehicles would be distributed across the NGT Project according to the specific construction method used. See appendix L-1 for average daily traffic counts on roads in the NGT Project area.

The daily total for material and equipment delivery vehicles is estimated to be 152 at peak construction with an estimated daily maximum total of 375 commuter vehicles, to be used to transport the construction workforce to TEAL Project sites. Construction activities would be scheduled for transportation in a manner similar to the NGT Project, as discussed above. See appendix L-2 for average daily traffic counts on roads in the TEAL Project area.

Construction activities would result in temporary effects on local transportation infrastructure and vehicle traffic, including disruptions from increased transportation of construction equipment, materials, and crew members; disruptions from construction of pipeline facilities at or across existing roads; and damage to local roads caused by heavy machinery and materials.

Public roads used by construction vehicles to travel to and from workspaces could experience increased sediment tracking/build-up and surface damage. Paved roads are the most durable and generally stand up well to periodic surges in traffic and heavy use; unpaved roads, on the other hand, are much less durable. Most states fund road repairs with motor fuel taxes, motor vehicle registration fees, and compensatory fees paid by commercial carriers. Commercial carriers need registrations to operate in each state and may need special permits for oversize and overweight vehicles, temporary trip permits within the state, or to haul hazardous materials. NEXUS and Texas Eastern would coordinate with state and local departments of transportation and land-managing agencies to obtain the required permits to operate trucks on public roads.

To minimize and mitigate these potential impacts, NEXUS and Texas Eastern would limit construction activities to daylight hours to the extent practicable; therefore, workers would travel to and from the site earlier and later in the day, outside of peak traffic hours thus minimizing their contribution to traffic congestion. NEXUS and Texas Eastern would also encourage its workforce to carpool. Some construction activities (e.g., hydrostatic testing, directional drilling, and tie-ins) could occur at unspecified times and/or outside of normal construction hours; however, NEXUS and Texas Eastern would attempt to schedule these activities to minimize impacts on local traffic.

During scoping, we received a comment that expressed concern over costs to local governments due to the effects of heavy equipment on local roads and bridges. The NGT and TEAL Projects would cross larger, typically paved roads (e.g., county roads, interstate highways) via the bore or HDD method (described in section 2.3.2.6), which would result in little to no disruption to traffic or road impacts. Smaller roads would be crossed using the open-cut method, which usually requires temporary road closures and/or detours. Where detours are infeasible, crews would leave at least one road lane open to maintain traffic flow, except when installing the pipeline, and use the necessary signage and traffic control measures, or install steel plate bridges over the open-cut area to ensure continued traffic flow during construction. Most open-cut crossings take 1 to 2 days to complete, but final road resurfacing following backfill could take weeks to allow for settling and compaction. NEXUS and Texas Eastern would coordinate with local police departments in areas of high traffic volume to avoid traffic flow interruptions and ensure the safety of pedestrians and vehicles and passing emergency vehicles. NEXUS and Texas Eastern would also employ traffic control measures, such as flagmen and signs, as necessary to ensure safety of local traffic. Additionally, NEXUS and Texas Eastern would be responsible for restoring roads in accordance with permit conditions and as requested by landowners or agencies. NEXUS and Texas Eastern would periodically inspect roads near crossings and make repair as necessary to damages caused by construction activities. NEXUS and Texas Eastern would coordinate with local officials to avoid traffic interruptions and ensure the safety of pedestrians, motorists, and emergency vehicles in the NGT and TEAL Projects area. Road crossings and proposed crossings methods for the NGT and TEAL Projects are listed in table 4.9.4-4.

NEXUS would improve or modify 141 existing roads and Texas Eastern would improve or modify 6 existing roads to accommodate construction vehicle traffic. Traffic disruptions similar to those previously described could occur and NEXUS and Texas Eastern would employ similar minimization and mitigation techniques to maintain traffic flow.

As a result of measures and methods described in this section, we anticipate that construction activities related to the NGT and TEAL Projects would result in minor and temporary to short-term impacts on transportation infrastructure.

4.10.8 Property Values

We received numerous comments from stakeholders voicing concern that the NGT and TEAL Projects would have negative effects on property values, potentially decreasing values from 25 percent to 100 percent and that local governments would lose tax revenue because of decreased property values. Typically, an easement would be used to convey both temporary (construction-related) and permanent rights-of-way to NEXUS or Texas Eastern. As further discussed in section 4.9, the easement would give NEXUS or Texas Eastern the right to access, construct, operate, and maintain their respective pipelines. In return, NEXUS or Texas Eastern would compensate the landowner. If the NGT and/or TEAL Projects are issued a Certificate, an easement could be obtained by use of eminent domain. In that case, the property owner would still be compensated by NEXUS or Texas Eastern but the amount of compensation would be determined by the courts.

The effect that a pipeline easement may have on property value is a damage-related issue that would be negotiated between the parties during the easement acquisition process, which is designed to provide fair compensation to the landowner for the right to use the property for pipeline construction and operation. Appraisal methods used to value land are typically based on objective characteristics of the property and any improvements. The impact a pipeline could have on a property's value would depend on many factors including the size of the tract, the values of adjacent properties, the presence of other utilities, the current value of the land, and the current land use. Subjective valuation is generally not considered in appraisals. A potential purchaser of property may make a decision to purchase land based on his or her planned use. An industrial user might find the pipeline (i.e., a potential source of energy for an industrial plant) preferable; a farmer looking for land for grazing or cropland may or may not find it objectionable. If the presence of a pipeline renders a planned use infeasible, it is possible that a potential purchaser would decide not to purchase the property; however, each potential purchaser has different criteria and differing capabilities to purchase land.

Property taxes for a piece of property are generally based on the actual use of the land. Construction of the pipeline would not change the general use of the land but would preclude construction of aboveground structures on the permanent right-of-way. If a landowner believes that the presence of a pipeline easement impacts the value of his or her land, resulting in an overpayment of property taxes, he or she could appeal the issue of the assessment and subsequent property taxation to the local property tax agency.

Several studies examined the effects of pipeline easements on sales and property values, and evaluated the impact of natural gas pipelines on real estate. The first study, *Pipeline Impact Study: Study of a Williams Natural Gas Pipeline on Residential Real Estate: Saddle Ride Subdivision, Dallas Township,* *Luzerne County, Pennsylvania* prepared by the firm of Allen, Williford & Seale, Inc., assessed the impact on the sale price of undeveloped lots and single-family residences that have a natural gas transmission line easement on the property (Allen, Williford & Seale, Inc., 2014). The report compared units in a subdivision in Luzerne County that had an existing natural gas transmission line located within it. Differences between the sale prices of undeveloped lots and houses with the pipeline easement and those that did not have an easement were analyzed. The report found that, when the sales prices of the encumbered residences were compared with the sales prices of the unencumbered residences, there was no indication that the pipeline easement had any effect on the sales prices of homes in Saddle Ridge. Likewise, when the sales prices of encumbered lots were compared with the sales prices of unencumbered lots, the differential in price could be explained by the reduction in lot size associated with the easement area.

One study, Diskin et al. in 2011, looked at the effects of natural gas transmission pipelines on residential values in Arizona. The study concluded that there was no identifiable systemic relationship between proximity to a pipeline and residential sale price or value.

Studies conducted in 2008 by PGP Valuation Inc. (PGP, 2008) for Palomar Gas Transmission, Inc. and by Ecowest for the Oregon LNG Project reached similar conclusions. Both studies evaluated the potential effect on property values of a natural gas pipeline that was constructed in 2003/2004 in northwestern Oregon, including along the western edge of the Portland metro area. The PGP study found that:

- there was no measurable long-term impact on property values resulting from natural gas pipelines for the particular pipeline project studied;
- interviews with buyers and brokers indicated no measurable impact on value or price; and
- there was no trend in the data to suggest an extension of marketing periods (i.e., time while the property is on sale) for properties with gas pipeline easements.

The Ecowest study concluded that the pipeline had no statistically significant or economically significant impact on residential properties. The study also concluded that there was no relationship between proximity to the pipeline and sale price (Fruits, 2008).

Another study (Hansen et al., 2006) analyzed property sales near a pipeline accident location in Washington State, using methodologies that considered proximity and persistence over time. This study noted a decline in property values following the incident; however, the effect was very localized and declined as the distance from the affected pipeline increased. The effect also diminished over time in the years following the incident.

For the purposes of another EIS analysis the FERC published in 2014 (with a project area in Pennsylvania and New York), several appraisers were contacted about the potential impacts on property values due to the presence of a natural gas pipeline (FERC, 2014). One appraiser who teaches seminars for appraisers and realtors, including discussions of mineral rights and pipeline easements, provided information on the subject. According to the appraiser, "the empirical evidence indicates no difference in value attributable to the existence of the pipeline easement." The appraiser further noted that he was not aware of appraisers making adjustments in the appraiser reports for the existence of a pipeline easement. He stated that the large number of variables that impact home values make it difficult to determine the incremental effect that any one variable may have on a home's value. Regardless, it is possible that the perceived safety issues or the limitations on land use within the permanent easement could reduce the number of potential buyers for a property, which may extend the number of days a property is on the market.

Based on the research we have reviewed, we find no conclusive evidence indicating that natural gas pipeline easements would have a negative impact on property values.

We also received comments voicing concern that insurance premiums would increase and/or insurance companies would not insure properties. The FERC has examined these concerns on other projects by contacting insurance offices to pose the question. We asked whether the presence of a utility crossing would change the terms of an existing or new residential insurance policy, which types of utilities may cause a change, how a policy might change, and what factors would influence a change in the policy terms, including the potential for a policy to be dropped completely. Results of this initial investigation suggested that the potential for a residential insurance policy to be affected could exist, but the extent of any action and corresponding corrective action would depend upon several factors, including the terms of the individual landowner's policy and the terms of the applicant's own policy. Insurance company contacts were not able to speak directly to the potential factors that could cause a change in a policy (e.g., type of utility, proximity of residence to utility), or provide quantitative information on the potential change in a policy premium (in dollars or percent). As such, there is no conclusive evidence indicating that insurance premiums would be affected by the presence of a natural gas pipeline easement.

4.10.9 Economy and Tax Revenues

4.10.9.1 NGT Project

During scoping, many commenters voiced concerns that the economic effects on the NGT Project area would be fiscally devastating because people would not want to move to and live in the area. We also heard that no long-term benefits would be realized and that the NGT Project would not produce significant local employment in Medina County.

An economic analysis commissioned by NEXUS was completed by Economic and Policy Resources in May 2015. The scope of the analysis covered 11 of the 13 counties that are in the NGT Project area in Ohio.[2] The economic analysis commissioned by NEXUS for the NGT Project's economic effects in Michigan was completed in April 2015 by the Michigan State University Land Policy Institute and Center for Economic Analysis. The scope of this analysis covered the three counties in the NGT Project area in Michigan, as well as the entire state of Michigan for the greenfield activity.

Construction and operation of the NGT Project would have a beneficial, short-term impact on local sales tax revenues. Payroll taxes would also be collected from workers employed on the NGT Project, resulting in additional beneficial, short-term effects. NEXUS anticipates that its total payroll would be approximately $668 million during the construction phase and an estimated total annual payroll of $3.1 million during operation. Economic effects resulting from construction and operation of the NGT Project would be beneficial at the local and county levels in the form of increased sales and payroll taxes. Direct payroll and materials expenditures related to the NGT Project would have an immediate impact on local economies. NEXUS would purchase goods, materials, and services locally when possible. Workers would also most likely spend a portion of their pay in local communities on items such as housing, food, automobile expenses, entertainment, and miscellaneous other items. NEXUS estimates that about 5.0 to 7.5 percent of the total construction cost would be spent on locally purchased consumables (e.g., fuel, tires, concrete, sand, gravel, office supplies) in Ohio and Michigan, respectively. These direct impacts would stimulate indirect impacts within the region as inventories are restocked and new workers are hired to meet demands. NEXUS estimates that over $449.6 million would be spent toward direct construction labor

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[2] The economic analysis completed by Economic and Policy Resources did not include Henry and Huron Counties in Ohio. These counties are crossed by the NGT Project for approximately 0.9 and 3.4 miles, respectively, and there are no major aboveground facilities located in these counties.

income with approximately $400.6 million in Ohio and approximately $49 million in Michigan. Operations employees would not be required for the Michigan portion of the NGT Project.

Though installation of the underground pipeline would have temporary surface impacts on roads, project-related damages would be repaired. Once installed, the pipeline would not impede normal surface traffic or access to businesses, and most pre-construction property uses would be allowed to continue.

The long-term positive economic impacts from the NGT Project include an increase in property taxes that would benefit local governments and their annual budgets for the life of the NGT Project. When broken down by construction and operation, the direct,[3] indirect,[4] and induced[5] economic benefits in Ohio include 5,325 jobs with $565 million in labor income and $697 million in value added for construction, and 59 jobs with $3.8 million in labor income and $5 million in value added for operation.

Table 4.10.9-1 presents the estimated total annual economic effects (i.e., the sum of the direct, indirect, and induced economic impacts) of the NGT Project during operation in Ohio. Economic impacts during operations would be focused to four counties that would have compressor stations.

TABLE 4.10.9-1

Estimated Economic Effects for Operations for the NGT Project in Ohio [a]

County	Jobs	Labor Income ($)	Value Added ($)	Annual Estimated Property Tax ($)
Columbiana	21	1,313,600	1,699,600	97,300
Lucas	14	883,500	1,145,400	65,600
Medina	12	825,800	1,053,500	60,300
Sandusky	12	825,800	1,053,500	60,300
Total	**59**	**3,848,700**	**4,952,000**	**283,500**

a Economic & Policy Resources, 2015

Another indicator of the economic impacts of a project is to calculate the total project output. Output is calculated by applying a multiplier[6] to the total expenditures on goods and services directly related to construction of the NGT Project. The purpose of calculating output is to capture the indirect impact that these expenditures could have on the local economy beyond their direct effect (e.g., purchases). For example, the total output of the NGT Project in Michigan is estimated to be $254 million in the state and $183 million in the southeast Michigan region (i.e., Lenawee, Monroe, and Washtenaw Counties). Statewide, the jobs that would be created resulting from the NGT Project are estimated at 1,533 with a total labor income of approximately $97 million. For the three-county southeast region, jobs created are estimated at 1,189 with projected labor income of $71 million for the duration of the NGT Project.

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[3] Direct effects are the initial economic changes resulting from the activity or policy that takes place associated with the industry immediately affected.

[4] Indirect effects are secondary economic changes associated with the purchase of materials and supplies and services for production of the NGT Project.

[5] Induced effects are economic changes associated with the disposable income that new workers with the NGT Project and linked businesses spend on household goods and services.

[6] Output is calculated using Regional Input-Output Modeling System multipliers developed by the U.S. Department of Commerce's Bureau of Economic Analysis. Regional Input-Output Modeling System multipliers are available by state, region, county, and metropolitan area throughout the United States: www.bea.gov/index.htm.

Tax impacts would also be generated by *ad valorem* taxes, which are property taxes that would be assessed per year, resulting in additional long-term benefits to the local and regional economy. The *ad valorem* experienced would depend on the length and amount of project facilities in a county. The total estimated *ad valorem* tax associated with the NGT Project would generate approximately $2.1 billion in the first 60 years of service, with approximately $1.9 billion distributed in Ohio and approximately $0.2 billion in Michigan.

Overall, the NGT Project would result in beneficial economic effects on the state and local economies by creating a short-term stimulus to the affected areas through payroll expenditures, local purchases of consumables and project-specific materials, and sales tax. Furthermore, operation of the NGT Project would result in long-term *ad valorem* property tax benefits for the counties in the NGT Project area.

4.10.9.2 TEAL Project

Construction and operation of the TEAL Project would have a beneficial economic effect on local sales tax revenue. Texas Eastern estimates that during construction, over $45 million in direct construction labor would be spent. Additional economic effects would be realized through the local purchase of construction materials. Texas Eastern estimates that a total of $47.5 million would be spent on construction materials, of which about $4.7 million would be spent locally. Although most construction materials would be purchased from outside vendors, common supplies (e.g., stone and concrete) would likely be purchased from local and state vendors. Economic effects would be realized through payroll and sales taxes, which may be beneficial at the local, county, and state levels; however, these effects would be limited to the duration of the construction period.

During operations and maintenance, Texas Eastern estimates five employees would be needed and the total annual income would be approximately $400,000. Approximately $981,000 is estimated in annual expenditure during operations, although the local proportion has not yet been determined. Property taxes for the first 60 years of the TEAL Project are estimated to generate $184 million.

As with the NGT Project, no long-term negative economic effects are expected. Any damage to local infrastructure would be repaired and most pre-construction property uses would be allowed.

4.10.10 Environmental Justice

Executive Order 12898 *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations* requires federal agencies to consider if impacts on human health or the environment (including social and economic aspects) would be disproportionately high and adverse for minority and low-income populations and appreciably exceed impacts on the general population or other comparison group. Consistent with Executive Order 12898, the CEQ called on federal agencies to actively scrutinize the following issues with respect to environmental justice (CEQ, 1997a):

- The racial and economic composition of affected communities;
- Health-related issues that may amplify project effects on minority or low-income individuals; and
- Public participation strategies, including community or tribal participation in the process.

The EPA's Environmental Justice Policies focus on enhancing opportunities for residents to participate in decision making. The EPA states that Environmental Justice involves meaningful involvement so that:

> (1) potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that would affect their environment and/or health; (2) the public's contributions can influence the regulatory agency's decision; (3) the concerns of all participants involved would be considered in the decision-making process; and (4) the decision-makers seek out and facilitate the involvement of those potentially affected (EPA, 2011).

As described in section 1.3, there have been many opportunities for the public to comment on and provide input about the Projects. All public documents, notices, and meetings were made readily available to the public during our review of the Project. NEXUS and Texas Eastern met with many different stakeholders during the initial development of the route including local residents and affected landowners. These efforts included NEXUS and Texas Eastern holding a number of open houses in the Projects area for the affected communities and local authorities. NEXUS and Texas Eastern also established, and are maintaining, a website to share information about the Projects with the public.

NEXUS and Texas Eastern also used the FERC's pre-filing process (see section 1.3). One of the major goals of this process is to increase public awareness and encourage public input regarding every aspect of a project before an application is filed. As part of this process, FERC staff participated in all of NEXUS' and Texas Eastern's open houses to receive input from the public about the Projects and to explain FERC's review process and the opportunities it provides for public input. Interested parties have had, and will continue to be given, opportunities to participate in the NEPA review process. To date, this has included the opportunity to participate in FERC's public scoping meetings to identify concerns and issues that should be covered in the EIS, as well as the opportunity to submit written comments about the Projects to FERC. Interested parties will also be invited to comment on the draft EIS either electronically, in writing, or at the draft EIS comment meetings, which will be held in the Projects area several weeks after the issuance of the draft EIS. All comments on the draft EIS will be responded to in the final EIS.

Based on published EPA guidance concerning environmental justice reviews (1998), we used a three-step approach to conduct our review. These steps are:

1. Determine the existence of minority and low-income populations.
2. Determine if resource impacts are high and adverse.
3. Determine if the impacts fall disproportionately on environmental justice populations.

In this review, a low-income population exists when the percentage of all persons living below the poverty level is more than the percentage for the state where the census tract is located. For the purposes of this review, a minority population exists when the:

1. total racial minorities in a U.S. Census Bureau-defined census tract (U.S. Census Bureau, 2013a) are more than 50 percent of the tract's population;
2. percentage of a racial minority in a census tract is "meaningfully greater"[7] than in the comparison group;

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[7] "Meaningfully greater" is defined in this analysis as minority or ethnic populations that are at least 10 percentage points more than in the comparison group, which was the population of the county where the census tract was located.

3. total ethnic minorities in a census tract are more than 50 percent of tract's population; or

4. percentage of ethnic minorities in a census tract is meaningfully greater than in the comparison group.

Racial and ethnic minorities include: African American/Black, Native American or Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, two or more races, and other races, as well as the Hispanic or Latino ethnicity.

The tables in appendices L-3 to L-5 provide an overview of the racial and economic characteristics of the population in the census tracts within a 1-mile radius of NGT and TEAL Projects facilities. In Ohio, minorities comprise 17.1 percent of the total population. The percentage of minorities in the Ohio census tracts that would be crossed by NGT Project facilities ranges from 0.9 to 36.1 percent. In 1 of the 64 census tracts, the minority population is meaningfully greater than that of the state. In Michigan, minorities comprise 20.7 percent of the total population. The percentage of minorities in the Michigan census tracts that would be crossed by NGT Project facilities ranges from 0.0 to 77.6 percent. In 12 of the 28 census tracts, the minority population is meaningfully greater than that of the state. No census tract within 1 mile of TEAL Project facilities have minority populations that meet the thresholds discussed in this section.

As stated previously, for the purpose of this analysis, a low-income population exists when the percentage of all persons living below the poverty level is greater than the percentage for the state where the census tract is located. In Ohio, 15.8 percent of all persons live below the poverty level. Four (4) of the 64 census tracts in Ohio within a 1-mile radius of NGT Project facilities have a higher percentage of persons living below the poverty level when compared to the state. In Michigan, 16.8 percent of all persons live below the poverty level. Eight (8) of the 28 census tracts in Michigan within a 1-mile radius of NGT Project facilities have a higher percentage of persons living below poverty-level when compared to the state. Two census tracts in Ohio within 1 mile of TEAL Project facilities have a higher percentage of persons living below poverty-level when compared to the state.

Section 4.12 describes the localized risks to public safety that could result from a pipeline failure and describes how applicable safety regulations and standards would minimize the potential for these risks. Because the Projects would generally traverse rural areas, the number of persons who would be at risk of injury due to a pipeline failure would be low, and there is no evidence that such risks would be disproportionately borne by any racial, ethnic, or socioeconomic group.

NEXUS and Texas Eastern would implement a series of measures that would minimize potential impacts on the nearby communities, including environmental justice communities located near Project facilities. For instance, NEXUS and Texas Eastern propose to employ proven construction-related practices to control fugitive dust, such as application of water or other commercially available dust control agents on unpaved areas subject to frequent vehicle traffic. Similarly, noise control measures would be implemented by NEXUS and Texas Eastern during construction and operation of the Projects. Additionally, NEXUS and Texas Eastern would ensure that the noise attributable to the compressor stations would be less than 55 dBA L_{dn} at nearby NSAs, and the increase in the overall noise due to the new stations would be well below the threshold considered perceptible to the human ear.

Based on the estimated emissions from operation of the proposed Projects facilities and our review of NEXUS' and Texas Eastern's modeling analysis, we have determined that the Projects would comply with NAAQS, which are protective of human health, including children, the elderly, and sensitive populations (see section 2.7.1). The Projects facilities would also be designed, constructed, operated, and maintained in accordance with or to exceed PHMSA's minimum federal safety standards in 49 CFR 192. These regulations, which are intended to protect the public and to prevent natural gas facility accidents and failures, apply to all areas along the proposed pipeline routes regardless of the presence or absence of minority or low income populations.

The impacts on the natural and human environment from constructing and operating the NGT and TEAL Projects are identified and discussed throughout the environmental analysis section of this document. As discussed throughout this EIS, potentially adverse environmental effects associated with the NGT and TEAL Projects would be minimized and/or mitigated, as applicable, and are not characterized as high and adverse. Although the racial and economic composition of the counties and census tracts that would be crossed by Projects facilities have racial, ethnic, and economic deviations from state-level statistics, there is no evidence that the Projects would cause a disproportionate share of high and adverse environmental or socioeconomic impacts on any racial, ethnic, or socioeconomic group.

Construction of the Projects would result in minor positive impacts on the local economy due to increases in payroll taxes, purchases made by the workforce, and expenses associated with the acquisition of material goods and equipment. Operation of the Projects would also have a minor to moderate positive effect on the counties and local communities due to the increase to property taxes that would be collected.

4.11 CULTURAL RESOURCES

Section 106 of the NHPA, as amended, requires the FERC to take into account the effects of its undertakings on properties listed or eligible for listing on the NRHP and to afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on the undertaking. NEXUS and Texas Eastern, as non-federal parties, are assisting the FERC in meeting our obligations under Section 106 by preparing the necessary information, analyses, and recommendations, as allowed by the ACHP's regulations for implementing Section 106 at 36 CFR 800.2(a)(3).

4.11.1 Cultural Resources Surveys

4.11.1.1 NGT Project

NEXUS identified the archaeological area of potential effect (APE) for direct project effects as the right-of-way for construction of the pipeline and the footprint of off-corridor facilities and extra workspaces. To ensure full coverage of the APE, NEXUS surveyed a 300-foot-wide corridor with expansions of the corridor as needed for crossing waterbodies or manmade features. NEXUS surveyed a 50-foot-wide corridor centered on proposed access roads and the entire footprint of compressor stations and ancillary facilities. The APE for indirect project effects includes the APE for direct effects, plus those properties immediately adjacent to the pipeline corridor, off-corridor facilities, and access roads. NEXUS has completed Phase I cultural resources surveys of 77 percent of the archaeological APE in Michigan and 92 percent of the archaeological APE in Ohio. NEXUS would survey the remaining mainline route and ancillary facilities and submit the results of surveys in future survey reports.

The APE for historic architectural properties consists of the 300-foot-wide study corridor, plus any areas where changes to the landscape (through removal of vegetation or modifications of surface topography, for example) lie within view of a historic resource, which is defined as any building or structure at least 50 years of age. Viewsheds to and from the NGT Project corridor(s) were terminated where vegetation and/or topography obstructed lines-of-sight, up to 0.8 kilometer (0.5 mile) on each side of the study corridor. The architectural APE also includes a distance of up to 0.8 kilometer (0.5 mile) surrounding the proposed aboveground facilities, including the compressor station and M&R station sites, MLVs, access roads, and proposed communication towers. NEXUS has completed 100 percent of the surveys of the historic architectural properties APEs in Michigan and Ohio.

NEXUS submitted a Phase I Cultural Resources Survey report covering both archaeological resources and historic architectural properties for Michigan to the FERC and Michigan State Historic Preservation Office (SHPO). Subsequently, NEXUS submitted an Addendum Phase I report to the FERC and the Michigan SHPO. NEXUS submitted a Phase I Archaeological Survey report and an Historic Architectural Survey report for Ohio to the FERC and the Ohio SHPO. Subsequently, NEXUS submitted an Addendum Phase I report to the FERC and the Ohio SHPO.

Michigan Archaeological Resources

Four cultural resources were newly identified during the archaeological surveys in Michigan, including two associated with the pre-contact period (20WA478 and 20WA479) and two associated with the post-contact period (20LE392 and 20WA480). Site 20WA480 is associated with the 1930-1940s Camp Willow Run and the Martha and Mary Chapel developed by Henry Ford. The area was converted for use during World War II as the 3509th Army Airbase. Avoidance or additional evaluation testing of this site was recommended in order to assess its NRHP-eligibility. The remaining three sites have been recommended as not eligible for the NRHP, and no further work was recommended.

One previously recorded pre-contact site, 20LE258, was located within the mainline route corridor; however, survey of the site area has not yet been completed. Additional work was recommended for this site to assess its NRHP-eligibility. NEXUS has not yet filed the Michigan SHPO's comments on the archaeological aspects of the Phase I report or Addendum report.

Michigan Historic Architectural Properties

A total of 66 historic architectural properties were identified during the architectural survey in Michigan. Five additional resources were identified prior to a realignment of the pipeline survey corridor that resulted in removal of these properties from the APE; as such, they were not assessed.

Sixty-three (63) of the historic architectural properties identified were recommended as not eligible for the NRHP, and no additional evaluation was recommended. Of these, CAN-070 represents a saddle dam associated with archaeological site 20WA480, discussed above; the NGT Project would avoid the dam. The remaining 62 historic architectural properties represent 22 farmsteads, 33 residences or residential complexes, 2 silos, 3 commercial/industrial properties, and 2 barns. Three historic architectural properties were recommended as eligible for the NRHP.

The Willow Run Tri-Level Grade Separation Historic District (CAN-071), listed on the NRHP, encompasses the Willow Run Expressway that was built to provide direct access to the Willow Run airport and now razed industrial complex (associated with newly identified site 20WA480). Two discontinuous interchanges include tri-level grade separation structures that allow three layers of traffic over and under U.S. Highway 12. The eastern tri-level bridge interchange is between 100 and 270 feet east of the NGT Project survey corridor, and thus would be avoided. In addition, NEXUS proposes to utilize the HDD technique to cross U.S. Highway 12. The western tri-level bridge interchange is over 700 feet west of the survey corridor and was therefore not surveyed or assessed.

The remaining two historic architectural properties (CAN-022 and CAN-026) were recommended as eligible for the NRHP. Both properties were characterized as farmstead complexes dating from the turn of the 19th century. The NGT Project centerline is 460 feet east of CAN-022 and 475 feet southwest (due to a project alignment modification) of CAN-026 within open agricultural fields; as such, both properties would be avoided. In addition, due to the alignment modification, NEXUS no longer plans to cross the row of trees northwest of the CAN-026 building complex. NEXUS has not yet filed the Michigan SHPO's comments on the architectural aspects of the Phase I report or Addendum report.

In a letter dated October 28, 2015, the Washtenaw County Office of Community and Economic Development responded to our NOI. They confirmed that the NGT Project does not cross any designated NRHP-eligible or state-listed properties or historic districts within Washtenaw County. However, they requested additional consideration of three properties on Tuttle Hill Road and Judd Road that were adjacent to the NGT Project corridor. NEXUS' historic architectural properties survey reviewed each property and its proximity to the NGT Project APE. All three properties are situated outside of the architectural APE for the pipeline corridor and the viewsheds of each property are obstructed by either trees or distance; as a result, these properties were not further assessed for eligibility for the NRHP. In addition, NEXUS contacted the Washtenaw County Office of Community and Economic Development requesting information about any historic structures, sacred sites, archaeological sites, or other areas of sensitivity. NEXUS has not received a response.

Ohio Archaeological Resources

Archaeological surveys in Ohio resulted in the identification of 172 archaeological resources: 129 pre-contact archaeological sites or isolated finds; 28 post-contact archaeological sites (including one site identified by two broken headstones [33ER586]) or isolated finds; and 15 pre- and post-contact archaeological sites or isolated finds. NEXUS recommended 9 archaeological sites in Ohio as potentially eligible for the NRHP; 159 of the archaeological sites or isolated finds as not eligible for the NRHP; and 4 resources (33ME416, 33SU614, 33SU617, and 33SU621) have not been assessed for NRHP-eligibility as they extend into abutting parcels where landowners have denied survey permission. Site 33ER586, associated with the Squire family, was identified within the mainline route study corridor; however, it is not located within the permanent easement or construction workspace and would be avoided and preserved in place.

Of the nine archaeological sites in Ohio recommended as potentially eligible for the NRHP, seven sites (33SA618, 33SA626, 33SA627, 33ST766, 33ST1095, 33CO975, and 33CO976) have been avoided through route modifications or restricting workspace and would be preserved in place. Mainline construction would avoid site 33ER600 by utilizing HDD beneath the adjacent Huron River. NEXUS indicated that one site (33ER613) could not be avoided by the NGT Project and conducted Phase II investigations at this site. As a result of these investigations, the site was recommended as not eligible for the NRHP. NEXUS has not yet provided the resulting Phase II report to the FERC and Ohio SHPO.

In a letter dated February 1, 2016, the Ohio SHPO commented on the Phase I Archaeological Survey report and concurred with the majority of eligibility and further work recommendations, but recommended Phase II testing and evaluation of two additional sites, 33ER609 and 33LN325, as well as a re-assessment of NRHP-eligibility and recommendations for 12 sites (33CO971, 33ER621, 33FU193, 33FU198, 33FU204, 33FU207, 33LN316, 33ME402, 33SA63, 33SA405, 33SA622, and 33ST1096). The SHPO also requested avoidance plans and additional information. NEXUS has not yet provided documentation that it has addressed the SHPO's comments or provided the SHPO's comments on the Addendum report.

During the scoping period, we received comments related to known archaeological sites and cultural resources that may be affected by the NGT Project. Specifically, commenters were concerned about several locations in Ohio with unique resources that may be affected by the NGT Project, including:

- NRHP-listed Dodge Site (33WO09/NRHP 87000693);
- Roche De Boeuf and the Interurban Bridge;
- Fallen Timber Battlefield;

- Missionary Island; and
- the City of Green's Ariss Park area.

The NRHP-listed Dodge Site is located approximately 0.3 mile north of the NGT Project area; Roche de Beouf and the Interurban Bridge are approximately 0.4 mile north of the NGT Project Mainline Route; and the Fallen Timbers Battlefield is located approximately 5.5 miles from the Waterville Compressor Station and 4.9 miles north of the location where the NGT Project crosses the Maumee River. Neither the NGT Project's Mainline Route nor its proposed ancillary facilities cross the Dodge Site, Roche De Boeuf, or the Fallen Timber Battlefield properties. As such, these resources would not be directly or indirectly impacted by construction of the NGT Project. NEXUS proposes to utilize the HDD technique to cross the Maumee River and Missionary Island. Utilization of the HDD technique would avoid any direct or indirect impacts on the surface of Missionary Island and its unique resources.

We received several comments regarding the unique resources within the City of Green's Ariss Park area (i.e., archaeological sites and areas with religious significance to Native Americans, and old growth forests within the park area and near the Mucklow properties). Section 4.9.5.3 discusses impacts associated with tree clearing. At this time, NEXUS has not conducted an archaeological survey of this property. If cultural resources are identified as a result of the archaeological survey, NEXUS would avoid or mitigate impacts on any significant cultural resources. In the absence of more specific information, it is not possible to determine what culturally significant resources are being referenced by commenters.

A commenter indicated a potential 1870- to 1890-era petroleum exploration and extraction site may be located on private farmland that would be crossed by the NGT Project. At this time, NEXUS has not conducted an archaeological survey of this property because landowner permission for survey is pending; however, the Ohio SHPO has no record of an archaeological site being recorded on the property. If cultural resources are identified as a result of the archaeological survey, NEXUS would avoid or mitigate impacts on any significant cultural resources.

A commenter expressed concern regarding potential impacts on six archaeological sites located on private property in Fulton County, Ohio (33FU189-33FU194) that were previously excavated by the University of Toledo in conjunction with the Fulton County Historical Society. Archaeological surveys conducted by NEXUS relocated site 33FU193 within the APE and recommended the site as not eligible for the NRHP. The Ohio SHPO, in its letter of February 1, 2016, requested additional discussion of the site's significance and integrity. This information is currently pending. The remaining sites are located outside of the APE and, as such, would not be directly or indirectly affected by the NGT Project.

Ohio Historic Architectural Properties

NEXUS identified 128 historic architectural properties within the NGT Project study areas in Ohio. Of these 128 historic architectural properties, 2 are NRHP-listed historic districts; 3 properties have been determined as eligible for the NRHP; and 34 properties (including 1 cemetery) have been recommended as potentially eligible for the NRHP. One resource (STA0381408) could not be assessed for NRHP-eligibility due to lack of access to the property. The remaining 88 historic architectural resources identified represent 42 farmstead complexes, 41 private residences, 2 cemeteries, 1 school/church, 1 abandoned railroad, and a segment of Neapolis-Waterville Road. All were recommended as not eligible for the NRHP, and no further work is recommended.

The Valley Railroad Historic District (NR85001123) and the John Isham Farmstead Historic District (NR92001159) are currently listed on the NRHP. The Valley Railroad Historic District represents an active railroad segment of the Valley Railway, currently operated by Conrail, whose NRHP-listed boundaries are currently over 11 miles northwest of the NGT Project pipeline crossing. While the NGT Project would have no direct or indirect impacts on the District itself, NEXUS proposes to use the boring method to install the proposed pipeline below a rail segment that is recommended as eligible for the NRHP for its association with the District. The John Isham Farmstead Historic District was listed for its significance in the area of exploration and settlement by New England settlers in the 19th century. NEXUS proposes to install the pipeline via open trench and HDD. All activity would be within an active agricultural field, with no proposed impacts on the contributing wooded lots surrounding the farmstead. Therefore, it was recommended that neither of these properties would be adversely affected by the NGT Project.

Two properties have been previously determined as eligible for, but not currently listed on, the NRHP. These include the St. Joseph School (STA0019208) and Archner Farmhouse (SAN0007402). The St. Joseph School and the associated parish house (STA0380808) that was recommended as potentially eligible contribute to the history of early French Catholic settlement in Maximo, Ohio. The Archner Farmhouse is significant for its Pre-Classic I-house type. As no permanent effects to the viewshed would occur because the pipeline would be installed underground within cultivated fields, it was recommended that none of these structures would be adversely affected by the NGT Project.

Two farmstead complexes (STA0380908 and STA0380105), one barn (FUL0037512), and the Mountain of Faith Hope Church (SUM0370119) have been recommended as eligible or potentially eligible for the NRHP. Because no permanent effects to the viewshed would occur as the pipeline would be installed underground within cultivated fields that are visually obstructed from the structures by distance or vegetative screens, it was recommended that none of these structures would be adversely affected by the NGT Project. An additional potentially eligible farmstead (ERI0264607) would be located along a proposed access road. Because the road is existing, no adverse effect was recommended.

A total of 15 active historic railroad segments have been identified by NEXUS and recommended as potentially eligible for the NRHP. These segments represent the Baltimore and Ohio Railroad (WOO0092912), Akron Barberton Cluster Railway (MED0067918), Conrail Railroad (COL0099501 and STA0381211), CSX Railroad (LOR0231514, SUM0370619, WOO0093118, and WOO0094010), Northern Ohio & Western Railroad (SAN0059502), Norfolk Southern Railroad (ERI0265302, ERI0265507, FUL0044710, and SAN0059707), and the Wheeling & Lake Erie Railway (MED0067710 and STA0381111). NEXUS plans to construct the pipeline by boring or HDD beneath these active railroad segments. Therefore, it was recommended that there would be no adverse effect to these railroad resources.

Twelve aboveground resources characterized as inactive or abandoned railroads have been recommended as potentially eligible for the NRHP. Of these, four inactive railroad segments (ERI0265406, LUC0470615, SAN0059807, and WOO0093910) and three abandoned railroads that have been repurposed as recreational trails (STA0381308 HEN0065003, and SAN0059607) would be crossed by the open-cut trenching method. Each segment would be restored to its pre-existing condition and, if applicable, returned to operation as a recreational trail upon NGT Project completion. MED0067810 is characterized as both an active railroad line with a cut-off segment converted to a trail; NEXUS proposes to install the pipeline via HDD and open trench, respectively. The remaining four railroad segments would be avoided during construction by directionally boring under each property. Of these, ERI0265607 and LOR0231413 are inactive rail lines, while LOR0231320 and FUL0044109 represent railroad segments that have been converted to recreational trails. Therefore, it was recommended that there would be no adverse effect for these abandoned railroad or rail/trail segments.

Two additional transportation-related properties would be crossed by the NGT Project. The Ohio and Erie Canal and Towpath (SUM0249119) has been determined eligible for, but not currently listed on, the NRHP, while the Milan Canal and Towpath (ERI0264807) has been recommended as potentially eligible for the NRHP. NEXUS plans to construct the pipeline by boring or HDD beneath these features. Therefore, it was recommended there would be no adverse effect.

Three resources are historic/modern Euro-American cemeteries (STA0380205, STA0380608, and SUM0369619). One of these, the St. Joseph's Cemetery (STA0380608) was recommended as potentially eligible for the NRHP. All three would be avoided by the construction workspace. Due to the proximity of the pipeline corridor to each cemetery, NEXUS would institute a buffer zone (from 60 to 110 feet, depending on the surrounding conditions) between the cemeteries and the construction workspace to prohibit inadvertent encroachment on these properties.

In its letter of February 1, 2016, the Ohio SHPO concurred with most of the recommendations and conclusions in the Historic Architectural Survey report, but requested additional information and assessment of 13 properties (STA0380908, STA0381408, STA0380105, STA0380505, ERI0265108, ERI0265008, ERI0264908, ERI0264607, SAN0007402, LUC0337318, MED0019710, NR75001383 [Abbott-Page House], and NR92001159 [John Isham Farmstead Historic District]). The SHPO also requested additional information regarding canal crossings and an avoidance plan for the identified cemeteries. NEXUS has not yet provided documentation that it has addressed the SHPO's comments or provided the SHPO's comments on the Addendum report.

During the scoping period, we received comments related to known historic architectural resources that may be affected by the NGT Project. Specifically, commenters were concerned about several locations in Ohio with unique resources that may be affected by the NGT Project:

- Dunlap Farmstead (33WO41);
- Abbott-Page House (NR75001383) and Fries' Landing; and
- Overmyer-Waggoner-Roush Farm Historic District (Creek Bend Farm Park) (NR83002055).

Neither NGT Project's Mainline Route nor its proposed ancillary facilities cross the Dunlap Farmstead property; therefore, this resource would not be impacted by construction of the NGT Project.

The NRHP-listed Abbott-Page House is located approximately 330 feet south of the proposed permanent right-of-way for the NGT Project. The Abbott-Page House is currently under NRHP review for an amendment to expand the site from a listed property to a historic district. Fries' Landing was located on the Page property along the Huron River in the 1870s and was the center of shipbuilding and shipping local goods to markets via the Milan Canal. In this area, NEXUS proposes to install the NGT Project pipeline via an HDD that would extend from the west side of Mudbrook Road to the east side of the Huron River. The HDD would extend below potential archaeological deposits associated with Fries' Landing and would minimize viewshed impacts on the Abbott-Page House. At this time, NEXUS has not conducted a visual assessment of this property due to denied access.

As currently proposed, the permanent right-of-way of the NGT Project's Mainline Route is located approximately 430 feet south of the NRHP-listed Overmyer-Waggoner-Roush Farm Historic District (also known as the Creek Bend Farm Park), and the main house and associated outbuildings and the Nature Center are located approximately 0.7 mile north of the proposed right-of-way. NEXUS proposes to cross Muddy Creek using the open-cut method during construction and would reduce the width of the construction workspace to minimize impacts on the riparian corridor. Following completion of construction, the crossing of Muddy Creek would be restored to preconstruction conditions in accordance with NEXUS' *E&SCP*.

During the scoping period, we received comments that there may be an abandoned graveyard on a parcel impacted by the NGT Project. The lot referenced by the commenter is located in Middletown Township, Wood County, Ohio and is approximately 2.25 miles north of the NGT Project APE. As such, there would be no impacts by the NGT Project to potential burials on this property.

4.11.1.2 TEAL Project

Texas Eastern identified the APE for direct effects on cultural resources as a 300-foot-wide survey corridor for the pipeline with expansions of the corridor as needed for crossing waterbodies or manmade features, a 50-foot-wide corridor for access roads, and the actual footprint of all aboveground facilities. The APE for indirect project effects includes the APE for direct effects, plus those properties immediately adjacent to the pipeline corridor, off-corridor facilities, and access roads.

Following background research, Texas Eastern conducted a pedestrian walkover and systematic shovel testing for those areas without sufficient surface visibility and the potential for subsurface cultural material. Texas Eastern followed Phase I cultural resources survey methods mandated in the Ohio state guidelines using a standard 15-meter survey transect, conducting pedestrian survey for those areas with greater than 50 percent ground visibility, and systematic shovel testing in areas with less than 50 percent ground visibility. Texas Eastern has completed surveys for 100 percent of the archaeological APE in Ohio.

The APE for effects on architectural resources was defined as the APE for direct effects, plus areas where land use may change and any locations from which the TEAL Project may be visible up to 0.5 mile surrounding the aboveground facility. Texas Eastern has completed 100 percent of the surveys for the architectural properties APE.

Texas Eastern submitted a Phase I Cultural Resource Survey report covering both archaeological resources and architectural properties to the FERC and Ohio SHPO.

Ohio Archaeological Resources

Two pre-contact isolated finds (33CO965 and 33CO966) were identified during the archaeological surveys for the TEAL Project, both near the Salineville Compressor Station. No other archaeological resources were identified at any of the other TEAL Project components. Both isolated finds have been recommended as not eligible for the NRHP, and no further work was recommended. Texas Eastern has not yet filed the SHPO’s comments on the archaeological aspects of the Phase I report.

Ohio Historic Architectural Properties

Texas Eastern identified 16 historic architectural properties within the TEAL Project study area. The 16 identified properties are characterized as previously recorded residences (BEL0165703, MOE0027104, MOE0048203, and MOE0050004); previously recorded farmsteads (JEF0097615, JEF0097715, MOE0028804, MOE0047204, MOE0049704, MOE0049904, and MOE0050104); and newly recorded private residences (COL0099312, COL0099612, COL0099712, MOE0053804, and MOE0053904). All 16 properties were recommended as not eligible for the NRHP, and no further work was recommended. Texas Eastern has not yet filed the SHPO’s comments on the architectural aspects of the Phase I report.

4.11.2 Native American Consultations

4.11.2.1 NGT Project

On April 8, 2015 and between February 22 and 24, 2016, we sent our NOI and follow-up letters, respectively, to the 42 federally recognized Native American tribes identified on table 4.11.4-1. The Leech Lake Band of the Minnesota Chippewa Tribe, Saginaw Chippewa Indian Tribe of Michigan, and Seneca Nation of Indians responded that there are no known sites of religious or cultural importance in these areas, or had no issues; however, they requested notification if unanticipated discoveries are encountered during construction. The Bois Forte Band of the Minnesota Chippewa Tribe indicated they were not interested in consulting on the NGT Project. No further responses have been received to date.

In addition to our contacts with the tribes, NEXUS contacted the same 42 tribes to provide them an opportunity to identify any concerns related to properties of traditional religious or cultural significance that may be affected by the NGT Project. A summary of correspondence with the tribes is provided in table 4.11.2-1.

TABLE 4.11.2-1

Consultation with Federally Recognized Native American Tribes for the NGT Project

Tribe Name	Date(s) Correspondence Sent	Date(s) Response Received
Absentee-Shawnee Tribe of Oklahoma	10/28/2014; 4/8/2015; 2/22/2016	No response received to date.
Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation	12/11/2014; 4/8/2015; 2/22/2016	No response received to date.
Bay Mills Indian Community	12/11/2014; 4/8/2015; 2/22/2016	2/25/2015; 3/12/2015
Bois Forte Band (Nett Lake) of the Minnesota Chippewa Tribe	12/11/2014; 4/8/2015; 2/22/2016	2/29/2016
Chippewa-Cree Indians of the Rocky Boy's Reservation	12/11/2014; 4/8/2015; 2/8/2016; 2/22/2016	2/2/2015; 3/25/2015
Citizen Potawatomi Nation	10/28/2014; 4/8/2015; 2/22/2016	No response received to date.
Delaware Nation	10/28/2014; 1/27/2015; 4/8/2015; 2/22/2016	1/6/2015; 2/10/2015; 2/11/2015
Delaware Tribe of Indians	10/28/2014; 11/6/2014; 4/8/2015; 2/8/2016; 2/22/2016	11/17/2014; 1/28/2015; 3/16/16
Eastern Shawnee Tribe of Oklahoma	10/28/2014; 4/8/2015; 2/22/2016	No response received to date.
Fond du Lac Band of the Minnesota Chippewa Tribe	12/11/2014; 4/8/2015; 2/22/2016	No response received to date.
Forest County Potawatomi	10/28/2014; 4/8/2015; 2/22/2016	No response received to date.
Grand Portage Band of the Minnesota Chippewa Tribe	12/11/2014; 4/8/2015; 2/22/2016	No response received to date.
Grand Traverse Band of Ottawa and Chippewa Indians	12/11/2014; 2/4/2015; 4/8/2015; 2/22/2016	No response received to date.
Hannahville Indian Community	10/28/2014; 4/8/2015; 2/22/2016	No response received to date.
Keweenaw Bay Indian Community	12/11/2014; 4/8/2015; 2/22/2016	No response received to date.
Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin	12/11/2014; 4/8/2015; 2/23/2016	No response received to date.
Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin	12/11/2014; 4/8/2015; 2/23/2016	No response received to date.
Lac Vieux Desert Band of Lake Superior Chippewa Indians	12/11/2014; 4/8/2015; 2/23/2016	12/29/2014
Leech Lake Band of the Minnesota Chippewa Tribe	12/11/2014; 4/8/2015; 2/23/2016	2/13/2015
Match-e-be-nash-she-wish Band of Potawatomi Indians of Michigan	12/11/2014; 4/8/2015; 2/23/2016	No response received to date.
Miami Tribe of Oklahoma	10/28/2014; 4/8/2015; 2/23/2016	3/17/2016
Mille Lacs Band of the Minnesota Chippewa Tribe	12/11/2014; 4/8/2015; 2/23/2016	No response received to date.

TABLE 4.11.2-1 (cont'd)

Consultation with Federally Recognized Native American Tribes for the NGT Project

Tribe Name	Date(s) Correspondence Sent	Date(s) Response Received
Minnesota Chippewa Tribe	12/11/2014; 4/8/2015; 2/23/2016	No response received to date.
Nottawaseppi Huron Band of the Potawatomi	12/11/2014; 12/16/2014; 4/8/2015; 2/8/2016; 2/23/2016	12/4/2014
Ottawa Tribe of Oklahoma	10/28/2014; 4/8/2015; 2/23/2016	No response received to date.
Peoria Tribe of Indians of Oklahoma	10/28/2014; 4/8/2015; 2/23/2016	11/7/2014
Pokagon Band of Potawatomi Indians	10/28/2014; 3/3/2015; 4/8/2015; 2/8/2016; 2/23/2016	11/26/2014; 2/25/2015; 2/26/2015; 3/2/2015
Prairie Band of Potawatomi Nation	10/28/2014; 4/8/2015; 2/22/2016	No response received to date.
Quechan Tribe of the Fort Yuma Indian Reservation	12/11/2014; 4/8/2015; 2/23/2016	No response received to date.
Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin	12/11/2014; 4/8/2015; 2/23/2016	No response received to date.
Red Lake Band of Chippewa Indians	12/11/2014; 4/8/2015; 2/23/2016	No response received to date.
Saginaw Chippewa Indian Tribe of Michigan	10/28/2014; 12/11/2014; 4/8/2015; 2/24/2016	3/3/2015
Sault Ste. Marie Tribe of Chippewa Indians of Michigan	12/11/2014; 4/8/2015; 2/24/2016	No response received to date.
Seneca-Cayuga Tribe of Oklahoma	10/28/2014; 4/8/2015; 2/24/2016	No response received to date.
Seneca Nation of Indians	10/28/2014; 11/12/2014; 4/8/2015; 2/24/2016	3/8/2016
Shawnee Tribe	10/28/2014; 4/8/2015; 2/24/2016	No response received to date.
Sokaogon Chippewa Community	12/11/2014; 4/8/2015; 2/24/2016	No response received to date.
St. Croix Chippewa Indians of Wisconsin	12/11/2014; 4/8/2015; 2/24/2016	No response received to date.
Tonawanda Band of Seneca Indians of New York	10/28/2014; 4/8/2015; 2/24/2016	No response received to date.
Turtle Mountain Band of Chippewa Indians of North Dakota	12/11/2014; 4/8/2015; 2/24/2016	No response received to date.
White Earth Band of Minnesota Chippewa Tribe	12/11/2015; 4/8/2015; 2/24/2016	1/5/2015
Wyandotte Nation	10/28/2014; 4/8/2015; 2/24/2016	No response received to date.

Of the 42 contacted tribes, the Bay Mills Indian Community, the Delaware Tribe of Indians, Lac Vieux Desert Band of Lake Superior Chippewa Indians of Wisconsin, Nottawaseppi Huron Band of the Potawatomi, and Pokagon Band of Potawatomi Indians requested additional information including a copy of the technical report to enable an evaluation of the NGT Project and its potential impacts on properties of traditional and cultural significance. NEXUS provided additional NGT Project information to the Pokagon Band of Potawatomi Indians on March 3, 2015, and to the Chippewa-Cree Indians of the Rocky Boy's Reservation on February 2, 2015. The Chippewa-Cree Tribe responded with a request to be consulted on the NGT Project due to the potential to affect properties of traditional and cultural significance. NEXUS provided the Phase I report to the Chippewa-Cree Indians of the Rocky Boy's Reservation, Delaware Tribe of Indians, Nottawaseppi Huron Band of the Potawatomi, and Pokagon Band of Potawatomi Indians on February 8, 2016. The Delaware Nation, Miami Tribe of Oklahoma, and Peoria Tribe of Indians of Oklahoma responded that no known sites of religious or cultural importance are located in the NGT Project area; however, they requested notification if unanticipated discoveries are encountered during construction. The White Earth Band of Minnesota Chippewa Tribe responded that no known sites of religious or cultural importance to their tribe are located in the NGT Project area. No response has been received from the 29 other Native American tribes.

4.11.2.2 TEAL Project

We sent our NOI for the TEAL Project to tribes in April 2015, and between February 22 and 24, 2016 we sent follow-up letters to the same 42 federally recognized tribes listed in table 4.11.2-1. The Bois Forte Band of the Minnesota Chippewa Tribe indicated they were not interested in consulting on the TEAL Project. No further responses have been received to date.

In addition to our contacts with the tribes, Texas Eastern provided information about the TEAL Project to eight federally recognized Native American tribes and offered an opportunity to identify traditional properties or provide comments about the TEAL Project. Tribes contacted included the Absentee-Shawnee Tribe of Oklahoma, Delaware Tribe of Indians, Delaware Nation, Eastern Shawnee Tribe of Oklahoma, Seneca-Cayuga Tribe of Oklahoma, Seneca Nation of Indians, Shawnee Tribe, and the Tonawanda Band of Seneca Indians of New York. The Delaware Tribe of Indians requested initiation of consultation on January 28, 2015, and they requested a copy of the technical report on February 20, 2015, to enable a reevaluation of the TEAL Project and its potential impacts on archaeological and human remains. The Phase I report was submitted to the tribe on February 8, 2016. No additional responses from Native American tribes have been received.

Table 4.11.4-2 provides the details regarding consultation with Native American tribes for the TEAL Project.

TABLE 4.11.2-2

Consultation with Federally Recognized Native American Tribes for the TEAL Project

Tribe Name	Date(s) Correspondence Sent	Date(s) Responses Received
Absentee-Shawnee Tribe of Oklahoma	1/20/2015; 2/22/2016	No response received to date.
Delaware Nation	1/20/2015; 2/22/2016	No response received to date.
Delaware Tribe of Indians	1/20/2015; 2/8/2016; 2/22/2016	1/28/2015; 2/20/2015
Eastern Shawnee Tribe of Oklahoma	1/20/2015; 2/22/2016	No response received to date.
Seneca-Cayuga Tribe of Oklahoma	1/20/2015; 2/22/2016	No response received to date.
Seneca Nation of Indians	1/20/2015; 2/22/2016	No response received to date.
Shawnee Tribe	1/20/2015; 2/22/2016	No response received to date.
Tonawanda Band of Seneca Indians of New York	1/20/2015; 2/22/2016	No response received to date.

4.11.3 Unanticipated Discovery Plans

The applicants provided plans for unanticipated discoveries addressing measures that would be implemented in the event that cultural resources or human remains are encountered during construction, and providing for the notification of interested parties, including Native American tribes, in the event of any discovery. NEXUS submitted the *Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains* to the FERC and Michigan and Ohio SHPOs. We requested revisions to the plan, and NEXUS resubmitted a revised plan. The SHPOs have not commented on the plan to date. Texas Eastern submitted the *Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains* to the FERC and Ohio SHPO. We requested revisions to the plan, and Texas Eastern resubmitted a revised plan. The Ohio SHPO has not commented on the plan to date. We find the revised plans to be acceptable.

4.11.4 General Impacts and Mitigation

Construction and operation of the NGT and TEAL Projects could potentially affect historic properties (i.e., cultural resources listed on or eligible for the NRHP). These historic properties could include prehistoric or historic archaeological sites, districts, buildings, structures, and objects, as well as locations with traditional value to Native Americans or other groups. Direct effects could include destruction or damage to all, or a portion, of an historic property. Indirect effects could include the introduction of visual, atmospheric, or audible elements that affect the setting or character of an historic property.

If NRHP-eligible resources are identified that cannot be avoided, the applicants would prepare treatment plans. Implementation of a treatment plan would only occur after certification of the project(s) and after the FERC provides written notification to proceed.

Compliance with Section 106 of the NHPA has not been completed for the Projects. NEXUS has not completed cultural resources surveys and/or NRHP evaluations, and consultation with the SHPOs for both Projects is not yet complete. To ensure that the FERC's responsibilities under the NHPA and its implementing regulations are met, **we recommend that:**

- **The applicants should not begin implementation of any treatment plans/measures (including archaeological data recovery); construction of facilities; or use staging, storage or temporary work areas and new or to-be-improved access roads <u>until</u>:**

  a. **Texas Eastern files with the Secretary, the Ohio SHPO's comments on the Phase I survey report for the TEAL Project;**

  b. **NEXUS files with the Secretary:**

     i. **the Michigan SHPO's comments on the Michigan Phase I survey report and Addendum report, and the Ohio SHPO's comments on the Ohio Addendum report;**

     ii. **documentation addressing the Ohio SHPO's February 1, 2016 comments, and any resulting SHPO comments on the documentation;**

     iii. **all outstanding survey reports, special studies, evaluation reports, and avoidance/treatment plans; and**

     iv. **comments on survey reports, special studies, evaluation reports, and avoidance/treatment plans from the Michigan and Ohio SHPOs, as applicable, as well as any comments from federally recognized Indian tribes;**

  c. **the ACHP is afforded an opportunity to comment on the undertaking if historic properties would be adversely affected; and**

  d. **the FERC staff reviews and the Director of OEP approves all cultural resources reports and plans and notifies the applicants in writing that treatment plans/mitigation measures may be implemented and/or construction may proceed.**

  All material filed with the Commission that contains <u>location, character, and ownership</u> information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering "<u>CONTAINS PRIVILEGED INFORMATION – DO NOT RELEASE</u>."

4.12 AIR QUALITY AND NOISE

4.12.1 Air Quality

Temporary air emissions would be generated during project construction, which would occur over a period of 2 years and across two states; however, most air emissions associated with the NGT and TEAL

Projects would result from the long-term operation of the new and modified compressor stations. Construction and operation air emissions and mitigation measures are discussed in section 4.12.1.3.

4.12.1.1 Existing Air Quality

Regional Climate

The NGT and TEAL Projects would be constructed in the continental Midwest portion of the United States. This region has four distinct seasons, each of which can produce potentially dangerous storms. Large temperature and precipitation extremes are common in the region, although precipitation is generally distributed evenly throughout the year. The mean annual precipitation averages about 40 inches annually, with between 17 and 37 inches of snowfall. Average daily temperatures are generally lowest in January and highest in July. Summers are warm and humid, with temperatures in excess 90 °F, and tend to be the rainiest season. During winter months, the average temperatures range from 8 °F to 35 °F, with occurrences of temperatures below 0 °F. Snowstorms and blizzards occur during winter months and droughts, tornadoes, and thunderstorms are characteristic of the region during the other seasons (NOAA, 2016).

Ambient Air Quality Standards

Ambient air quality is protected by federal and state regulations. The EPA has established NAAQS to protect human health and welfare. The NAAQS include primary standards that are designed to protect human health, including the health of "sensitive" individuals such as children, the elderly, and those with chronic respiratory problems. The NAAQS also include secondary standards designed to protect public welfare, including visibility, vegetation, animal species, economic interests, and other concerns not related to human health.

Standards have been set for seven principal pollutants that are called “criteria pollutants.” These criteria pollutants are ground-level ozone, carbon monoxide (CO), oxides of nitrogen (NO_X), sulfur dioxide (SO_2), fine particulate matter (inhalable particulate matter with an aerodynamic diameter less than or equal to 10 microns [PM_{10}] and less than or equal to 2.5 microns [$PM_{2.5}$]), and airborne lead (Pb). Ozone is not emitted into the atmosphere from an emissions source; it develops as a result of a chemical reaction between NO_X and VOCs in the presence of sunlight. Therefore, NO_X and VOCs are often referred to as ozone precursors and are regulated to control the potential for ozone formation. The current NAAQS are listed on the EPA’s website at www.epa.gov/criteria-air-pollutants/naaqs-table (EPA, 2015e).

Air quality control regions (AQCR) are areas established by the EPA and local agencies for air quality planning purposes, in which State Implementation Plans describe how the NAAQS would be achieved and maintained. The AQCRs are intra- and interstate regions such as large metropolitan areas where improvement of the air quality in one portion of the AQCR requires emission reductions throughout the AQCR. Each AQCR, or smaller portion within an AQCR (such as a county or multiple counties), is designated, based on compliance with the NAAQS, as attainment, unclassifiable, maintenance, or nonattainment, on a pollutant-by-pollutant basis. Areas in compliance, or below the NAAQS, are designated as attainment, while areas not in compliance, or above the NAAQS, are designated as nonattainment. Areas previously designated as nonattainment that have since demonstrated compliance with the NAAQS are designated as maintenance for that pollutant. Maintenance areas may be subject to more stringent regulatory requirements similar to nonattainment areas to ensure continued attainment of the NAAQS. Areas that lack sufficient data are considered unclassifiable and are treated as attainment areas.

The MDEQ and the OEPA have adopted the NAAQS. Counties designated as nonattainment and maintenance with the NAAQS are shown in table 4.12.1-1 (EPA, 2015f). All other counties are in attainment with the NAAQS. All counties affected by the TEAL Project are in attainment with the NAAQS.

TABLE 4.12.1-1

Attainment Status of NGT and TEAL Projects Counties

Control Region	Facility	County	Nonattainment	Maintenance
OHIO				
Canton-Massillon, OH	NGT Mainline Route	Stark		$PM_{2.5}$
Cleveland-Akron-Lorain, OH	NGT Mainline Route	Summit	2008 Ozone	$PM_{2.5}$
	NGT Mainline Route NGT Wadsworth Compressor Station	Medina		
	Mainline Route	Lorain	2012 $PM_{2.5}$ 2008 Ozone	
Wheeling, WV-OH	Colerain Compressor Station	Belmont		$PM_{2.5}$
MICHIGAN				
Detroit-Ann Arbor, MI	NGT Mainline Route	Monroe		$PM_{2.5}$
	NGT Mainline Route NGT NEXUS/Willow Run M&R Station	Washtenaw		
	NGT Mainline Route	Wayne	2010 SO_2 [a]	$PM_{2.5}$ CO [b]

[a] Wayne County, Michigan is in partial nonattainment with the 2010 SO_2 standard. No portion of the mainline would go through the designated SO_2 nonattainment area.

[b] Wayne County, Michigan is in partial maintenance with the CO standard. No portion of the mainline goes through the designated CO maintenance area.

The EPA now defines air pollution to include the mix of six long-lived and directly emitted greenhouse gases (GHG), finding that the presence of the following GHGs in the atmosphere may endanger public health and welfare through climate change: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. As with any fossil-fuel fired project or activity, the Projects would contribute GHG emissions. The principle GHGs that would be produced by the Projects are CO_2, CH_4, and N_2O. No fluorinated gases would be emitted by the Projects. GHG emissions are quantified and regulated in units of CO_2 equivalents (CO_2e). The CO_2e takes into account the global warming potential (GWP) of each GHG. The GWP is a ratio relative to CO_2 of a particular GHG's ability to absorb solar radiation as well its residence time within the atmosphere. Thus, CO_2 has a GWP of 1, CH_4 has a GWP of 25, and N_2O has a GWP of 298 (EPA, 2016).[8] We received comments on the amount and impacts of GHG emission the Projects would contribute. In compliance with EPA's definition of air pollution to include GHGs, we have provided estimates of GHG emissions for construction and operation, as discussed throughout this section. Impacts from GHG emissions (i.e., climate change) are discussed in more detail in section 4.14.8.9.

Air Quality Monitoring and Existing Air Quality

The majority of operational emissions from the Projects would result from the compressor stations. The EPA, state, and local agencies have established a network of ambient air quality monitoring stations to measure and track the background concentrations of criteria pollutants across the United States. The Lucas

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[8] These GWPs are based on a 100-year time period. We have selected their use over other published GWPs for other timeframes because these are the GWPs that the EPA has established for reporting of GHG emissions and air permitting requirements. This allows for a consistent comparison with these regulatory requirements.

County Health Department requested monitoring and disclosure of existing concentrations of pollutants. Data were obtained from representative air quality monitoring stations to characterize the background air quality for each compressor station and are presented in tables 4.12.1-10 and 4.12.1-11 in combination with the Projects' impact for comparison with the NAAQS.

4.12.1.2 Regulatory Requirements for Air Quality

New Source Review

New Source Review (NSR) is a pre-construction permitting program designed to protect air quality when air pollutant emissions are increased either through the modification of existing sources or through the construction of a new source of air pollution. In areas with good air quality, NSR ensures that the new emissions do not degrade the air quality, which is achieved through the implementation of the Prevention of Significant Deterioration (PSD) permitting program or state minor permit programs. In areas with poor air quality, Nonattainment NSR (NNSR) ensures that the new emissions do not inhibit progress toward cleaner air. In addition, NSR ensures that any large, new, or modified industrial source uses air pollution control technology. Air permitting of stationary sources has been delegated to each state. Based on the operating emissions presented in tables 4.12.1-4 through 4.12.1-9, an NSR permit would not be required for any of NEXUS' or Texas Eastern's compressor stations.

Commenters requested that all compressor stations associated with the NGT Project be considered a single source with respect to federal air quality permitting. Most states, including Michigan and Ohio, have been delegated authority by the EPA to implement federal air quality regulations. NEXUS and Texas Eastern submitted air quality applications to MDEQ and OEPA in accordance with federal and state requirements. Each state permitting agency is responsible for determining the facilities applicable under each permit.

Title V Operating Permits

Title V is an operating permit program run by each state. Texas Eastern's Colerain Compressor Station is an existing Title V minor source and would remain a minor source upon completion of the TEAL Project. The potential to emit (PTE) at the new NGT and TEAL Project compressor stations and the new M&R stations would not be subject to Title V.

The EPA issued the Title V GHG Tailoring Rule, which established permitting requirements and thresholds for GHGs. On June 23, 2014, the U.S. Supreme Court ruled that a facility may not be required to obtain a Title V permit based solely on GHG emissions; however, if a facility is a major stationary source based on the PTE of other regulated pollutants, a Title V permit may include permit requirements for GHGs.

New Source Performance Standards

The EPA promulgates New Source Performance Standards (NSPS) that establish emission limits and fuel, monitoring, notification, reporting, and recordkeeping requirements for new or significantly modified stationary source types or categories. NSPS Subpart JJJJ (*Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*) sets emission standards for NO_X, CO, and VOC. Subpart JJJJ would apply to the emergency generators at each of the new NGT and TEAL compressor and M&R stations. NEXUS and Texas Eastern would comply with all applicable requirements of Subpart JJJJ. Subpart KKKK, *Standards of Performance for Stationary Combustion Turbines*, regulates emissions of NO_X and SO_2. This subpart would apply to the new and modified compressor units installed at the NGT and TEAL Projects compressor stations. NEXUS and Texas Eastern would be required to comply with applicable emission limits and monitoring, reporting, and testing requirements of this subpart.

National Emission Standards for Hazardous Air Pollutants

The CAA Amendments established a list of 189 hazardous air pollutants (HAP), resulting in the promulgation of National Emission Standards for Hazardous Air Pollutants for Source Categories (NESHAP). NESHAPs regulate HAP emissions from stationary sources by setting emission limits, monitoring, testing, recordkeeping, and notification requirements. Subpart ZZZZ (*National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*) would apply to the emergency electrical power generators at each compressor station. NEXUS and Texas Eastern would be subject to all applicable Subpart ZZZZ monitoring, recordkeeping, and reporting requirements and/or would comply with NESHAPs Subpart ZZZZ by complying with NSPS Subpart JJJJ requirements.

General Conformity

The General Conformity Rule was developed to ensure that federal actions in nonattainment and maintenance areas do not impede states' attainment of the NAAQS. A conformity determination must be conducted by the lead federal agency if a federal action’s construction and operation activities are likely to result in generating direct and indirect emissions that would exceed the conformity applicability threshold level of the pollutant(s) for which an air basin is designated as nonattainment or maintenance. Conforming activities or actions should not, through additional air pollutant emissions:

- cause or contribute to new violations of the NAAQS in any area;
- increase the frequency or severity of any existing violation of any NAAQS; or
- delay timely attainment of any NAAQS or interim emission reductions.

The General Conformity Rule entails both an applicability analysis and a subsequent conformity determination, if applicable. According to the conformity regulations, emissions from sources that are subject to any NNSR or PSD permitting/licensing (major or minor) are exempt and are deemed to have conformed. A General Conformity Determination must be completed when the total direct and indirect emissions of a project would equal or exceed the specified pollutant thresholds on a calendar year basis for each nonattainment or maintenance area.

All non-permitted emissions that would occur within a nonattainment area were considered in the general conformity applicability analysis. Table 4.12.1-2 provides the results of the general conformity applicability review for the NGT and TEAL Projects. Based on the results in table 4.12.1-2, the emissions that would occur in nonattainment or maintenance areas would not exceed the general conformity applicability thresholds for any criteria pollutant in a single calendar year. Therefore, general conformity would not apply to the NGT and TEAL Projects.

Mandatory Greenhouse Gas Reporting Rule

The EPA established the final Mandatory Greenhouse Gas Reporting Rule, requiring the reporting of operational GHG emissions from applicable sources that emit greater than or equal to 25,000 metric tons of CO_2e in 1 year. Recent additions to the Mandatory Reporting Rule effective for calendar year 2016 require reporting of GHG emissions generated during operation of natural gas pipeline transmission system, which would include blowdown emissions, equipment leaks, and vent emissions at compressor stations, as well as blowdown emissions between compressor stations. The applicability of the reporting rule would apply to the entire NEXUS or Texas Eastern system.

TABLE 4.12.1-2

General Conformity Applicability Analysis for NGT and TEAL Projects [a]

Designated Pollutant	Designated Area	Threshold (tpy)	Pollutant or Precursor	2017 Total Non-Exempt Emissions	2018 Total Non-Exempt Emissions	Ongoing Non-Exempt Operational Emissions
Ozone[b]	Cleveland-Akron-Lorain, OH	100	VOC	8.2	1.8	1.8
		100	NO_X	32.8	0.0	0.0
$PM_{2.5}$[c]	Wheeling, WV-OH	100	$PM_{2.5}$	2.9	0.2	0.0
		100	SO_2	0.1	<0.1	0.0
		100	NO_X	32.3	1.4	0.0
	Cleveland-Akron-Lorain, OH	100	$PM_{2.5}$	45.1	0.0	0.0
		100	SO_2	0.06	0.0	0.0
		100	NO_X	32.8	0.0	0.0
	Canton-Massillon, OH	100	$PM_{2.5}$	12.8	0.0	0.0
		100	SO_2	0.02	0.0	0.0
		100	NO_X	7.5	0.0	0.0
	Detroit-Ann Arbor, MI	100	$PM_{2.5}$	24.1	<0.1	<0.1
		100	SO_2	0.03	<0.1	<0.1
		100	NO_X	19.5	3.0	3.0

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a This table presents a summary of emission estimates. Detailed calculations may be found in Appendix 9B of Resource Report 9 in NEXUS' November 2015 Application, updated in the March 3 Response to Staff Environmental Data Requests.

b NOx and VOC are ozone precursors.

c PM, SO_2, and NO_X are $PM_{2.5}$ precursors.

Although the rule does not apply to construction emissions, we have provided GHG construction emission estimates, as CO_2e, for accounting and disclosure purposes in section 4.12.1.3 and table 4.12.1-3. Operational GHG emission estimates for the Projects are presented, as CO_2e, in section 4.12.1.3. Based on the emission estimates presented, actual GHG emissions from operation of each NGT or TEAL Project compressor station, each considered as a separate stationary source, has the potential to exceed the 25,000-metric tons per year (tpy) reporting threshold for the Mandatory Reporting Rule. Therefore, if the actual operational emissions from any compressor station or the NEXUS or Texas Eastern system are greater than 25,000 metric tpy, NEXUS and/or Texas Eastern would be required to report GHG emissions.

State Regulations

NEXUS and Texas Eastern would be required to obtain an air quality permit from the applicable air permitting authority for each of the new and modified compressor stations. The process of obtaining the air permit would involve the review and implementation of state regulations. Air quality rules in Ohio and Michigan are outlined in the Ohio Administrative Code (OAC) and the Michigan Administrative Code (MAC), respectively. State air quality regulations that would establish emission limits or other restrictions that may be in addition to those required under federal regulations are summarized below.

In addition to PSD and NNSR permitting requirements, Ohio administers its own construction permitting requirements within Chapter 3745-31 of the OAC. At a minimum, new or modified stationary sources with potential emissions of any air pollutant that exceed the *de minimis* permitting thresholds of 10 pounds per day from a single source or 25 tpy from a group of sources at the same facility, or 1 tpy of HAP, are required to obtain a Permit-to-Install or Permit-to-Install-and-Operate (PTIO).

The emissions from the compressor stations and three of the M&R stations to be constructed in Ohio indicate that each facility would be required to obtain a PTIO. Launcher/receiver facilities located at the Wadsworth and Waterville Compressor Stations would be incorporated into the PTIO for the respective stations. The potential air emissions from the MLV sites in Ohio would not require air permits. Based on NEXUS' initial design, the NEXUS/Dominion East Ohio M&R Station and the remaining launcher/receiver facilities would not require a permit. However, if the final design results in air emissions above the *de minimis* levels, NEXUS would obtain the required PTIO.

Ohio Air Quality Rules

The Ohio facilities would also be subject to Ohio state regulations including, but not limited to, the following (OEPA, 2010):

- OAC 3745-15 (General Provisions on Air Pollution Control) contains definitions, purpose, submission of emission information, measurement of emission of air contaminants, exemptions, malfunction, maintenance and reporting requirements, prohibitions, and circumvention requirements;
- OAC 3745-16 (Stack Height Requirements) establishes good engineering practice stack height requirements;
- OAC 3745-17 (Particulate Matter Standards) establishes particulate matter definitions, measurement methods and procedures, compliance time schedules, control of visible emissions, and restricts fugitive dust;
- OAC 3745-18 (Sulfur Dioxide Regulations) establishes sulfur dioxide definitions, compliance time schedules, measurement methods and procedures, ambient monitoring requirements, and emission limits by county;
- OAC 3745-19 (Open Burning Standards) establishes open burning standards including definitions, open burning requirement in restricted and unrestricted areas, and relationship to other prohibitions;
- OAC 3745-21 (Carbon Monoxide, Ozone, Hydrocarbon Air Quality Standards, and Related Emissions Standards) establishes ambient air emission standards, measurement methods, compliance time schedules, region classifications, and control methods;
- OAC 3745-23 (Nitrogen Oxide Standards) establishes measurement methods for NO_X;
- OAC 3745-24 (Nitrogen Oxide Emission Statements) established applicability, deadlines, and emission standard requirements for NO_X emission statements;
- OAC 3745-21 (VOC Emission Standards) establishes standards for storage of volatile organic liquids in fixed and floating roof tanks; and
- OAC 3745-113 (Standards for Architectural and Industrial Maintenance Coatings) establishes VOC content limits for coatings.

Michigan Air Quality Rules

The Michigan facilities would also be subject to MDEQ regulations including, but not limited to, the following (MDEQ, 2016):

- MAC Rule 336*.201 – 336.205* (Annual Reporting) establishes requirements for annual emissions reports;
- MAC Rule 336.1224 (T-BACT Requirements [Air Toxics]) establishes emissions limits and exemptions for air toxics;
- MAC Rule 336.1371 and 336.1372 (Fugitive Dust Control Program) establishes requirements for a fugitive dust control program, including record keeping, and describes acceptable control methods that may be implemented;
- MAC Rule 336.1310 (Open Burning Standards) establishes requirements and exceptions for open burning;
- MAC Rule 301 (Opacity Standards) establishes density/visibility limits for emissions; and
- MAC Rule 702 (VOC Emission Standards) establishes VOC emission rates for new sources.

4.12.1.3 Air Quality Impacts and Mitigation

Construction Emissions

Construction of the NGT and TEAL Projects would result in temporary increases of pollutant emissions from the use of diesel- and gas-fueled equipment, blowdown and purging activities, open burning, as well as temporary increases in fugitive dust emissions from earth/roadway surface disturbance. Indirect emissions would be generated from vehicles associated with construction workers traveling to and from work sites. The volume of fugitive dust generated would be dependent upon the area disturbed and the type of construction activity, along with the soil's silt and moisture content, wind speed, and the nature of vehicular/equipment traffic. Fugitive particulate emissions of PM_{10} and $PM_{2.5}$ were calculated using the EPA AP-42 recommended emission factors for heavy construction equipment, combined with estimates of the extent and duration of active surface disturbance during construction. These emission factors tend to be conservative and can overestimate potential fugitive dust generated by the Projects. Combustion emissions from construction equipment operation were estimated using emission factors generated by USEPA's NONROAD2008a model. Combustion emissions from on-road delivery and material removal vehicles were estimated using the USEP Motor Vehicle Emission Simulator (MOVES) model. Construction emissions are shown in table 4.12.1-3 below.[9]

NEXUS and Texas Eastern would implement measures to control fugitive dust emissions. Each company has prepared separate project-specific *Fugitive Dust Control Plans*. NEXUS and Texas Eastern would implement emission reduction measures such as water suppression, covering truckloads during transit, limiting on-site vehicle speed, stabilizing exposed soil, and removing track-out on public roads. We have reviewed the *Fugitive Dust Control Plans* and found them acceptable. Further, NEXUS, Texas

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[9] Detailed emission calculations were provided in NEXUS' and Texas Eastern's applications each filed on November 20, 2015, and NEXUS' supplemental filing dated March 21, 2016. Detailed emissions calculations can be found on the FERC eLibrary website using Accession Numbers 20151120-5253 and 20151201-5125 (NGT Project) and 20151120-5254 (TEAL Project).

Eastern, and their contractors would ensure that construction equipment would be properly tuned and operated only on an as-needed basis to minimize the combustion emissions from diesel and gasoline engines.

Both NEXUS and Texas Eastern may utilize open burning to dispose of construction debris. Ohio and Michigan each regulate open burning, and NEXUS and Texas Eastern would comply with applicable regulations. Open burning emissions are estimated for the NGT and TEAL Projects in table 4.12.1-3.

TABLE 4.12.1-3

Estimated Construction Emissions for the NGT and TEAL Projects

	Emissions (tpy)						
Year/Activity	SO_2	PM_{10}	$PM_{2.5}$	NO_X	CO	VOC	CO_2e
OHIO 2017							
NGT Project							
Non-road and On-road Construction Vehicle Equipment and Commuting Vehicles	0.6	6.6	6.4	115.7	334.6	16.9	32,783.2
Fugitive Dust	N/A	1,203.2	126.6	N/A	N/A	N/A	N/A
Blowdown and Purge	N/A	N/A	N/A	N/A	N/A	8.9	17,235.4
Open Burning	N/A	19.6	19.6	5.6	202.6	4.9	N/A
NGT Project Total	**0.6**	**1,222.8**	**152.6**	**121.3**	**537.2**	**30.7**	**50,018.6**
TEAL Project							
Fugitive Dust	N/A	62.8	6.5	1.4	N/A	N/A	N/A
Non-road and On-road Construction vehicle Equipment	0.2	N/A	5.5	106.2	185.2	13.0	24,345
Commuting Vehicles	<0.1	[a]	0.1	2.7	28.1	1.0	2,429
Open Burning	N/A	[a]	4.8	1.4	48.8	1.2	N/A
NGT Project Total	**0.2**	**62.8**	**16.9**	**111.7**	**262.1**	**15.2**	**26,774**
Ohio 2017 Grand Total	**0.8**	**1,285.6**	**169.5**	**233.0**	**799.3**	**45.9**	**76,792.6**
MICHIGAN 2017							
NGT Project							
Non-road and On-road Construction Vehicle Equipment and Commuting Vehicles	<0.1	1.3	1.3	24.8	46.1	3.1	6,914.5
Fugitive Dust	N/A	230.7	24.6	N/A	N/A	N/A	N/A
Blowdown and Purge	N/A	N/A	N/A	N/A	N/A	2.4	5,775.1
Open Burning	N/A	10.1	10.1	5.17	104.1	2.5	N/A
Michigan 2017 Grand Total	**<0.1**	**242.1**	**36.0**	**30.0**	**150.2**	**8.0**	**12,689.9**
OHIO 2018							
TEAL Project							
Fugitive Dust	N/A	1.0	0.1	N/A	N/A	N/A	N/A
Non-road and On-road Construction vehicle Equipment	<0.1	[a]	0.1	2.3	7.6	0.4	498
Commuting Vehicles	<0.1	[a]	<0.1	0.1	0.6	0.02	53
Ohio 2018 Grand Total	**<0.1**	**1.0**	**0.2**	**2.4**	**8.2**	**0.4**	**551**
Grand Total (2017 and 2018)	**0.8**	**1,528.7**	**205.7**	**2,65.4**	**957.7**	**54.3**	**90,033.5**

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a Emissions for PM_{10} and $PM_{2.5}$ have been combined.

Note: The sum of the addends may not total due to rounding.

N/A = Not applicable

Construction of the NGT Project would take place over several months in 2017, while the TEAL Project would be phased over 2 years (2017 and 2018); however, pipeline construction at any given location would generally last from 6 to 10 weeks. Construction at aboveground facilities and the use of construction support areas would occur over a longer period of time but at specific locations. Therefore, most construction related emissions would be temporary and localized, and would dissipate with time and distance from areas of active construction. Further, construction emissions along the pipelines would subside once construction is complete. Following construction at the compressor stations, emissions would transition to operating emissions. Based on the mitigation measures outlined in NEXUS' and Texas Eastern's *Fugitive Dust Control Plans* and the temporary nature of construction, we conclude that construction of the NGT and TEAL Projects would not have a significant impact on air quality.

Operation Emissions

Operation of the project facilities at the Hanoverton, Wadsworth, Clyde, Waterville, Salineville, and Colerain Compressor Stations and the new and modified M&R Stations would result in air emission increases over existing emissions levels.[10] The turbines at the NGT and TEAL Projects compressor stations would incorporate SoLoNO$_X$ (i.e., dry low NO$_X$ or lean pre-mix) combustors to control NO$_X$ emissions.

Air pollutant emissions from operation of NEXUS' proposed compressor stations were calculated using emissions factors from vendor data, the EPA's *Compilation of Air Pollutant Emission Factors* (*AP-42*) and 40 CFR 98. The PTE emissions resulting from the NGT and TEAL Projects' compressor stations are summarized in tables 4.12.1-4 through 4.12.1-9.

TABLE 4.12.1-4

Proposed Hanoverton Compressor Station Emissions Summary (tpy)

	Maximum Potential Emissions							
Description	NO$_X$	CO	VOC	SO$_2$	PM / PM$_{10}$ / PM$_{2.5}$	CO$_2$e	Hexane [a]	Total HAP
Combustion Turbine #1	31.1	7.8	3.3	3.2	6.3	112,281	N/A	0.6
Combustion Turbine #2	31.1	7.8	3.3	3.2	6.3	112,281	N/A	0.6
Emergency Generator	1.3	2.6	1.2	0.0	0.0	576	0.0	0.7
Gas Releases	N/A	N/A	24.6	N/A	N/A	19,114	0.7	2.0
Equipment Leaks	N/A	N/A	10.1	N/A	N/A	1,419	0.2	1.2
Separator Vessel #1	N/A	N/A	0.1	N/A	N/A	7	0.0	0.0
Separator Vessel #2	N/A	N/A	0.1	N/A	N/A	7	0.0	0.0
Separator Vessel #3	N/A	N/A	0.1	N/A	N/A	6	0.0	0.0
Separator Vessel #4	N/A	N/A	0.6	N/A	N/A	18	0.0	0.0
Separator Vessel #5	N/A	N/A	0.0	N/A	N/A	1	0.0	0.0
Storage Tank #1	N/A	N/A	0.3	N/A	N/A	14	0.0	0.0
Storage Tank #2	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Storage Tank #3	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Storage Tank #4	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Process Heater #1	0.7	0.4	0.2	0.0	0.0	554	0.0	0.0
Process Heater #2	0.7	0.4	0.2	0.0	0.0	554	0.0	0.0
Parts Washer	N/A	N/A	0.4	N/A	N/A	N/A	N/A	N/A
Loading Operation	N/A	N/A	0.0	N/A	N/A	N/A	0.0	0.0
Total	**65.0**	**19.1**	**44.5**	**6.4**	**12.6**	**246,832**	**1.0**	**5.3**

a Hexane (*n*-) emissions are presented for worst-case Individual HAP
N/A = Not applicable

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[10] Each of the new M&R Stations would include an emergency generator with a natural gas-fired heater.

TABLE 4.12.1-5

Proposed Wadsworth Compressor Station Emissions Summary (tpy)

	Maximum Potential Emissions							
Description	NO_X	CO	VOC	SO_2	PM / PM_{10} / $PM_{2.5}$	CO_2e	Hexane [a]	Total HAP
Combustion Turbine	31.0	7.8	3.3	3.2	6.2	112,925	N/A	0.6
Emergency Generator	1.0	1.9	0.9	0.0	0.0	432	0.0	0.5
Gas Releases	N/A	N/A	19.8	N/A	N/A	15,401	0.6	1.6
Equipment Leaks	N/A	N/A	6.3	N/A	N/A	997	0.1	0.8
Separator Vessel #1	N/A	N/A	0.1	N/A	N/A	8	0.0	0.0
Separator Vessel #2	N/A	N/A	0.1	N/A	N/A	8	0.0	0.0
Separator Vessel #3	N/A	N/A	0.1	N/A	N/A	6	0.0	0.0
Separator Vessel #4	N/A	N/A	0.6	N/A	N/A	18	0.0	0.0
Separator Vessel #5	N/A	N/A	0.0	N/A	N/A	1	0.0	0.0
Storage Tank #1	N/A	N/A	0.3	N/A	N/A	15	0.0	0.0
Storage Tank #2	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Storage Tank #3	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Process Heater	0.7	0.4	0.2	0.0	0.0	554	0.0	0.0
Parts Washer	N/A	N/A	0.4	N/A	N/A	N/A	N/A	N/A
Loading Operation	N/A	N/A	0.0	N/A	N/A	1	0.0	0.0
Total	**32.7**	**10.2**	**32.2**	**3.2**	**6.3**	**129,365**	**0.8**	**3.6**

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[a] Hexane(n-) emissions are presented for worst-case Individual HAP

N/A = Not applicable

TABLE 4.12.1-6

Proposed Clyde Compressor Station Emissions Summary (tpy)

	Maximum Potential Emissions							
Description	NO_X	CO	VOC	SO_2	PM / PM_{10} / $PM_{2.5}$	CO_2e	Hexane [a]	Total HAP
Combustion Turbine	31.1	7.8	3.3	3.2	6.3	112,238	N/A	0.6
Emergency Generator	1.0	1.9	0.9	0.0	0.0	432	0.0	0.5
Gas Releases	N/A	N/A	19.8	N/A	N/A	15,401	0.6	1.6
Equipment Leaks	N/A	N/A	6.3	N/A	N/A	997	0.1	0.8
Separator Vessel #1	N/A	N/A	0.1	N/A	N/A	8	0.0	0.0
Separator Vessel #2	N/A	N/A	0.1	N/A	N/A	8	0.0	0.0
Separator Vessel #3	N/A	N/A	0.1	N/A	N/A	6	0.0	0.0
Separator Vessel #4	N/A	N/A	0.6	N/A	N/A	18	0.0	0.0
Separator Vessel #5	N/A	N/A	0.0	N/A	N/A	1	0.0	0.0
Storage Tank #1	N/A	N/A	0.3	N/A	N/A	15	0.0	0.0
Storage Tank #2	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Storage Tank #3	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Process Heater	0.7	0.4	0.2	0.0	0.0	554	0.0	0.0
Parts Washer	N/A	N/A	0.4	N/A	N/A	N/A	N/A	N/A
Loading Operation	N/A	N/A	0.0	N/A	N/A	1	0.0	0.0
Total	**32.8**	**10.2**	**32.2**	**3.2**	**6.3**	**129,678**	**0.8**	**3.6**

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[a] Hexane(n-) emissions are presented for worst-case Individual HAP

N/A = Not applicable

TABLE 4.12.1-7

Proposed Waterville Compressor Station Emissions Summary (tpy)

	Maximum Potential Emissions							
Description	NO_X	CO	VOC	SO_2	PM / PM_{10} / $PM_{2.5}$	CO_2e	Hexane [a]	Total HAP
Combustion Turbine	31.1	7.8	3.3	3.2	6.3	112,240	N/A	0.6
Emergency Generator	1.0	1.9	0.9	0.0	0.0	432	0.0	0.5
Gas Releases	N/A	N/A	19.8	N/A	N/A	15,401	0.6	1.6
Equipment Leaks	N/A	N/A	6.3	N/A	N/A	997	0.1	0.8
Separator Vessel #1	N/A	N/A	0.1	N/A	N/A	8	0.0	0.0
Separator Vessel #2	N/A	N/A	0.1	N/A	N/A	8	0.0	0.0
Separator Vessel #3	N/A	N/A	0.1	N/A	N/A	6	0.0	0.0
Separator Vessel #4	N/A	N/A	0.6	N/A	N/A	18	0.0	0.0
Separator Vessel #5	N/A	N/A	0.0	N/A	N/A	1	0.0	0.0
Storage Tank #1	N/A	N/A	0.3	N/A	N/A	15	0.0	0.0
Storage Tank #2	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Storage Tank #3	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Process Heater	0.7	0.4	0.2	0.0	0.0	554	0.0	0.0
Parts Washer	N/A	N/A	0.4	N/A	N/A	N/A	N/A	N/A
Loading Operation	N/A	N/A	0.0	N/A	N/A	1	0.0	0.0
Total	**32.8**	**10.2**	**32.2**	**3.2**	**6.3**	**129,680**	**0.8**	**3.6**

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a Hexane(n-) emissions are presented for worst-case Individual HAP

N/A = Not applicable

TABLE 4.12.1-8

Proposed Salineville Compressor Station Emissions Summary (tpy)

	Maximum Potential Emissions							
Description	NO_X	CO	VOC	SO_2	PM / PM_{10} / $PM_{2.5}$	CO_2e	Toluene [a]	Total HAP
Combustion Turbine #1	20.7	13.3	1.5	1.3	2.5	42,250	0.1	0.3
Combustion Turbine #2	20.7	13.3	1.5	1.3	2.5	42,250	0.1	0.3
Emergency Generator	1.0	1.9	0.9	0.0	0.0	432	0.0	0.5
Gas Releases	N/A	N/A	24.6	N/A	N/A	19,114	0.5	2.0
Equipment Leaks	N/A	N/A	10.1	N/A	N/A	1,419	0.4	1.2
Separator Vessel #1	N/A	N/A	0.3	N/A	N/A	16	0.0	0.0
Separator Vessel #2	N/A	N/A	0.3	N/A	N/A	16	0.0	0.0
Separator Vessel #3	N/A	N/A	0.1	N/A	N/A	4	0.0	0.0
Separator Vessel #4	N/A	N/A	0.1	N/A	N/A	4	0.0	0.0
Separator Vessel #5	N/A	N/A	0.7	N/A	N/A	23	0.0	0.0
Separator Vessel #6	N/A	N/A	0.1	N/A	N/A	8	0.0	0.0
Storage Tank #1	N/A	N/A	0.3	N/A	N/A	17	0.0	0.0
Storage Tank #2	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Storage Tank #3	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Storage Tank #4	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Parts Washer	N/A	N/A	0.4	N/A	N/A	N/A	N/A	N/A
Loading Operation	N/A	N/A	0.0	N/A	N/A	1	0.0	0.0
Total	**42.5**	**28.6**	**41.0**	**2.6**	**5.1**	**111,553**	**1.0**	**4.5**

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a Toluene emissions are presented for worst-case Individual HAP

N/A = Not applicable

TABLE 4.12.1-9

Proposed Colerain Compressor Station Modification Emissions Summary (tpy)

	Maximum Potential Emissions							
Description	NO_X	CO	VOC	SO_2	PM / PM_{10} / $PM_{2.5}$	CO_2e	Toluene [a]	Total HAP
Combustion Turbine #1	20.8	10.9	1.5	1.3	2.5	45,255	0.1	0.3
Combustion Turbine #2	20.8	10.9	1.5	1.3	2.5	45,255	0.1	0.3
Emergency Generator	1.0	1.9	0.9	0.0	0.0	432	0.0	0.5
Separator Vessel #1	N/A	N/A	0.3	N/A	N/A	16	0.0	0.0
Separator Vessel #2	N/A	N/A	0.3	N/A	N/A	16	0.0	0.0
Separator Vessel #3	N/A	N/A	0.1	N/A	N/A	4	0.0	0.0
Separator Vessel #4S	N/A	N/A	0.1	N/A	N/A	4	0.0	0.0
Separator Vessel #4D	N/A	N/A	0.7	N/A	N/A	23	0.0	0.0
Separator Vessel #6	N/A	N/A	0.1	N/A	N/A	8	0.0	0.0
Storage Tank #1	N/A	N/A	0.3	N/A	N/A	17	0.0	0.0
Storage Tank #2	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Storage Tank #3	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Parts Washer	N/A	N/A	0.4	N/A	N/A	N/A	N/A	N/A
Maximum Post-Project Potential Emissions – Modified Sources								
Gas Releases	N/A	N/A	29.4	N/A	N/A	22,827	0.5	2.4
Equipment Leaks	N/A	N/A	14.0	N/A	N/A	1,841	0.5	1.7
Loading Operation	N/A	N/A	0.0	N/A	N/A	1	0.0	0.0
Combustion Turbine #3	20.8	10.9	1.5	1.3	2.5	45,255	0.1	0.3
Separator Vessel #7	N/A	N/A	0.1	N/A	N/A	4	0.0	0.0
Storage Tank #4	N/A	N/A	0.0	N/A	N/A	N/A	N/A	N/A
Total	**63.3**	**34.6**	**51.1**	**3.9**	**7.6**	**160,956**	**1.4**	**5.6**

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a Toluene emissions are presented for worst-case Individual HAP.

N/A = Not applicable

Air Quality Modeling

NEXUS and Texas Eastern performed air quality screening analyses for each of the compressor stations using the EPA approved AERSCREEN Model. AERSCREEN provides results based on 1-hour, 3-hour, 8-hour, 24-hour, and annual averaging periods. AERSCREEN is a screening level modeling tool that provides “worst case” impact estimates and often presents conservative results that overestimate compacts. NEXUS and Texas Eastern modeled the operational emissions from the compressor stations and compared the result for each pollutant and averaging period to the NAAQS. Tables 4.12.1-10 and 4.12.1-11 present the results of the modeling analyses for the compressor stations associated with the NGT and TEAL Projects, respectively, including the current ambient monitored data, the compressor station impact, the combined concentration, and a comparison with the NAAQS.

TABLE 4.12.1-10

AERSCREEN Modeling Results for NGT Project Compressor Stations

Pollutant	Averaging Period	Background Concentration (µg/m3)	AERSCREEN Modeled Impact (µg/m3)	Combined Impact (µg/m3)	NAAQS (µg/m3)
Hanoverton Compressor Station					
NO_2	Annual	5.7	2.9	8.7	100
	1-hour	45.9	29.3	75.2	188
CO	8-hour	1280.9	44.7	1325.5	10,000
	1-hour	1746.7	49.6	1796.3	40,000

TABLE 4.12.1-10 (cont'd)

AERSCREEN Modeling Results for NGT Project Compressor Stations

Pollutant	Averaging Period	Background Concentration (µg/m3)	AERSCREEN Modeled Impact (µg/m3)	Combined Impact (µg/m3)	NAAQS (µg/m3)
SO_2	3-hour	69.3	3.1	72.3	1,300
	1-hour	69.3	3.1	72.3	196
$PM_{2.5}$	Annual	10.4	0.6	11.0	12
	24-hour	24.0	3.6	27.6	35
PM_{10}	24-hour	40.3	3.6	43.9	150
Wadsworth Compressor Station					
NO_2	Annual	5.7	2.2	7.9	100
	1-hour	45.9	22.0	67.9	188
CO	8-hour	931.6	33.4	965.0	10,000
	1-hour	1630.2	37.1	1667.3	40,000
SO_2	3-hour	58.6	2.3	60.9	1,300
	1-hour	58.6	2.3	60.9	196
$PM_{2.5}$	Annual	9.5	0.5	10.0	12
	24-hour	22.0	2.7	24.7	35
PM_{10}	24-hour	29.0	2.7	31.7	150
Clyde Compressor Station					
NO_2	Annual	5.7	2.1	7.8	100
	1-hour	45.9	20.8	66.7	188
CO	8-hour	4308.5	31.6	4340.1	10,000
	1-hour	8267.6	35.1	8302.7	40,000
SO_2	3-hour	186.4	2.2	188.6	1,300
	1-hour	186.4	2.2	188.6	196
$PM_{2.5}$	Annual	9.5	0.4	9.9	12
	24-hour	22.0	2.5	24.5	35
PM_{10}	24-hour	29.0	2.5	31.5	150
Waterville Compressor Station					
NO_2	Annual	5.7	2.1	7.9	100
	1-hour	45.9	21.4	67.3	188
CO	8-hour	1280.9	32.6	1313.5	10,000
	1-hour	1746.7	36.2	1782.9	40,000
SO_2	3-hour	29.3	2.2	31.5	1,300
	1-hour	29.3	2.2	31.5	196
$PM_{2.5}$	Annual	9.9	0.4	10.3	12
	24-hour	24.0	2.6	26.6	35
PM_{10}	24-hour	30.3	2.6	32.9	150

µg/m3 = micrograms per cubic meter

TABLE 4.12.1-11

AERSCREEN Modeling Results for TEAL Project Compressor Stations

Pollutant	Averaging Period	Background Concentration (µg/m3)	AERSCREEN Modeled Impact (µg/m3)	Combined Impact (µg/m3)	NAAQS (µg/m3)
Salineville Compressor Station					
NO_2	Annual	5.7	5.0	10.7	100
	1-hour	45.9	49.7	95.6	188
CO	8-hour	931.6	45.4	977.0	10,000
	1-hour	1164.5	50.5	1214.9	40,000
SO_2	3-hour	69.3	3.1	72.4	1,300
	1-hour	69.3	3.1	72.4	196

TABLE 4.12.1-11

AERSCREEN Modeling Results for TEAL Project Compressor Stations

Pollutant	Averaging Period	Background Concentration (µg/m3)	AERSCREEN Modeled Impact (µg/m3)	Combined Impact (µg/m3)	NAAQS (µg/m3)
$PM_{2.5}$	Annual	10.4	0.6	11.0	12
	24-hour	24.0	3.6	27.6	35
PM_{10}	24-hour	40.3	3.6	44.0	150
Colerain Compressor Station					
NO_2	Annual	5.7	2.8	8.5	100
	1-hour	45.9	27.8	73.7	188
CO	8-hour	931.6	25.4	956.9	10,000
	1-hour	1164.5	28.2	1192.6	40,000
SO_2	3-hour	61.3	1.7	63.0	1,300
	1-hour	61.3	1.7	63.0	196
$PM_{2.5}$	Annual	11.1	0.3	11.4	12
	24-hour	24.0	2.0	26.0	35
PM_{10}	24-hour	39.0	2.0	41.0	150

µg/m3 = micrograms per cubic meter

As shown in tables 4.12.1-10 and 4.12.1-11, the screening analysis concentration for each modeling run is below the applicable NAAQS for all compressor stations for the NGT and TEAL Projects and the Projects area would continue to remain protective of human health and public welfare for all listed pollutants.

The Lucas County Health Department requested post-construction air quality monitoring and reporting at the NGT Project facilities. As discussed above, the EPA, state, and local agencies have an established network of air quality monitors around the country. The OEPA would determine any long-term monitoring requirements during its air permit review and may choose to install additional air monitors, as it deems appropriate throughout the state. The OEPA would also enforce its requirements for stack testing, emission limits, monitoring, and recordkeeping in accordance with any air permit it issues.

One commenter states that Lucas County, Ohio already experiences “Ozone Action Days”, and believes that emissions from the Waterville Compressor Station may exacerbate this problem. Action days may be established under a wide range of conditions including: 1) days when air quality is moderate but may approach levels that are considered unhealthy for sensitive groups; 2) days when air quality is unhealthy for sensitive groups; or 3) days when air quality may be unhealthy for the general population. Each air pollution control agency determines under which conditions it would identify an action day for cities participating in the Action Day Program. No cities in Lucas County, Ohio participate in the EPA Action Day Program; however, the City of Toledo has its own Ozone Action Season Program. It is unclear under what air quality conditions Toledo enacts ozone action days under its program. However, upon review of nearby ozone monitoring data and ozone air quality maps for Ohio,[11] ozone levels have not exceeded the NAAQS or reached levels that were unhealthy for sensitive groups over the past 3 years. Further, NEXUS would be required to obtain an air permit for the Waterville Compressor Station through OEPA.

Numerous commenters expressed concern with public health impacts resulting from operational and intermittent blowdown emissions of HAPs and criteria pollutants in populated areas. One commenter

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[11] Maps are provided through the AirNow system developed by the EPA; NOAA; NPS; and tribal, state, and local agencies (AirNow, 2016)

expressed concern for the health of a child diagnosed with alpha-1 antitrypsin deficiency and the health implications associated with emissions from the Waterville Compressor Station. Based on tables 4.12.1-4 through 4.12.1-7, the Hanoverton, Wadsworth, Clyde, and Waterville Compressor Stations would all be minor sources of air emissions under all federal programs. Operation of the NGT and TEAL Projects would not result in an exceedance of the NAAQS at any location. Methane, the primary component of natural gas, would be released during a blowdown event, as station blowdowns do not involve combustion. Methane is non-toxic but is classified as a simple asphyxiate if concentrated in a confined space. However, methane is buoyant and rapidly rises in air. Blowdown events are infrequent aspects of compressor station operation and can last for several minutes. However, methane is a GHG, which tends to have less localized effects. Methane emissions from blowdown activities are estimated in tables 4.12.1-12 and 4.12.1-13. The estimated emissions are relatively minor, because blowdowns occur infrequently (i.e., not part of normal, everyday operation), and we conclude they would not have a significant impact on air quality or public health. With respect to the Waterville Compressor Station and the potential health impacts on sensitive populations, the National Heart, Lung, and Blood Institute (a division under the U.S. Department of Health and Human Services [DHHS]) indicates that symptoms of alpha-1 antitrypsin deficiency include lung function deterioration, difficulty breathing, and sensitivity to smoking, air pollution, and allergens (DHHS, 2011). As previously discussed, the primary NAAQS were established to protect human health, including sensitive populations such as the elderly, children, and those with chronic respiratory illnesses. As shown in table 4.12.1-10, the AERSCREEN results indicate that the Waterville Compressor Station would not contribute to an exceedance of the NAAQS and would be below the OEPA's Acceptable Incremental Impact levels.

We received a comment indicating that an "oily vapor" would coat lawns in the vicinity of the pipeline and compressor station. While pipeline fugitive methane leaks (e.g., from valves and fittings) and compressor station natural gas combustion emissions would occur, these do not produce oily vapors. The commenter did not provide evidence of such an occurrence involving natural gas pipelines or compression, and based on extensive experience, we conclude that this is unlikely to occur as a result of the NGT and TEAL Projects.

We received a comment stating that Medina County, Ohio is in marginal nonattainment with the NAAQS, and because the Ohio E-Check system is required in Medina County in an attempt to offset its emissions, the Wadsworth Compressor Station should not be constructed at its proposed location. In addition, the commenter states that the compressor station would result in further NAAQS violations characterizing the proposed PTE for the station as high. As discussed throughout section 4.12.1, the emissions associated with the Wadsworth Compressor Station (and the NGT and TEAL Projects as a whole) would not contribute or cause a violation of the NAAQS. According to the OEPA website, the E-Check program was implemented to identify vehicles that emit excessive levels of pollutants into the air. With respect to pollution contributions, the Wadsworth Compressor Station would emit far less than the vehicles tested under the E-Check program as of 2014 (based on the report attached to the comment letter). In 2014, 815,316 vehicles were tested under E-Check. Using the EPA's average emissions factors for standard passenger vehicles (EPA, 2008), this resulted in more than 10,000 metric tpy of VOC and 6,775 metric tpy of NO_X. By comparison, the Wadsworth Compressor Station would emit 32.7 tpy of NO_X and 32.2 tpy of VOC. Further, the E-Check system is designed for passenger vehicles and is not applicable to stationary pipeline facilities.

We received comments about emissions from blowdowns at the NGT Project compressor stations. NEXUS has included startup and shutdown emissions in the air permit applications for the compressor stations, and blowdown estimates are included in the emissions presented in tables 4.12.1-4 through 4.12.1-9.

We received comments concerning potential leaks and emissions from the NGT Project pipelines. The EPA requested that we utilize the DOE's National Energy Technology Laboratory studies on exporting natural gas, particularly liquefied natural gas to evaluate GHG emissions. The DOE expressly states that these reports are not intended NEPA purposes. Further, the proposed Projects do not involve the export of liquefied natural gas, and the FERC has routinely determined that upstream production and downstream consumption of natural gas are not casually connected to a project. Therefore, we continue to find the use of these reports inappropriate. GHG emission estimates from the NGT Project compressor stations are shown in tables 4.12.1-4 through 4.12.1-9. Pipeline GHG emissions are shown in table 4.12.1-13. Fugitive GHG emissions from the pipeline were calculated using the Interstate Natural Gas Association of America's *Greenhouse Gas Emission Estimation Guidelines for Natural Gas Transmission and Storage*. Although not subject to stationary source permitting, these emissions are well below major stationary source permitting levels and would occur across a large distance.

Tables 4.12.1-12 and 4.12.1-13 show estimates of CO_2e and VOC emissions by for the NGT M&R stations and the NGT and TEAL Projects pipelines.

TABLE 4.12.1-12

Estimated Emissions from NGT Project M&R Stations (tpy)

Source	VOC	CO_2e
Gas Releases (Blowdowns)	1.7	2,336
Equipment Leaks	12.5	2,099
Storage Tanks	2.4	72
Liquid Loading	6.7	4
Combustion Sources	6.7	N/A
Total	**23.5**	**4,511**

Emissions generated during operation of the NGT and TEAL Projects would include emissions from natural gas combustion, fugitive CO_2e emissions (from valves, fittings, etc.), and CO_2e emissions resulting from planned, non-routine station blowdowns. Table 4.12.1-13 provides an estimate of operational emissions for the NGT and TEAL Projects pipelines.

TABLE 4.12.1-13

Estimated Emissions from the NGT and TEAL Project Pipelines (tpy)

Project, Source	VOC	CO_2e
NGT Project		
Fugitives	0.1	76.2
Non-Routine (blowdowns)	7.3	5,676
NGT Project Total	**7.4**	**5,752**
TEAL Project		
Fugitives	<0.1	1.4
Non-Routine (blowdowns)	0.1	107.0
TEAL Project Total	**0.1**	**108.4**

In conclusion, potential impacts on air quality associated with construction and operation of the NGT and TEAL Projects would be minimized by strict adherence to all applicable federal and state regulations that are designed to be protective of air quality. NEXUS' and Texas Eastern's facilities would comply with the NAAQS that were designed to protect human health, including sensitive populations, and the environment. Each compressor station would be a minor source under all federal air quality permitting programs. Based on the analysis presented above, operation of the new Hanoverton, Wadsworth, Clyde, Waterville, Salineville, and modified Colerain Compressor Stations and the new M&R Stations would not have a significant impact on regional air quality.

4.12.1.4 Radon Exposure

We received comments about the potential exposure to released radon gas. We have recently evaluated general background information, studies, and literature on radon in natural gas in several past project EISs.[12] These studies include samples taken at well sites, pre-processing, post processing, and transmission pipelines and the recent Pennsylvania Department of Environmental Protection's (PADEP) Technologically Enhanced Naturally Occurring Radioactive Materials Study Report issued in January 2015 (PADEP, 2015). This PADEP report is consistent with past studies, which identify indoor radon concentrations ranging from 0.0042 picocuries per liter (pCi/L) to 0.13 pCi/L.

The EPA has set the indoor action level for radon at 4 pCi/L. If concentrations of radon are high enough to exceed these activity levels, the EPA recommends implementing remedial actions, such as improved ventilation, to reduce levels below this threshold. Further, the Indoor Radon Abatement Act established the long-term goal that indoor air radon levels be equal to or better than outdoor air radon levels. The average home in the United States has a radon activity level of 1.3 pCi/L, while outdoor levels average approximately 0.4 pCi/L. Past studies demonstrate that indoor radon concentrations from Marcellus Shale sourced gas would remain below the EPA action level and the Indoor Radon Abatement Act long-term goal. Therefore, we find that the risk of exposure to radon in natural gas is not significant.

We also received comments concerning the potential buildup of decay products (progeny) within the pipeline and the risk of releasing these products to the environment either during pipeline maintenance or the removal of existing pipe. First, we note that without a significant presence of the parent radionuclide (i.e. radon), it is unlikely for there to be a significant presence of progeny. However, to further address this potential, the applicants would clean the pipeline to be removed prior to its being reused for another purpose. The applicants also conduct annual inspections and regular cleaning of their operational pipelines. Any liquids or solids removed during these cleanings would be collected and treated as hazardous material that would be disposed of at a licensed facility in accordance with federal, state, and local regulations. These measures would minimize the risk that any radioactive solids would be released into the environment.

4.12.2 Noise

Construction and operation of the NGT and TEAL Projects may affect overall noise levels in the Projects area. The ambient sound level of a region is defined by the total noise generated within the specific environment and is comprised of natural and man-made sounds. At any location, both the magnitude and frequency of environmental noise may vary considerably over the course of a day and throughout the week. This variation is caused in part by changing weather conditions and the effect of seasonal vegetation cover. As a point of reference, a person's threshold of perception for a noticeable change in loudness is about 3 dBA, whereas a 5 dBA change is clearly noticeable and a 10 dBA change is perceived as either twice or half as loud.

Two measurements used by some federal agencies to relate the time-varying quality of environmental noise to its known effects on people are the equivalent sound level (L_{eq}) and the L_{dn}. The L_{eq} is a sound level over a specific time period corresponding to the same sound energy as measured for an instantaneous sound level assuming it is a constant noise source. Sound levels are perceived differently, depending on the length of exposure and time of day. The L_{dn} takes into account the time of day and duration the noise is encountered. Specifically, in calculation of the L_{dn}, late night and early morning (10:00 p.m. to 7:00 a.m.) noise exposures are increased by 10 dBA to account for people's greater sensitivity to

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[12] New Jersey-New York Expansion Project Final Environmental Impact Statement (Docket CP1156) issued March 2012, Rockaway Delivery Lateral and Northeast Connector Projects Final Environmental Impact Statement (Dockets CP13-36 and CP13-132) issued February 2014, and the Algonquin Incremental Market Project Final Environmental Impact Statement (Docket CP14-96) issued January 2015.

sound during nighttime hours. Due to the 10 dBA nighttime penalty added prior to calculation of the L_{dn}, for a facility to meet the 55 dBA L_{dn} limit, the facility must be designed such that the constant 24-hour noise level does not exceed an L_{eq} of 48.6 dBA at any NSA. The A-weighted scale is used because human hearing is less sensitive to low and high frequencies than mid-range frequencies.

Federal Regulations

In 1974, the EPA published its *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. This document provides information for state and local governments to use in developing their own ambient noise standards. The EPA has indicated that an L_{dn} of 55 dBA protects the public from indoor and outdoor activity interference. We have adopted this criterion and used it to evaluate to potential noise impacts from the proposed Projects at pre-existing NSAs such as schools, hospitals, and residences. In addition, Commission regulations state that operation of compressor stations may not result in any perceptible increase in vibration at any NSA.

State and Local Regulations

The Michigan Public Service Commission has established Rule 324.1015 *Nuisance noise* and Rule 324.1016 *Construction standards for noise abatement at compressors associated with surface facilities* in the Michigan Oil and Gas Regulations. Rule 1015 regulates noise from surface facilities associated with the production of oil, gas, or brine. The NGT Project is not associated with oil, gas, or brine production. Ohio has not established noise regulations that would be applicable to the construction or operation of the NGT and TEAL Projects facilities located in the state.

Ypsilanti Charter Township, Michigan established a local ordinance requiring that noise is limited to 75 dBA during daytime and 70 dBA during nighttime at the property line. However, our noise criterion is generally more stringent. Therefore compliance with the 55 dBA L_{dn} limit at the nearest NSA would result in compliance with this ordinance.

Columbiana County, Ohio requires that noise must be limited to 50 dBA between 10:00 p.m. and 7:00 a.m. or 60 dBA between 7:00 a.m. and 10:00 a.m. at the property boundary of the nearest noise-sensitive receptor. Columbiana County provides exceptions to the ordinance, which include construction organizations/workers during normal operations and permitted blasting activities

Monroe County, Ohio maintains a noise ordinance in its Code of Ordinances, Part 6 – General Offenses, Chapter 632 – Noise Control. This rule prohibits noise between the hours of 10:00 p.m. and 8:00 a.m. that is plainly audible at a distance of 75 feet, including construction noise. Texas Eastern would comply with this ordinance by constructing during daytime hours and meeting the FERC noise criterion. If construction is required prior to 8:00 a.m., Texas Eastern should work with the county to determine appropriate mitigation measures.

No other local noise ordinances were identified. However, if additional local noise ordinances are identified through local permitting processes, NEXUS and Texas Eastern would address them during consultations with the local government.

4.12.2.1 Construction Noise Impacts and Mitigation

Noise would be generated during construction of the pipeline and the aboveground facilities for the NGT and TEAL Projects. Noise levels would be highest in the immediate vicinity of construction activities and would diminish with distance from the work area. These impacts would be localized and temporary. The changing number and type of construction equipment at these sites would result in varying levels of noise. Construction activities associated with the Projects would be performed with standard heavy equipment such as track-excavators, backhoes, cranes, bulldozers, dump trucks, boring equipment, and cement trucks. In addition, various powered pumps would be used to control water in the workspace or during hydrostatic testing activities. Noise would also be generated by trucks and other light vehicles traveling in and near areas under construction. Construction would generally not affect nighttime noise levels as it would be limited to daylight hours, with the exception of HDD activities.

Surface topography, vegetation cover, wind, and weather conditions would also affect the distance that construction-related noise would extend from the workspace. Tall, dense vegetation and rolling topography typically attenuates noise when compared to less vegetated, open land. Typically, the most prevalent sound source during construction would be the internal combustion engines used to power the construction equipment. Table 4.12.2-1 provides estimated noise levels (50 feet from the source) for typical construction equipment.

TABLE 4.12.2-1

Noise Levels of Major Construction Equipment [a]

Equipment Type	Sound Level at 50 Feet (dBA)
Trucks	85
Crane	85
Roller	85
Bulldozers	85
Pickup Trucks	55
Backhoes	80
Grader	85
Portable generators	84
Jackhammer	89
Pumps	81
Horizontal Boring Hydraulic Jack	82

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a FHWA, 2011

Pipeline installation would typically be completed within 6 to 10 weeks at any given location, with the exception of HDD activities discussed below. Construction equipment noise levels would typically be about 85 dBA at 50 feet when equipment is operating at full load, which could be heard by people in nearby buildings. However, most pipeline construction noise would be localized. NEXUS and Texas Eastern would mitigate pipeline construction noise by ensuring that sound muffling devices, which would be provided as standard equipment by the construction equipment manufacturer, are kept in good working order and by limiting the majority of construction to daylight hours. Some discrete activities (e.g., hydrostatic testing, tie-ins, and purge and packing the pipeline) may require 24 hours of activity for limited periods of time. However, these activities would be short-term. Due to the temporary, transitory nature of pipeline construction, we conclude that construction noise would not have a significant impact on nearby landowners.

Blasting

NEXUS and Texas Eastern indicate that blasting could potentially be required in areas of shallow bedrock. As discussed in section 4.1.1.2, blasting would be conducted according to the NGT and TEAL Projects' *Blasting Plans*. Instantaneous sounds levels from blasting would vary based on a number of factors, but typical construction blasting operations have been documented at about 94 dBA at a distance of 50 feet (FHWA, 2011). If necessary, blasting would be relatively instantaneous and short-term in duration and nearby landowners would be notified prior to any blasting activities. Noise from blasting would occur infrequently for very short durations. Based on the limited scope and short-term nature of noise associated with blasting and NEXUS' and Texas Eastern's adherence to its *Blasting Plans*, we conclude that blasting would not result in significant noise impacts on nearby landowners.

Aboveground Facilities

Construction of the compressor stations and M&R stations associated with the NGT Project would occur over a period of several weeks to several months and would occur during daylight hours. Figures 4.12.2-1 through 4.12.2-4 in appendix M depict the NSAs within 0.5 mile of the Hanoverton, Wadsworth, Clyde, and Waterville Compressor Stations, respectively. Figures 4.12.2-5 through 4.12.2-8 in appendix M depict the NSAs within a 0.5-mile radius of M&R Stations MR01, MR02, MR03, MR04, and MR05, respectively. MR02 and MR03 are directly adjacent and are shown in the same figure (figure 4.12.2-6). Noise impacts associated with the NGT Project M&R stations would be short-term and temporary. Figures 4.12.2-9 and 4.12.2-10 depict the NSAs within a 0.5 mile of the Salineville and Colerain Compressor Stations, respectively.

Based on an acoustical analysis for the NGT and TEAL Projects, the noise associated with construction of the compressor stations at the nearest NSA to each station would be as follows:

- Hanoverton Compressor Station: 53 dBA
- Wadsworth Compressor Station: 45 dBA
- Clyde Compressor Station: 54 dBA
- Waterville Compressor Station: 47 dBA
- Salineville Compressor Station: 47 dBA
- Colerain Compressor Station: 55 dBA

Based on the analysis above, the temporary nature of construction and compliance with the 55 dBA L_{dn} criterion, we conclude that construction noise at the aboveground facility sites would not have a significant impact on nearby landowners.

HDD Operations

The NGT Project would include 18 HDD locations. HDD operations would generate noise at drill entry and exit points at specific locations (see table 2.3.2-1 for the location of the proposed HDDs). HDD activities in any one area could last from several weeks to several months depending on the length of the drill and the hardness of the substrate being drilled. Typical equipment used at HDD entry sites includes:

- drilling rig and engine-driven hydraulic power unit;
- engine-driven mud pump(s) and engine-driven generator set(s);
- mud mixing/cleaning equipment;
- mobile equipment including a crane, backhoe, front loader, forklift, and/or trucks(s);
- frac tanks; and
- engine-driven lights.

Noise associated with HDD exit sites could result from use of the following equipment:

- backhoe, side boom, and/or truck(s);
- engine-driven generator and pump; and
- engine-driven lights.

The results of NEXUS' HDD noise assessment are summarized in table 4.12.2-2. Additional NSAs are also present farther from the noise-generating sources at the HDD entry/exit sites; however, NGT Project noise levels at further NSAs in each direction would be lower than presented in table 4.12.2-2 due to additional noise attenuation.

TABLE 4.12.2-2

Estimated Noise Levels for HDD Entry and Exit Sites Along the NGT Project Route

HDD Segment (Entry or Exit Site)	Distance and Direction to Closest NSA to HDD Site Center	Ambient L_{dn} (dBA)	Calculated L_{dn} of HDD Operations (dBA)	L_{dn} of HDD Operations + Ambient L_{dn} (dBA)	Change in Ambient Sound Level (db)
HDD #1 (Entry)	600 ft. (NW)	43.3	**64.3**	64.2	**20.9**
HDD #1 (Exit)	1,260 ft. (E)	43.3	43.4	46.4	3.1
HDD #2 (Entry)	925 ft. (E)	45.5	**64.2**	64.2	**20.9**
HDD #2 (Exit)	460 ft. (N)	38.9	43.4	46.4	3.1
HDD #3 (Entry)	450 ft. (NW)	42.6	**59.9**	60.0	**14.5**
HDD #3 (Exit)	830 ft. (NW)	43.3	53.2	53.4	**14.5**
HDD #4 (Entry)	1,670 ft. (WSW)	42.3	**66.9**	67.0	**24.4**
HDD #4 (Exit)	1,820 ft. (NW)	49.7	49.4	50.4	7.1
HDD #5 (Entry)	900 ft. (W)	41.2	53.7	54.0	**11.7**
HDD #5 (Exit)	1,550 ft. (SSE)	40.2	39.6	49.7	0.4
HDD #6 (Entry)	740 ft. (NW)	43.6	**59.2**	59.2	**18.0**
HDD #6 (Exit)	370 ft. (S)	41.1	44.7	46.0	5.8
HDD #7 (Entry)	460 ft. (NW)	43.0	**62.1**	62.2	**18.6**
HDD #7 (Exit)	680 ft. (S)	44.6	54.3	54.5	**13.4**
HDD #8 (Entry)	860 ft. (E)	53.0	**66.7**	66.8	**13.8**
HDD #8 (Exit)	740 ft. (W)	59.6	49.5	50.7	6.1
HDD #9 (Entry)	590 ft. (NE)	55.8	**60.6**	61.3	8.3
HDD #9 (Exit)	630 ft. (E)	56.4	50.5	60.1	0.5
HDD #10 (Entry)	490 ft. (E)	56.2	**64.3**	64.9	9.1
HDD #10 (Exit)	910 ft. (WNW)	56.2	50.3	57.3	0.9
HDD #11 (Entry)	520 ft. (NE)	42.3	**66.1**	66.6	**10.4**
HDD #11 (Exit)	450 ft. (N)	44.1	46.7	56.7	0.5
HDD #12 (Entry)	970 ft. (E)	43.3	**65.6**	65.6	**23.3**
HDD #12 (Exit)	360 ft. (SW)	43.3	53.5	53.9	9.8
HDD #13 (Entry)	1,080 ft. (SW)	45.3	**59.4**	59.5	**16.2**
HDD #13 (Exit)	1,310 ft. (S)	43.6	54.5	54.9	**11.6**
HDD #14 (Entry)	540 ft. (NW)	39.4	**58.3**	58.5	**13.2**

TABLE 4.12.2-2 (cont'd)

Estimated Noise Levels for HDD Entry and Exit Sites Along the NGT Project Route

HDD Segment (Entry or Exit Site)	Distance and Direction to Closest NSA to HDD Site Center	Ambient L_{dn} (dBA)	Calculated L_{dn} of HDD Operations (dBA)	L_{dn} of HDD Operations + Ambient L_{dn} (dBA)	Change in Ambient Sound Level (db)
HDD #14 (Exit)	1,080 ft. (S)	39.4	44.8	47.3	3.7
HDD #15 (Entry)	460 ft. (NW)	40.8	**65.2**	65.2	**25.8**
HDD #15 (Exit)	720 ft. (S)	46.3	45.0	46.0	6.6
HDD #16 (Entry)	1,300 ft. (NW)	49.0	**66.7**	66.7	**25.9**
HDD #16 (Exit)	800 ft. (NE)	53.1	49.0	50.8	4.5
HDD #17 (Entry)	220 ft. (W)	51.1	52.5	54.1	5.1
HDD #17 (Exit)	250 ft. (NW)	60.6	47.9	54.3	1.2
HDD #18 (Entry)	970 ft. (NW)	56.9	**75.1**	75.1	**24.0**
HDD #18 (Exit)	>1/2 mile	N/A	**62.2**	64.5	3.9

Note: **Bold** values indicate sites that could exceed FERC's 55 dBA L_{dn} noise guideline at the nearest NSA

As indicated (in bold) in table 4.12.2-2, 17 of the HDD entry or exit sites could exceed the FERC's 55 dBA L_{dn} noise guideline at the nearest NSA. NEXUS estimates that the work associated with HDD installations would range from 14 to 89 days.

NEXUS is evaluating implementation of specific noise mitigation measures for the proposed HDDs that exceed 55 dBA L_{dn}. The mitigation measures considered include:

- a temporary noise barrier constructed of plywood panels or a sound-absorptive material designed with a minimum Sound Transmission Class rating of 20-31;
- a temporary noise-reducing tent lined with sound-absorptive material covering the workspace or equipment;
- a partial noise barrier or enclosure constructed of plywood panels or a sound-absorptive material placed around the hydraulic power unit and engine-driven pumps;
- "low noise" generators (i.e., with factory designed enclosures);
- residential-grade exhaust silencers on any engines associated with the HDD equipment;
- relocation of the mud mixing/cleaning rig and/or locating equipment, such as the mud rig (if must be outside the workspace tent), such that the tent provides sound shielding; and
- limiting HDD operations to daytime hours, if feasible.

NEXUS would employ these mitigation measures, or other measures that would provide equal reductions, to demonstrate compliance with the FERC's 55 dBA L_{dn} noise standard. The mitigated noise impacts for the 15 referenced HDD entry or exit locations are estimated in table 4.12.2-3.

TABLE 4.12.2-3

Estimated Noise Levels for HDDs that Could Exceed the Sound Criterion at the Closest NSA [a]

HDD Segment (Entry or Exit Site)	Calculated L_{dn} of HDD Operations (dBA)[a]	L_{dn} of HDD Operations + Ambient L_{dn} (dBA)	Change in Ambient Sound Level (dBA)
HDD #1 (Entry)	52.1	52.7	9.4
HDD #2 (Entry)	48.0	49.9	4.4
HDD #3 (Entry)	53.5	53.8	11.2
HDD #5 (Entry)	49.2	49.9	8.7
HDD #6 (Entry)	50.2	51.0	7.4
HDD #7 (Entry)	54.3	54.6	11.6
HDD #8 (Entry)	47.7	54.1	1.1
HDD #9 (Entry)	52.3	57.4	1.6
HDD #10 (Entry)	52.2	57.6	1.4
HDD #11 (Entry)	51.4	51.9	9.6
HDD #12 (Entry)	49.5	50.5	7.2
HDD #13 (Entry)	48.7	50.3	5.0
HDD #14 (Entry)	53.1	53.3	13.9
HDD #15 (Entry)	51.1	51.5	10.7
HDD #17 (Entry)	53.3	55.3	4.2
HDD #17 (Exit)	50.1	61.0	0.4

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a Assumes additional noise mitigation measures employed to meet the FERC noise criterion.

In addition to noise mitigation measures, NEXUS would provide affected landowners written notification at least 2 weeks prior to any necessary nighttime HDD operations, including in-person notifications and telephone calls as a secondary means of communication. To ensure that HDD noise levels are not significant, **we recommend that**:

- **NEXUS should file in the <u>weekly construction status reports</u> the following for each HDD entry and exit site:**
  - **a. the noise measurements from the nearest NSA for each drill entry/exit site, obtained at the start of drilling operations;**
  - **b. the noise mitigation that NEXUS implemented at the start of drilling operations; and**
  - **c. any additional mitigation measures that NEXUS would implement if the initial noise measurements exceeded an L_{dn} of 55 dBA at the nearest NSA and/or increased noise is greater than 10 dBA over ambient conditions.**

4.12.2.2 Operational Impacts and Mitigation

Pipeline Facilities

Operation of the NGT and TEAL Project pipelines would not typically cause noise impacts, except during pipeline blowdown events at MLV sites, which would occur periodically. However, this noise is localized and short-term, lasting minutes. We received comments about potential impacts on residents due to low frequency sounds waves generated by high pressure natural gas flowing through a pipeline. This type of noise is typically associated with compressor stations that include reciprocating engines, which have been reported to result in a "thumping" or "pulsing" effect along the pipeline downstream from the compressor station. There are mitigation measures that can be installed at these types of compressor stations; however, the proposed compressor units at all compressor stations are turbines, and this issue would not occur.

Aboveground Facilities

A noise analysis was completed for each of the NGT Project M&R stations. Table 4.12.2-4 below summarizes the results. Figures 4.12.2-5 through 4.12.2-8 in appendix M display the nearest NSA to each M&R station.

TABLE 4.12.2-4

Estimated Noise Levels for NGT Project M&R Stations

M&R Station	Distance (ft.)/ Direction	Ambient L_{dn} (dBA)	Estimated L_{dn} due to M&R Station (dBA)	M&R Station L_{dn} + Ambient L_{dn} (dBA)	Change in Ambient Sound Level (dB)
NEXUS/TGP M&R Station (MR01)	850 ft./ (West)	45.0	32.0	45.2	0.2
NEXUS/Kensington M&R Station (MR02) and NEXUS/Texas Eastern M&R Station (MR03)[a]	700 ft. (Northeast)	60.0	35.5	60.0	0.0
NEXUS/Dominion East Ohio M&R Station (MR05)	270 ft. (West)	56.7	49.2	57.4	0.7
Columbia Gas of Ohio M&R Delivery Station	2,200 ft. (Southeast)	41.8	26.0	41.9	0.1
NEXUS/Willow Run M&R Station (MR04)	270 ft. (East)	54.2	43.9	54.6	0.4

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a MR03 would be directly adjacent to MR02 and would impact the same NSA.

Based on the M&R station configuration and mitigation measures, the noise attributable to each M&R station would not exceed the FERC criterion of 55 dBA L_{dn} at the nearest NSAs and would not result in a perceptible noise increase at the nearby NSAs.

To ensure that the actual noise levels resulting from operation of the M&R Stations comply with our noise guidelines, **we recommend that:**

- **NEXUS should file a noise survey with the Secretary <u>no later than 60 days</u> after placing the new M&R stations into service. If the noise attributable to the operation of all of the equipment at each M&R station exceeds 55 dBA L_{dn} at the nearest NSA, NEXUS should file a report on what changes are needed and should install the additional noise controls to meet the level <u>within 1 year</u> of the in-service date. NEXUS should confirm compliance with the above requirement by filing a second noise survey for each station with the Secretary <u>no later than 60 days</u> after it installs the additional noise controls.**

The noise impact evaluation for the NGT and TEAL Projects considers the noise produced by all significant sound sources associated with the proposed compressor stations that could impact the sound contribution at nearby NSAs. Significant sound sources include the turbine-driven compressor units, gas cooling equipment, and aboveground gas piping at each station. The noise evaluation incorporates reductions from the proposed noise controls. Noise controls for the compressor buildings include acoustical specifications for wall, roof, and entry door materials; prohibition of windows or skylights; and acoustical specifications for the ventilation system. Noise mitigation for the compressor equipment include the use of mufflers and silencers on turbine exhaust and blowdown units and acoustic blankets for exterior aboveground piping. Table 4.12.2-5 shows the estimated noise impact at the nearest NSAs due to the full load operation of the Hanoverton, Wadsworth, Clyde, and Waterville Compressor Stations. Table 4.12.2-6 shows the estimated noise impact at the nearest NSAs due to the full load operation of the Salineville and Colerain Compressor Stations.

TABLE 4.12.2-5

Estimated Noise Levels for NGT Project Compressor Stations

Nearest NSA	Distance (ft.)/ Direction	Ambient Sound Level (dBA L_{dn})	Sound Level During Operation (dBA L_{dn})	Station L_{dn} + Ambient L_{dn} (dBA)	Noise Increase (dB)
Hanoverton Compressor Station					
NSA #1	1,040 ft./south-southeast	46.4	51.0	52.3	5.9
NSA #2	1,680 ft./west	45.5	45.9	48.7	3.2
NSA #3	1,800 ft./northeast	41.1	45.2	46.6	5.5
NSA #4	1,740 ft./south	45.5	45.6	48.5	3.0
NSA #5	1,900 ft./southwest	45.5	44.7	48.1	2.6
Wadsworth Compressor Station					
NSA #1	1,800 ft./west	56.7	44.5	57.0	0.3
NSA #2	1,840 ft./west-northwest	46.9	44.2	48.8	1.9
NSA #3	2,490 ft./northeast	48.5	40.7	49.2	0.7
Clyde Compressor Station					
NSA #1	1,450 ft./north-northwest	63.2	46.4	63.3	0.1
NSA #2	810 ft./southwest	51.8	52.7	55.3	3.5
NSA #3	1,160 ft./southeast	53.4	48.9	54.7	1.3
Waterville Compressor Station					
NSA #1	1,390 ft./east	60.6	48.0	60.8	0.2
NSA #2	1,990 ft./north	48.6	43.8	49.9	1.3
NSA #3	3,790 ft./west	41.5	36.0	42.6	1.1
NSA #4	1,600 ft./southeast	60.6	46.0	60.7	0.1

TABLE 4.12.2-6

Estimated Noise Levels for TEAL Project Compressor Stations

Nearest NSA	Distance (ft)/ Direction	Ambient Sound Level L_{dn} (dBA)	Estimated L_{dn} of Station during Operation (dBA)	Station L_{dn} + Ambient L_{dn} (dBA)	Change in Ambient Sound Level (dB)
Salineville Compressor Station					
NSA #1	1,490 ft./north	39.7	43.7	45.2	5.5
NSA #2	1,660 ft./west	43.8	42.6	46.2	2.4
NSA #3	1,910 ft./west-northwest	43.8	41.0	45.6	1.8
NSA #4	2,200 ft./northeast	39.7	39.4	42.6	2.9
Colerain Compressor Station [a]					
NSA #1	1,880 ft./west	45.0 [b]	42.2	46.8	1.8
NSA #2	2,140 ft./south-southeast	43.6 [b]	40.3	45.3	1.7
NSA #3	2,100 ft./north-northeast	43.7 [b]	41.7	45.8	2.1

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[a] Existing station sound level at the NSA is based on previously measured ambient sound data and the results of a recent acoustical analysis of the compressor station for the OPEN Project, FERC Docket No. CP14-68-000.

The results of the acoustical analyses indicate that the sound contribution of the compressor stations would remain below our 55 dBA L_{dn} criterion at the nearest NSAs during operation. The highest increase in noise would occur at NSA 1 for the Hanoverton Compressor Station (5.9 dBA). While the increase at this NSA would be noticeable, it would not be significant.

Landowners near the proposed Hanoverton Compressor Station expressed concern with the noise levels resulting from compressor station operations and blowdowns, and that loud and unpredictable noises from a blowdown may startle horses and cause injury. A blowdown involves the venting of natural gas from compressor station components into the atmosphere. Most blowdowns occur as a result of system testing or maintenance activities, and NEXUS would incorporate blowdown silencers to minimize noise during planned blowdowns. In addition, projected sound levels associated with planned blowdown events are also estimated to remain below 55 dBA L_{dn} at the nearest NSAs at each compressor station and would be infrequent, lasting from 1 to 5 minutes. Unsilenced station blowdowns would occur in the event of an emergency. Horses and cattle may be close to blowdown events and experience noise levels greater than the 55 dBA L_{dn} criterion.

Landowners near the Waterville Compressor Station expressed concern regarding the potential for excessive noise levels in the vicinity of the Waterville Compressor Station. The results in table 4.12.2-5 indicate that the Waterville Compressor Station would be below the FERC criterion and would represent an increase of 1.3 dBA or less at the nearest NSA (i.e., would not result in a noticeable increase in noise).

We received comments regarding the potential for low frequency vibrations to cause or exacerbate health issues near compressor stations associated with the Projects. FERC regulations state that a new compressor station or modification of an existing station shall not result in a perceptible increase in vibration at any NSA. This would apply to both the NGT and TEAL Projects compressor stations. FERC staff would investigate noise and vibration complaints, and to the extent that a violation is documented, each company would be required to address the issue.

To ensure that the actual noise levels resulting from operation of the Hanoverton, Wadsworth, Clyde, and Waterville Compressor Stations are not significant, **we recommend that:**

- **NEXUS should file a noise survey with the Secretary no later than 60 days after placing each of the NGT Project compressor stations in service. If a full load condition noise survey is not possible, NEXUS should instead file an interim survey at the maximum possible hp load and file the full load survey within 6 months. If the noise attributable to the operation of all of the equipment at any station under interim or full hp load exceeds 55 dBA L_{dn} at any nearby NSA, NEXUS should file a report on what changes are needed and should install the additional noise controls to meet the level within 1 year of the in-service date. NEXUS should confirm compliance with the 55 dBA L_{dn} requirement by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.**

To ensure that the actual noise levels resulting from operation of the Salineville and Colerain Compressor Stations are not significant, **we recommend that:**

- **Texas Eastern should file a noise survey with the Secretary no later than 60 days after placing each of the TEAL Project compressor stations in service. If a full load condition noise survey of the entire station is not possible, Texas Eastern should instead file an interim survey at the maximum possible hp load and file the full load survey within 6 months. If the noise attributable to the operation of all of the equipment at any compressor station under interim or full hp load conditions exceeds 55 dBA L_{dn} at any nearby NSAs, Texas Eastern should file a report on what changes are needed and should install the additional noise controls to meet the level within 1 year of the in-service date. Texas Eastern should confirm compliance with the 55 dBA L_{dn} requirement by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.**

Based on the noise analyses for the NGT and TEAL Projects M&R Stations and compressor stations, mitigation measures NEXUS and Texas Eastern would employ, and adherence to our noise criterion of 55 dBA L_{dn} (including station blowdowns), we conclude that the noise resulting from operation of the NGT and TEAL Projects would not have a significant impact on the surrounding ambient noise environment.

4.13 RELIABILITY AND SAFETY

The transportation of natural gas by pipeline involves some incremental risk to the public due to the potential for an accidental release of natural gas. The greatest hazard is a fire or explosion following a major pipeline rupture.

CH_4, the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic but is classified as a simple asphyxiate, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death.

CH_4 has an auto-ignition temperature of 1,000 °F and is flammable at concentrations between 5.0 and 15.0 percent in air. At atmospheric temperatures, CH_4 is buoyant and disperses rapidly in air. An unconfined mixture of CH_4 and air is not explosive; however, it may ignite if there is an ignition source. A flammable concentration within an enclosed space in the presence of an ignition source can explode.

4.13.1 Safety Standards

The DOT is mandated to provide pipeline safety under Title 49 USC Chapter 601. PHMSA's Office of Pipeline Safety administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. It develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards that set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve the required safety standard.

We received comments from landowners about the need for safety inspections of the construction activities. PHMSA ensures that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local level. The DOT provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing the federal standards. A state may also act as the DOT's agent to inspect interstate facilities within its boundaries. Ohio and Michigan perform inspections on interstate natural gas pipeline facilities. The DOT is also responsible for enforcement action in all of the Projects' states. In addition to DOT inspections, NEXUS' and Texas Eastern's contractors, including construction workers, would be required to adhere to federal and state safety regulations and recommendations.

The DOT pipeline standards are published in 49 CFR 190-199. Part 192 specifically addresses the minimum federal safety standards for transportation of natural gas by pipeline. Under a *Memorandum of Understanding on Natural Gas Transportation Facilities* (Memorandum) dated January 15, 1993, between DOT and FERC, DOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of FERC's regulations requires that an applicant certify that it would design, install, inspect, test, construct, operate, replace, and maintain the facility for which a Certificate is requested in accordance with federal safety standards and plans for maintenance and inspection, or certify that it has been granted a waiver of the requirements of the safety standards by the DOT in accordance with section 3(e) of the Natural Gas Pipeline Safety Act. FERC accepts this certification and does not impose additional safety standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert DOT. The Memorandum also provides for referring complaints and inquiries made by state and local governments and the general public involving safety matters related to pipelines under the Commission's jurisdiction.

FERC also participates as a member of the DOT's Technical Pipeline Safety Standards Committee, which determines if proposed safety regulations are reasonable, feasible, and practicable.

The pipeline and aboveground facilities associated with the NGT and TEAL Projects must be designed, constructed, operated, and maintained in accordance with the DOT Minimum Federal Safety Standards in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. The DOT specifies material selection and qualification, minimum design requirements, and protection from internal, external, and atmospheric corrosion. NEXUS and Texas Eastern have stated that the project facilities would be designed, constructed, operated, and maintained in accordance with 49 CFR 192.

The DOT also defines area classifications, based on population density in the vicinity of pipeline facilities, and specifies more rigorous safety requirements for populated areas. The class location unit is an area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. The four area classifications are defined as:

- Class 1: Location with 10 or fewer buildings intended for human occupancy.
- Class 2: Location with more than 10 but less than 46 buildings intended for human occupancy.
- Class 3: Location with 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building, or small well-defined outside area occupied by 20 or more people on at least 5 days a week for 10 weeks in any 12-month period.
- Class 4: Location where buildings with four or more stories aboveground are prevalent.

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. For example, pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated rock. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil and 24 inches in consolidated rock.

Class locations also specify the maximum distance to a sectionalizing block valve (i.e., 10.0 miles in Class 1, 7.5 miles in Class 2, 4.0 miles in Class 3, and 2.5 miles in Class 4 locations). Pipe wall thickness and pipeline design pressures, hydrostatic test pressures, Maximum Allowable Operating Pressure (MAOP), inspection and testing of welds, and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas.

Class locations for the NGT and TEAL Projects have been determined based on the relationship of the pipeline centerline to other nearby structures and manmade features. Table 4.13.1-1 provides the class locations by milepost for the NGT Project pipeline. In addition, each of the proposed NGT Project compressor stations would be in Class 1 areas. The TEAL Project would only consist of Class 1 pipe.

TABLE 4.13.1-1

NGT Project Pipeline Class Locations

	Class 1 [a]			Class 2 [a]			Class 3 [a]		
State, County	MP Start [b]	MP End [b]	Length (miles) [c]	MP Start [b]	MP End [b]	Length (miles) [c]	MP Start [b]	MP End [b]	Length (miles) [c]
OHIO									
Columbiana	0.0	0.9	0.9	0.1	0.2	0.1	0.2	0.5	0.3
	0.0	0.1	0.1	0.5	0.6	0.1	N/A	N/A	N/A
	0.6	0.9	0.3	0.9	1.3	0.4	N/A	N/A	N/A
	1.3	1.5	0.2	1.5	3.0	1.5	N/A	N/A	N/A
	3.0	4.6	1.6	4.6	4.8	0.2	N/A	N/A	N/A
	4.8	5.3	0.5	5.3	5.8	0.5	N/A	N/A	N/A
	5.8	6.1	0.3	6.1	6.6	0.5	N/A	N/A	N/A
	6.6	6.8	0.2	6.8	7.3	0.5	N/A	N/A	N/A
	7.3	7.5	0.2	7.5	7.9	0.4	N/A	N/A	N/A
	7.9	9.7	1.8	9.7	10.7	1.0	N/A	N/A	N/A
	10.7	11.0	0.3	11.0	11.6	0.6	N/A	N/A	N/A
	11.6	12.3	0.7	12.3	12.5	0.2	N/A	N/A	N/A
Stark	12.7	13.0	0.3	12.5	12.7	0.1	31.9	34.1	2.2
	13.6	13.8	0.2	13.0	13.6	0.6	N/A	N/A	N/A
	14.5	18.2	3.7	13.8	14.5	0.7	N/A	N/A	N/A

TABLE 4.13.1-1 (cont'd)

NGT Project Pipeline Class Locations

	Class 1 [a]			Class 2 [a]			Class 3 [a]		
State, County	MP Start [b]	MP End [b]	Length (miles) [c]	MP Start [b]	MP End [b]	Length (miles) [c]	MP Start [b]	MP End [b]	Length (miles) [c]
Stark (cont'd)	18.7	21.8	3.1	18.2	18.7	0.6	N/A	N/A	N/A
	22.4	26.3	3.8	21.8	22.4	0.6	N/A	N/A	N/A
	26.5	26.8	0.2	26.3	26.5	0.2	N/A	N/A	N/A
	27.4	29.2	1.8	26.8	27.4	0.7	N/A	N/A	N/A
	29.5	30.0	0.5	29.2	29.5	0.3	N/A	N/A	N/A
	30.5	31.1	0.6	30.0	30.5	0.5	N/A	N/A	N/A
	31.5	31.9	0.5	31.1	31.5	0.4	31.9	33.5	1.6
	N/A	N/A	N/A	33.5	33.6	0.1	33.6	34.2	0.6
Summit	34.2	34.5	0.3	34.5	35.3	0.8	34.2	34.2	0.02
	35.3	35.8	0.5	35.8	36.4	0.6	36.4	37.6	1.2
	40.4	41.0	0.6	41.0	41.9	0.9	41.8	43.0	1.2
	41.9	41.9	0.04	36.4	37.0	0.6	41.9	43.0	1.1
	N/A	N/A	N/A	43.0	43.2	0.2	43.2	43.8	0.6
	N/A	N/A	N/A	43.8	43.9	0.1	N/A	N/A	N/A
	43.9	44.1	0.2	44.1	45.8	1.6	N/A	N/A	N/A
	45.8	45.9	0.1	45.9	47.1	1.1	N/A	N/A	N/A
	47.1	48.6	1.6	48.6	49.0	0.4	N/A	N/A	N/A
	49.0	49.2	0.2	48.6	49.0	0.4	49.2	50.2	1.0
	N/A	N/A	N/A	50.2	50.4	0.1	N/A	N/A	N/A
Wayne	50.6	51.2	0.6	50.4	50.6	0.2	N/A	N/A	N/A
	51.7	51.8	0.1	51.2	51.7	0.5	N/A	N/A	N/A
	52.2	52.4	0.2	51.8	52.2	0.4	52.4	54.0	1.6
	55.0	55.5	.05	54.0	55.0	1.0	N/A	N/A	N/A
	55.9	56.2	0.3	55.5	55.9	0.4	N/A	N/A	N/A
	N/A	N/A	N/A	56.2	56.6	0.4	N/A	N/A	N/A
	N/A	N/A	N/A	57.2	57.3	0.1	57.3	57.5	0.
	N/A	N/A	N/A	57.5	57.7	0.2	N/A	N/A	N/A
	N/A	N/A	N/A	56.6	57.2	0.6	N/A	N/A	N/A
Medina	58.6	59.2	0.6	57.7	58.6	0.9	N/A	N/A	N/A
	59.7	60.0	0.3	59.2	59.7	0.5	N/A	N/A	N/A
	60.5	65.3	4.9	60.0	60.5	0.5	N/A	N/A	N/A
	66.1	67.5	1.5	65.3	66.1	0.7	N/A	N/A	N/A
	68.6	71.6	3.0	67.5	67.9	0.4	67.9	68.9	0.9
	73.0	73.4	0.4	68.9	69.5	0.7	N/A	N/A	N/A
	69.5	71.6	2.2	71.6	73.0	1.4	N/A	N/A	N/A
	73.0	73.3	0.3	73.3	74.3	1.0	N/A	N/A	N/A
	74.3	75.8	1.4	75.8	76.6	0.8	N/A	N/A	N/A
	76.6	76.8	0.2	76.8	77.2	0.4	N/A	N/A	N/A
	77.2	80.5	3.3	N/A	N/A	N/A	N/A	N/A	N/A
Lorain	80.5	82.4	2.0	82.4	82.9	0.4	N/A	N/A	N/A
	82.9	93.3	10.4	93.5	93.8	0.3	93.3	93.5	0.2
	93.8	94.4	0.6	95.3	95.4	0.1	94.4	95.4	1.0
	95.4	98.3	2.9	98.3	98.7	0.4	N/A	N/A	N/A
	98.7	98.9	0.2	98.9	99.4	0.5	N/A	N/A	N/A
	99.4	99.8	0.5	99.8	100.2	0.3	N/A	N/A	N/A
	100.2	100.4	0.2	100.4	100.8	0.4	N/A	N/A	N/A
	100.8	101.1	0.3	101.1	101.3	0.2	N/A	N/A	N/A
Huron	101.5	104.7	3.2	101.3	101.5	0.2	N/A	N/A	N/A
Erie	104.7	111.0	6.3	111.0	111.4	0.4	N/A	N/A	N/A
	111.4	111.6	0.3	111.6	112.3	0.7	N/A	N/A	N/A
	112.3	116.8	4.5	116.8	117.5	0.7	N/A	N/A	N/A

TABLE 4.13.1-1 (cont'd)

NGT Project Pipeline Class Locations

State, County	Class 1 [a]			Class 2 [a]			Class 3 [a]		
	MP Start [b]	MP End [b]	Length (miles) [c]	MP Start [b]	MP End [b]	Length (miles) [c]	MP Start [b]	MP End [b]	Length (miles) [c]
Erie (cont'd)	117.5	125.6	8.0	125.6	126.0	0.4	N/A	N/A	N/A
	126.0	126.1	0.1	126.1	126.5	0.3	N/A	N/A	N/A
	126.5	127.3	0.8	127.3	127.9	0.6	N/A	N/A	N/A
	127.9	129.9	2.0	129.9	131.0	1.1	N/A	N/A	N/A
	131.0	131.5	0.5	N/A	N/A	N/A	N/A	N/A	N/A
Sandusky	131.5	145.8	14.3	145.8	146.6	0.8	N/A	N/A	N/A
	146.6	147.2	0.6	146.3	146.6	0.3	N/A	N/A	N/A
	147.7	153.6	5.9	147.2	147.7	0.5	N/A	N/A	N/A
	155.0	157.3	2.3	153.6	154.0	0.5	154.0	155.0	1.0
	157.8	158.0	0.1	157.3	157.8	0.5	N/A	N/A	N/A
	158.3	162.7	4.4	158.0	158.3	0.4	N/A	N/A	N/A
	163.3	163.5	0.2	162.7	163.3	0.5	N/A	N/A	N/A
	N/A	N/A	N/A	163.5	163.7	0.2	N/A	N/A	N/A
Wood	164.0	164.2	0.2	163.7	164.0	0.2	N/A	N/A	N/A
	164.8	165.0	0.2	164.2	164.8	0.7	164.8	165.0	0.2
	165.3	173.3	8.0	165.0	165.3	0.3	N/A	N/A	N/A
	173.7	173.8	0.1	173.3	173.7	0.4	N/A	N/A	N/A
	174.1	181.5	7.3	173.8	174.1	0.3	N/A	N/A	N/A
Lucas	181.5	181.6	0.2	N/A	N/A	N/A	181.6	181.9	0.2
	181.9	187.2	5.3	187.8	189.0	1.2	187.2	187.8	0.6
	189.0	189.0	0.1	189.0	189.3	0.3	N/A	N/A	N/A
Henry	189.5	190.0	0.5	189.3	189.5	0.2	N/A	N/A	N/A
	N/A	N/A	N/A	190.0	190.2	0.2	N/A	N/A	N/A
Fulton	190.4	193.2	2.8	190.2	190.4	0.2	N/A	N/A	N/A
	194.0	194.6	0.7	193.2	194.0	0.8	N/A	N/A	N/A
	195.0	195.1	0.1	194.6	195.0	0.3	N/A	N/A	N/A
	196.4	204.7	8.3	195.1	196.4	1.3	N/A	N/A	N/A
	205.1	208.3	3.2	204.7	205.1	0.4	N/A	N/A	N/A
MICHIGAN									
Lenawee	208.3	230.4	22.1	N/A	N/A	N/A	N/A	N/A	N/A
Monroe	230.4	236.8	6.5	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	236.8	244.2	7.4	244.2	244.5	0.4	N/A	N/A	N/A
	244.5	244.7	0.1	244.7	245.2	0.5	245.2	245.3	0.1
	245.5	247.2	1.7	245.3	245.5	0.2	249.6	250.3	0.7
	248.4	248.5	0.1	247.2	247.6	0.4	247.6	248.2	0.6
	248.4	248.5	0.1	248.2	248.4	0.2	248.5	248.9	0.4
Washtenaw	249.3	249.4	0.1	248.9	249.3	0.5	N/A	N/A	N/A
	250.3	250.8	0.5	249.4	249.6	0.2	249.6	250.3	0.7
	N/A	N/A	N/A	N/A	N/A	N/A	250.8	253.0	2.2
	253.3	253.7	0.4	253.0	253.3	0.3	253.7	253.9	0.2
	253.9	254.5	0.6	254.5	254.7	0.2	254.7	254.9	0.2
	254.9	255.0	0.1	N/A	N/A	N/A	N/A	N/A	N/A

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[a] Class 1: Location with 10 or fewer buildings for human occupancy
Class 2: Location with more than 10 but fewer than 46 buildings intended for human occupancy
Class 3: Location with 46 or more buildings intended for human occupancy or where pipeline lies within 100 yards of any building, or small, well-defined outside area occupied by 20 or more people during normal use
Class 4: Location where buildings with four or more stories aboveground are prevalent

[b] Approximate milepost along the proposed pipeline rounded to the nearest 0.1 mile

[c] Crossing length of each pipeline class within each county

N/A = not applicable

If a subsequent increase in population density adjacent to the right-of-way results in a change in class location for the pipeline, NEXUS and Texas Eastern would reduce the MAOP or replace the segment with pipe of sufficient grade and wall thickness, if required to comply with DOT requirements for the new class location.

The DOT Pipeline Safety Regulations require operators to develop and follow a written Integrity Management Program (IMP) that contains all the elements described in 49 CFR 192.911 and addresses the risks on each transmission pipeline segment. Specifically, the rule establishes an IMP that applies to all high-consequence areas (HCA).

The DOT has published rules in 49 CFR 192.903 that define HCAs where a gas pipeline accident could do considerable harm to people and their property, and requires an IMP to minimize the potential for an accident. This definition satisfies, in part, the Congressional mandate for DOT to prescribe standards that establish criteria for identifying each gas pipeline facility in a high-density population area.

The HCAs may be defined in one of two ways. In the first method, an HCA includes:

- current Class 3 and 4 locations;
- any area in Class 1 or 2 where the potential impact radius[13] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle[14]; or
- any area in Class 1 or 2 where the potential impact circle includes an identified site.

An “identified site” is an outside area or open structure that is occupied by 20 or more persons on at least 50 days in any 12-month period; a building that is occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12-month period; or a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate.

In the second method, an HCA includes any area within a potential impact circle that contains:

- 20 or more buildings intended for human occupancy; or
- an identified site.

We received numerous comments regarding the safety of homes, schools, hospitals, etc., that would be within the potential impact radius for the NGT Project pipeline, which would be 1,100 feet. For the NGT Project compressor stations, the potential impact radius would be 943 feet. The potential impact radius is designed to identify locations where additional safety measures are required to ensure and promote pipeline safety in populated areas. NEXUS would develop a Public Awareness Program as outlined in 49 CFR 192.616, which would provide outreach measures to the affected public, emergency responders, and public officials. NEXUS’ program would use multiple media channels (e.g., direct mail, e-mail, social networking, public service announcements, print advertisement, and public meetings) to engage these core audiences. In addition, NEXUS would also mail informational brochures to landowners, businesses, potential excavators, and public officials along the pipeline system each year to inform them of the presence of the pipeline and instruct them on how to recognize and react to unusual activity in the area. These

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[13] The potential impact radius is calculated as the product of 0.69 and the square root of the MAOP of the pipeline in pounds per square inch (gauge), multiplied by the square of the pipeline diameter in inches.

[14] The potential impact circle is a circle of radius equal to the potential impact radius.

brochures would provide emergency contact phone numbers and reinforce the need for excavators to use the “811 Call Before You Dig” service.

We also received numerous comments regarding the need for required setbacks for homes and structures in relation to pipelines, in reference to 49 CFR 195.210; however this regulation is only applicable to pipelines transporting hazardous liquids. The DOT regulations applicable to the NEXUS and TEAL Projects under 49 CFR 192 for pipelines transporting natural gas do not have a similar setback provision. As discussed throughout this section, the DOT maintains and enforces pipeline safety regulations. The Commission sites pipelines in cooperation with the DOT under a memorandum of understanding. At this time there are no established setback requirements for natural gas pipeline facilities.

Once a pipeline operator has determined the HCAs along its pipeline, it must apply the elements of its IMP to those sections of the pipeline within HCAs. DOT regulations specify the requirements for the IMP at section 192.911. The HCAs for the Projects have been determined based on the relationship of the pipeline centerline to other nearby structures and identified sites. Table 4.13.1-2 lists the HCAs for the NGT Project, which have been determined using the second method. The NGT Project compressor stations would not be constructed in HCAs. There are no HCAs located along the proposed facilities associated with the TEAL Project.

TABLE 4.13.1-2

Location of High Consequence Areas along the NGT Project Pipeline Facilities

State, Facility Name, County	Milepost Start [a]	Milepost End [a]	Length (miles) [b]
OHIO			
Mainline			
Columbiana	0.0	0.8	0.8
Columbiana	1.5	2.4	0.9
Stark	18.1	18.9	0.8
Stark	29.2	29.8	0.6
Stark	31.9	34.2	2.3
Summit	34.2	34.3	0.1
Summit	34.8	35.3	0.5
Summit	36.3	37.8	1.4
Summit	38.4	38.8	0.4
Summit	38.8	39.4	0.6
Summit	39.6	40.1	0.5
Summit	41.1	41.8	0.8
Summit	42.0	43.3	1.3
Summit	43.3	43.9	0.7
Summit	44.7	45.2	0.5
Summit	49.1	50.2	1.1
Wayne	51.7	52.1	0.5
Wayne	52.3	54.1	1.8
Wayne	56.3	56.5	0.3
Medina	57.0	57.3	0.3
Wayne	57.3	57.7	0.4
Medina	62.3	62.8	0.5
Medina	64.6	65.1	0.5
Medina	67.7	69.1	1.5
Medina	70.0	71.4	1.4

TABLE 4.13.1-2 (cont'd)

Location of High Consequence Areas along the NGT Project Pipeline Facilities

State, Facility Name, County	Milepost Start [a]	Milepost End [a]	Length (miles) [b]
Medina	72.9	74.0	1.1
Medina	76.1	76.5	0.4
Lorain	93.0	93.8	0.8
Lorain	94.3	95.6	1.3
Erie	116.8	117.8	1.0
Erie	118.2	119.6	1.4
Erie	120.1	120.6	0.5
Erie	130.5	131.1	0.6
Sandusky	138.6	139.2	0.6
Sandusky	145.9	146.6	0.8
Sandusky	153.9	155.1	1.2
Wood	164.5	165.3	0.8
Wood	181.4	181.5	0.1
Lucas	181.5	182.2	0.7
Lucas	187.2	188.0	0.8
		Ohio Total	**32.9**
MICHIGAN			
Mainline			
Washtenaw	244.5	245.7	1.2
Washtenaw	247.6	255.0	7.4
		Michigan Total	**8.6**
		Project Total	**41.5**

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a Approximate mileposts along the proposed pipeline have been rounded to the nearest 0.1 mile

b Crossing length of segment within county

As previously discussed and required by PHMSA regulations, the pipelines and aboveground facilities would be designed, constructed, operated, and maintained to meet or exceed the requirements at 49 CFR 192. The general construction methods that NEXUS and Texas Eastern would implement to ensure the safety of the Projects are described in section 2.3, including welding, inspection, and integrity testing procedures. NEXUS and Texas Eastern identified the following voluntary safety measures that would be implemented and are more stringent than the requirements in 49 CFR 192:

- minimum depth of cover of 36 inches is required over the proposed pipeline for all pipeline Class locations and geological conditions;
- all welding, coating, and backfilling activities would be inspected;
- all welds would be non-destructively examined by an independent radiographic inspection company, regardless of Class location;
- remote-controlled valves and monitoring equipment would be installed for all mainline valves;
- spacing of mainline valves would be based on population density and 49 CFR 192 area classifications;
- valves would be installed as close to roads as possible to provide good access;

- all mainline piping would have at least 16 mils nominal thickness of epoxy coating; and
- the minimum pressure for pressure tests, based upon the pipeline MAOP, would be greater than the operating pressure of the pipeline.

The DOT prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. Each pipeline operator is required to establish an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency. Key elements of the plan include procedures for:

- identifying and classifying emergency events, gas leakage, fires, explosions, and natural disasters;
- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;
- emergency system shutdown and safe restoration of service;
- making personnel, equipment, tools, and materials available at the scene of an emergency; and
- protecting people first and then property, and making them safe from actual or potential hazards.

We received several comments indicating that local first responders along the NGT Project pipeline route were not capable of responding to a pipeline incident. NEXUS stated that its employees and local emergency response personnel would meet for emergency drills periodically to test staff readiness and identify improvement opportunities. In accordance with 49 CFR 192.615, NEXUS would develop, maintain, and implement a written emergency response plan to minimize the hazards from a pipeline emergency. Key features would include:

- identifying, verifying, and classifying emergency events – leaks, fires, explosions, or natural disasters;
- managing communications with emergency responders and public officials to establish incident command and coordinate response efforts;
- making personnel, equipment, tools, and materials available for emergencies;
- ensuring that response efforts focus on public safety first; and
- ensuring emergency shutdown actions are taken in a timely manner.

The DOT regulations specified in 49 CFR 192 require that pipeline operators establish and maintain liaison with appropriate fire, police, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency and to coordinate mutual assistance. Pipeline operators must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. NEXUS and Texas Eastern would provide the appropriate training to local emergency service personnel before the pipeline is placed in service. In addition pipeline markers identifying the owner of the pipe and a 24-hour telephone number would be placed for "line of sight" visibility along the entire pipeline length, except in active agricultural crop locations and in waterbodies, in accordance with DOT requirements. NEXUS would also provide pipeline location information in the National Pipeline Mapping System to inform the public and others of the general location of their pipeline facilities.

The DOT also requires pipeline operators to place pipeline markers at frequent intervals along pipeline rights-of-way, such as where a pipeline intersects a street, highway, railway or waterway, and at other prominent points along the route. Pipeline right-of-way markers can help prevent encroachment and excavation-related damage to pipelines. Because the right-of-way is much wider than the pipeline itself and a pipeline can be anywhere within the right-of-way, state laws require excavators to call their state One Call center well in advance of digging to locate underground utilities and ensure it is safe for the contractor to dig in that location.

We received several comments regarding the potential for pipeline leaks. Several commenters expressed concern regarding methane leaks from the pipeline causing soil and waterbody contamination. Commenters also expressed concern for pipeline leaks resulting in power line accidents where the proposed pipeline would be co-located with power lines. In accordance with DOT regulations, NGT and TEAL Projects facilities would be regularly inspected for leakage as part of scheduled operations and maintenance, including:

- physically walking and inspecting the pipeline corridor periodically;
- conducting fly-over inspections of the right-of-way as required; and
- conducting leak surveys at least once every calendar year or as required by regulations.

In addition to the DOT-required surveys described previously, NEXUS and Texas Eastern would monitor portions of its pipeline system using a supervisory control and data acquisition system. This system would gather information related to system pressures, flows, and customer deliveries 24 hours per day, 365 days per year. Finally, methane is lighter than air and at typical pipeline burial depths (i.e., 30 to 36 inches) it migrates through soil and water before dispersing into the atmosphere. Further, fugitive pipeline leaks generally occur at valves sites, fittings, and other aboveground and/or connection points at very low levels. Because methane is lighter than air, the gas would disperse into the atmosphere; therefore the methane concentration would not be high enough to cause a power line incident. Pipeline operators use in-line inspection tools to detect internal pipe anomalies, including deformations and metal loss. In addition, there are remote-controlled valves along the route and should a major leak occur, natural gas can be isolated and evacuated from that portion of the line to allow for repairs. For these reasons, it is unlikely that a pipeline leak would result in methane levels in soil or water that would cause significant environmental impacts on these resources along the pipeline routes; it is also unlikely that a pipeline leak would result in a power line incident.

We received comments from numerous citizens expressing concern about impacts on residences and public safety resulting from operation of the proposed compressor stations associated with the NGT and TEAL Projects. Residents expressed concerns for public recreation areas, schools, homes, businesses, and large populations in the event of a pipeline accident. As discussed previously, the compressor stations for the NGT and TEAL Projects would be designed, constructed, operated, and maintained in accordance with the DOT Minimum Federal Safety Standards in 49 CFR 192. These regulations include more stringent design criteria for facilities located near populated areas, public use areas, and schools. In addition to the general safety procedures discussed previously, NEXUS and Texas Eastern would also implement the following specific safety measures at its proposed compressor stations:

- Each compressor station would be completely surrounded by a chain link fence with barbed wire to maintain the safety of the facility and workers.

- A controlled access system and intrusion alarm network would be installed to restrict access to authorized personnel and the facilities would be monitored with video cameras.

- Compressor buildings would be constructed of noncombustible material and ventilated to minimize the potential of gas accumulating in enclosed areas.

- Compressor stations would be equipped with automatic emergency detection and shutdown systems that include sensors for detecting natural gas concentrations as well as sensors for detecting flames. The system would be maintained and tested routinely to ensure proper operation.

- Compressor station equipment would be designed to shut down automatically if system operation deviates from its designed operating limits, which could cause a mechanical failure and pose risk to personnel and equipment, or otherwise constitute a hazard. The compressor stations would also be equipped with relief valves to protect the piping from over-pressurization.

- Fire protection, first aid, and safety equipment would be maintained at the compressor stations, and NEXUS' and Texas Eastern's emergency response personnel would be trained in proper equipment use and in first aid.

The most effective and immediate way to begin to address a gas pipeline rupture is to shut off the gas source. NEXUS would have valves spaced along the pipeline that can be used to shut off the gas and isolate each pipeline segment. In an emergency, NEXUS and Texas Eastern would rely on the local emergency services (e.g., fire and police) to communicate with the public.

We received comments from landowners about the need for safety inspections of the construction activities. NEXUS' and Texas Eastern's contractors, including construction workers, would be required to adhere to federal and state safety regulations and recommendations. In addition, FERC staff or its contractors would routinely inspect construction activities to ensure environmental compliance.

Based on NEXUS' and Texas Eastern's compliance with federal design and safety standards and their implementation of the aforementioned safety measures, we conclude that constructing and operating the pipeline facilities would not significantly impact public safety.

4.13.2 Pipeline Accident Data

The DOT requires all operators of natural gas transmission pipelines to notify the National Response Center at the earliest practicable moment following the discovery of an incident and to submit a report within 30 days to PHMSA. Incidents are defined as any leaks that:

- cause a death or personal injury requiring hospitalization; or

- involve property damage, including cost of gas lost of more than $50,000 in 1984 dollars.[15]

During the 20-year period from 1996 through 2015, a total of 1,312 significant incidents were reported on the more than 300,000 total miles of natural gas transmission pipelines nationwide. To provide

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[15] The equivalent of $50,000 in 1984 is approximately $114,060 in 2015 (Bureau of Labor Statistics, 2016).

perspective, there were 30 incidents in Michigan and 24 incidents in Ohio during this same time period (DOT, 2015a).

Additional insight into the nature of service incidents may be found by examining the primary factors that caused the failures. Table 4.13.2-1 provides a distribution of the causal factors as well as the number of each incident by cause from 1996 to 2015.

We received numerous comments regarding potential pipeline accidents, including explosions, fires, and ruptures, among others. The dominant causes of pipeline incidents from 1996 to 2015 were corrosion and pipeline material, weld, or equipment failure, constituting 50.9 percent of all significant incidents. The pipelines included in the data set in table 4.13.2-1 vary widely in terms of age, diameter, and level of corrosion control. Each variable influences the incident frequency that may be expected for a specific segment of pipeline.

TABLE 4.13.2-1

Natural Gas Transmission Pipeline Significant Incidents by Cause (1996 to 2015) [a]

Cause	Number of Incidents	Percentage
Corrosion [b]	311	23.7
Excavation	210	16.0
Pipeline material, weld, or equipment failure	357	27.2
Natural force damage	146	11.1
Outside Force [c]	84	6.4
Incorrect operation	41	3.1
All other causes [d]	163	12.4
Total	**1,312**	**100**

a All data gathered from PHMSA Significant Incident files, March 30, 2016
b Includes third-party damage
c Fire, explosion, vehicle damage, previous damage, or intentional damage
d Miscellaneous causes or other unknown causes
Source: DOT, 2016a

The frequency of significant incidents is strongly dependent on pipeline age. Older pipelines have a higher frequency of corrosion incidents because corrosion is a time-dependent process. Jones et al. (1986) compared reported incidents with the presence or absence of cathodic protection[16] and protective coatings. The results of that study, summarized in table 4.13.2-2, indicated that corrosion control was effective in reducing the incidence of failures caused by external corrosion. The use of both an external protective coating and a cathodic protection system, required on all pipelines installed after July 1971, significantly reduces the corrosion rate compared to unprotected or partially protected pipe. The data also indicate that cathodically protected pipe without a protective coating actually has a higher corrosion rate than unprotected pipe. This anomaly reflects the retrofitting of cathodic protection to actively corroding spots on pipes.

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[16] Cathodic protection is a technique to reduce corrosion (rust) of the natural gas pipeline that includes the use of an induced current and/or a sacrificial anode that corrodes preferentially.

TABLE 4.13.2-2

Incidents Caused by External Corrosion and Level of Protection (1970 through June 1984)

Corrosion Control	Incidents per 1,000 Miles per Year
None – bare pipe	0.4
Cathodic protection only	1.0
Coated only	0.4
Coated and cathodic protection	0.1

Source: Jones, et al., 1986

Older pipelines also have a higher frequency of outside force incidents partly because their location may be less well-known and less well-marked than newer lines. In addition, the older pipelines contain a disproportionate number of smaller diameter pipelines, which are more easily crushed or broken by mechanical equipment or earth movements.

We received comments stating that the pipelines could rust, resulting in soil contamination. To prevent corrosion, the NGT and TEAL Projects would be constructed using pipe with an external coating capable of withstanding stress from a variety of environmental sources, including oxygen, water, and other chemicals. NEXUS would also install cathodic protection along the entire length of the NGT Project pipeline and Texas Eastern would connect the TEAL pipeline to its existing cathodic protection system. In addition, the applicants would complete annual surveys of their pipelines for evidence of corrosion. Based on NEXUS' and Texas Eastern's use of cathodic protection and external pipeline coating, we do not believe that the pipeline would be subject to extensive rusting or cause soil contamination.

Outside force, excavation, and natural forces were the cause in 33.4 percent of significant pipeline incidents from 1996 to 2015. These result from the encroachment of mechanical equipment such as bulldozers and backhoes; earth movements due to soil settlement, washouts, or geological hazards; weather effects such as winds, storms, and thermal strains; and willful damage. Table 4.13.2-3 provides a breakdown of outside force incidents by cause.

TABLE 4.13.2-3

Outside Force Incidents by Cause [a] (1996 to 2015)

Cause	Number of Incidents	Percent of All Incidents
Third party excavation damage	172	13.1
Operator excavation damage	25	1.9
Unspecified excavation damage/Previous damage	13	1.0
Heavy Rain/Floods	74	5.6
Earth Movement	32	1.4
Lightning/Temperature/High Winds	27	2.1
Other/Unspecified natural force damage	13	1.0
Vehicle (not engaged with excavation)	49	3.7
Fire/Explosion	9	0.7
Previous mechanical damage	6	0.5
Maritime equipment, vessel adrift, fishing, or maritime activity	9	0.7
Intentional damage	1	0.1
Electrical arcing from other equipment/facility	1	0.1
Unspecified/Other outside force	9	0.7
Total [b]	**438**	**33.5**

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a Derived from Excavation, Outside Force, and Natural Force categories in table 4.13.2-1

b Sum of addends may not total due to rounding

Source: DOT, 2016a; 2016b

Since 1982, operators have been required to participate in One Call public utility programs in populated areas to minimize unauthorized excavation activities in the vicinity of pipelines. The One Call program is a service used by public utilities and some private sector companies (e.g., oil pipelines and cable television) to provide preconstruction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts.

We received comments regarding the safety history on Spectra's existing pipeline systems. Spectra is the parent company to Texas Eastern and partial owner of NEXUS. The Commission reviews each project based on its own merits and has siting authority for interstate natural gas infrastructure. PHMSA would be notified of and investigate all pipeline accidents and take any necessary action. In addition, pipeline operator compliance and incident history is publically available at www.phmsa.dot.gov/pipeline.

4.13.3 Impacts on Public Safety

The service incident data summarized in table 4.13.2-3 include pipeline failures of all magnitudes with widely varying consequences. Table 4.13.3-1 presents the average annual fatalities that occurred on natural gas transmission pipelines between 2011 and 2015. The data have been separated into employees and nonemployees to better identify a fatality rate experienced by the general public. Fatalities among the public averaged two per year over the 20-year period from 1996 to 2015. There were no injuries in Michigan and five in Ohio during this time period; however, there were no fatalities in either state.

TABLE 4.13.3-1

Injuries and Fatalities – Natural Gas Transmission Pipelines

	Injuries		Fatalities	
Year	Employees	Public	Employees	Public
2011	1	0	0	0
2012	1	6	0	0
2013	0	2	0	0
2014	1	0	0	0
2015	1	13	1	2

Source: DOT, 2016b

Note: On April 29, 2016, a segment along Texas Eastern's Penn-Jersey Line exploded, resulting in 1 injury. PHMSA is currently investigating the pipeline incident.

The majority of fatalities from natural gas pipelines are associated with local distribution pipelines. These pipelines are not regulated by FERC; they distribute natural gas to homes and businesses after transportation through interstate transmission pipelines. In general, these distribution lines are smaller-diameter pipes and/or plastic pipes and are more susceptible to damage. In addition, local distribution systems do not have large rights-of-way and pipeline markers common to FERC-regulated interstate natural gas transmission pipelines.

The nationwide totals of accidental fatalities from various anthropogenic and natural hazards are listed in table 4.13.3-2 in order to provide a relative measure of the industry-wide safety of natural gas transmission pipelines. However, direct comparisons between accident categories should be made cautiously, because individual exposures to hazards are not uniform among all categories. As indicated in table 4.13.3-2, the number of fatalities associated with natural gas facilities is much lower than the fatalities from natural hazards such as lightning, tornados, floods, earthquakes, etc.

TABLE 4.13.3-2

Nationwide Accidental Deaths [a]

Type of Accident	Annual No. of Deaths
All accidents	130,557
Poisoning	38,851
Motor vehicle	33,804
Falls	30,208
Drowning	3,391
Fire, smoke inhalation, burns	2,760
Floods [b]	81
Lightning [b]	49
Tornado [b]	72
Natural gas distribution lines [c]	14
Natural gas transmission pipelines [c]	2

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a All data, unless otherwise noted, reflects 2013 statistics from U.S. Department of Health and Human Services (2016)

b Reflects 30 Year Average (1985 to 2014) statistics from U.S. Department of Commerce, NOAA, National Weather Service (2016)

c 20-year average, 1996-2015 (DOT, 2015c; 2015d)

We received comments expressing concern that pipeline integrity would be compromised due to vibration from blasting at the Waterville Stone Quarry. The NGT Project pipeline route would be about 0.5 mile away from the quarry and, as a result, activities would not impact the pipeline.

Several commenters expressed concern that the NEXUS pipeline route would cross abandoned or unmapped mine shafts, resulting in pipeline bending, sinkholes, and failure. We also received comments regarding karst and the potential for subsidence to impact the pipeline. Routing across potentially unmapped mine shafts and karst terrain are addressed in sections 4.1.3.5 (Karst Topography), 4.1.3.6 (Surface Subsidence – Underground Mines), and 4.1.5 (Impacts and Mitigation) and would not affect the pipelines.

Although incidents have occurred on natural gas transmission systems, the available data show that natural gas transmission pipelines continue to be a safe, reliable means of energy transportation. From 1996 to 2015, there were an average of 63 significant incidents and 2 fatalities per year. The number of significant incidents distributed over the more than 300,000 miles of natural gas transmission pipelines indicates the risk is low for an incident at any given location. The rate of total fatalities for the nationwide natural gas transmission lines in service is approximately 0.01 per year per 1,000 miles of pipeline. The operation of the NGT and TEAL Projects would represent only a slight increase in risk to the nearby public.

4.13.4 Terrorism

We received comments regarding concerns that the Projects' facilities could be used in a terrorist attack. We received a comment from CORN requesting that FERC require NEXUS to conduct a Security Vulnerability Assessment comparing the proposed route to the City of Green alternative route. Safety and security concerns have changed the way pipeline operators as well as regulators must consider terrorism, both in approving new projects and in operating existing facilities.

The U.S. Department of Homeland Security is tasked with the mission of coordinating the efforts of all executive departments and agencies to detect, prepare for, prevent, protect against, respond to, and recover from terrorist attacks within the United States. The Commission, in cooperation with other federal agencies, industry trade groups, and interstate natural gas companies, is working to improve pipeline security practices, strengthen communications with the industry, and extend public outreach in an ongoing effort to secure pipeline infrastructure.

The Commission, like other federal agencies, is faced with a dilemma in how much information can be offered to the public while still providing a significant level of protection to the facility. Consequently, the Commission has taken measures to limit the distribution of information to the public regarding facility design and layout location information to minimize the risk of sabotage. Facility design and location information has been removed from FERC's website to ensure that sensitive information filed as Critical Energy Infrastructure Information is not readily available to the public (Docket No. RM06-23-000, issued October 30, 2007 and effective as of December 14, 2007).

NEXUS and Texas Eastern, through their parent company Spectra, would continue to participate in various activities in close collaboration with the U.S. Department of Homeland Security's Transportation Safety Administration (TSA) and key industry groups concerning security as part of the Projects. This would include:

- complying with the TSA's Pipeline Security Division's Security Guidelines;
- participating in monthly intelligence meetings with both the U.S. Department of Homeland Security's Intelligence Program and the TSA's Pipeline Security Division's monthly update conference calls;
- attending classified briefings with the U.S. Department of Homeland Security for the industry, annually, and as needed;
- chairing the Interstate Natural Gas Association of America Security Committee and participating in the American Gas Association Security Committee, as well as the Oil and Natural Gas Sector Coordinating Council's Pipeline Working Group;
- participating in the production of a new video, sponsored by TSA, aimed at training law enforcement officers to respond to security events at pipeline facilities;
- participating annually in TSA's International Pipeline Security Forum;
- reporting suspicious incidents to the Transportation Security Operations Center; and
- conducting major crisis management drills, at least annually, within the company.

In accordance with DOT surveillance requirements, NEXUS and Texas Eastern would also incorporate air and ground inspection of their proposed facilities into their inspection and maintenance program. Security measures at the new aboveground facilities would include secure fencing and camera surveillance.

Safety and security are important considerations in any action undertaken by FERC. However, the likelihood of future acts of terrorism or sabotage occurring at the proposed facilities, or at any of the myriad natural gas pipeline or energy facilities throughout the United States, is unpredictable given the disparate motives and abilities of terrorist groups. The continuing need to construct facilities to support future natural gas pipeline infrastructure is not diminished from the ongoing potential for terrorist acts. The efforts of the Commission, the DOT, and the Office of Homeland Security to continually improve pipeline safety would minimize the risk of terrorist sabotage of the NGT and TEAL Projects to the maximum extent practical, while still meeting the country's natural gas needs.

4.14 CUMULATIVE IMPACTS

In accordance with NEPA, we identified other actions in the vicinity of NGT and TEAL Projects' facilities and evaluated the potential for a cumulative effect on the environment. As defined by the CEQ, a cumulative effect is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions (CEQ, 1997b). In this analysis, we consider the impacts of past projects within the regions of influence as part of the affected environment (environmental baseline) that was described and evaluated in the preceding environmental analysis. However, present effects of past actions that are relevant and useful are also considered. This cumulative impacts analysis uses an approach consistent with the methodology set forth in relevant guidance. Under these guidelines, inclusion of actions within the analysis is based on identifying commonalities of impacts from other actions to potential impacts that would result from the Projects.

To avoid unnecessary discussions of insignificant impacts and projects, and to adequately address and accomplish the purposes of this analysis, the cumulative impacts analysis for the NGT and TEAL Projects was conducted using the following guidelines:

- A project must impact the same resource category as the NGT and TEAL Projects for there to be a cumulative impact on that resource category. Typically this occurs when other projects are in the same region or area as the proposed actions. The effects of more distant projects generally are not assessed because their impacts would be localized and would not contribute significantly to impacts in the NGT and TEAL Projects area. An exception is air quality, which can affect larger areas; therefore, air quality was considered based on the county and/or air basin. Another exception is loss and fragmentation of migratory bird habitat. Similar species will utilize the forests of the Marcellus and Utica shale formations. Birds of Conservation Concern (BCCs) have already declining populations and loss and fragmentation of additional forested habitat has a possibility of continuing this decline with impacts at the population level.

- The distance into the past and future that other projects could cumulatively impact the area of the Projects is based on whether the impacts are short term, long term, or permanent. Most of the impacts associated with the NGT and TEAL Projects, other than forest clearing and air quality, are short-term effects that would occur during the period of construction.

- Where a potential for cumulative impacts exists, those impacts are quantified to the extent practicable; however, in some cases the potential impact can only be described qualitatively. This is particularly the case for projects that are in the planning stages; are contingent on economic conditions, availability of financing, and/or the issuance of permits; or for which there is a lack of comprehensive information available.

- The scope of the cumulative impact assessment depends on the availability of information about other projects. For this assessment, other projects were identified from information provided by the applicants, field reconnaissance, internet research, and communications with federal, state, and local agencies.

Projects meeting one or more of the following criteria were considered in this cumulative analysis. These criteria define the NGT and TEAL Projects' region of influence, which will be used in this analysis to describe the general area where projects could potentially contribute to cumulative impacts with the NGT and TEAL Projects. The region of influence varies depending on the resource being discussed. Specifically, we included:

- minor projects, including residential development, small commercial development, and small transportation projects, within 0.5 mile of the NGT and TEAL Projects area;
- major projects, such as large commercial, industrial, transportation and energy development projects (including production well, gathering lines, and access roads), requiring more than 10 acres of land within 10 miles of the NGT and TEAL Projects area;
- major projects within watersheds crossed by the NGT and TEAL Projects; and
- projects with potential to result in longer-term impacts on air quality (for example, natural gas pipeline compressor stations) located within an AQCR crossed by the NGT and TEAL Projects area and loss of forested migratory bird habitat.

4.14.1 Background

The Midwest region of the United States has been affected by human activity for thousands of years. Today, approximately 21.5 million people reside in Michigan and Ohio (Census Bureau, 2014). These two states have a combined annual gross domestic product of approximately $1 trillion based on farming, transportation, construction, commerce, tourism, education, health, and other industries. The Midwest economy is traditionally heavily industrial, although other areas such as education and medicine are becoming more prevalent. Although the region has been significantly affected by human activity, valuable natural resources remain.

Actions located outside the regions of influence are generally not evaluated because their potential to contribute to a cumulative impact diminishes with increasing distance from the NGT and TEAL Projects. For example, we received comments recommending that we evaluate the cumulative impacts of the NGT and TEAL Projects and shale gas production in the Appalachian Basin. While shale gas production may impact the same resources affected by the NGT and TEAL Projects, these impacts are so far removed from the Projects area that the effects are not additive. Furthermore, impacts from natural gas production are generally neither caused by a proposed pipeline project nor are they reasonably foreseeable consequences of the Commission's approval of an infrastructure project. Therefore, we do not address these activities in this analysis.

About 45 percent of the NGT Project pipeline would be co-located with existing utilities (e.g., overhead electric transmission lines, pipelines, and railroads), while the TEAL Project would primarily consist of pipeline loops (parallel to existing pipe) with the exception of some reroutes implemented to avoid construction constraints. Co-location reduces impacts across most, if not all, environmental resources. Based on NEXUS' and Texas Eastern's implementation of impact avoidance, minimization, and mitigation measures as described in their construction and restoration plans, and their adherence to our recommendations, we find that with the exception of temporary socioeconomic impacts (e.g., housing, traffic, public services) and long-term air emissions, the impacts of the NGT and TEAL Projects would be largely limited to a narrow corridor that extends for about 255 miles across two states. Furthermore, because the impacts of the NGT and TEAL Projects would generally be localized, they would only contribute incrementally to a cumulative impact in the region of influence. As a result, we have related the scope of our analysis to the magnitude of the aforementioned environmental impacts.

Based on the impacts of the NGT and TEAL Projects as identified and described in this EIS and consistent with CEQ guidance, we have determined that the following resource-specific regions of influence are appropriate to assess cumulative impacts:

- Impacts on geology, soils, wetlands, vegetation, and terrestrial wildlife would be largely contained within or adjacent to proposed NGT and TEAL Projects' workspaces. Impacts on water resources (primarily increased turbidity) could extend outside of the workspaces but would also be contained to a relatively small area. Therefore, for these resources we evaluated other projects/actions within the HUC 12 sub-watersheds crossed by the NGT and TEAL Projects.

- Loss and fragmentation of upland forests would result in impacts on BCCs and migratory birds in the region, and could potentially result in significant impacts on bird populations.

- Impacts on cultural resources would also be largely contained within or adjacent to proposed workspaces. Therefore, we evaluated other projects/actions that overlapped with known cultural features potentially affected by the NGT and TEAL Projects.

- Temporary impacts on air quality, including fugitive dust, would be largely limited to areas immediately around active construction. Long-term impacts on air quality would be largely contained within about a 30-mile radius. We evaluated other projects/actions that overlap in time and location with construction activities and those with potentially significant long-term stationary emission sources within a 30 mile radius of the NGT and TEAL Projects.

- Long-term impacts on NSAs were evaluated by identifying other stationary source projects with the potential to result in significant noise that would affect the same NSAs within 0.5 mile of the NGT and TEAL Projects' compressor stations. None were identified; therefore we do not consider long-term cumulative noise impacts further in this analysis. However, we did consider areas where the temporary noise from construction of the NGT and TEAL Projects would overlap with noise from other construction projects.

- Communities that could be affected by the increased workforce were considered in our analysis (socioeconomics). In more rural locations of the NGT and TEAL Projects, these communities could be located numerous miles from the NGT and TEAL Projects' workspaces.

In addition to the geographic relationship between the NGT and TEAL Projects and other projects in the area, we also considered the temporal relationship. The NGT and TEAL Projects would begin construction in the first quarter of 2016, with an in-service date of November 1, 2017. The majority of impacts associated with the NGT and TEAL Projects would occur during construction and most resources (with exceptions) would return to pre-construction conditions shortly after or within 3 years of construction. Thus, construction-related cumulative impacts could occur if other projects in the regions of influence would impact the same resources within these timeframes. Additionally, permanent impacts resulting from the operation of the NGT and TEAL Projects could contribute to a cumulative impact in the regions of influence. Specifically, permanent impacts on air quality and forest resources from operation of the NGT and TEAL Projects could contribute to a cumulative impact in the regions of influence for those resources.

Four types of projects that would potentially cause a cumulative impact when considered with the NGT and TEAL Projects are identified in appendix N-1. These are: 1) natural gas production; 2) FERC jurisdictional and non-jurisdictional linear pipeline projects; 3) energy projects; and 4) major residential, commercial, and industrial development projects within counties affected by the Projects.

4.14.2 Present and Reasonably Foreseeable Projects

The table in appendix N-1 identifies present and reasonably foreseeable projects or actions that occur within the region of influence. These projects were identified by a review of publicly available information; consultations with federal, state, and local agencies and development authorities; and information provided by NEXUS and Texas Eastern, affected landowners, and concerned citizens. These projects, their impacts, and our determinations of cumulative impact are discussed in the following sections.

We received comments requesting that our cumulative impacts analysis take a “hard look” at the potential impacts of other projects as described in relevant guidance. NEPA requires “reasonable forecasting,” but an agency is not required “to engage in speculative analysis” or “to do the impractical, if not enough information is available to permit meaningful consideration.” For example and as discussed below, the actual timing and final scope of many development projects in the NGT and TEAL Projects’ region of influence are simply unknown. Therefore, the impacts that may result from these projects, and their potential cumulative effects, are speculative and would not permit meaningful consideration of the potential cumulative effects with the NGT and TEAL Projects.

4.14.3 Natural Gas Production

4.14.3.1 Shale Formations

Several shale formations occur in the NGT and TEAL Projects area, including the well-known Marcellus and Utica Shales and to a lesser extent the Antrim Shale formation. The Marcellus Shale is an approximately 385-million-year-old, organic-rich shale formation that exists beneath 145,313 square miles of Pennsylvania, southern New York, eastern Ohio, and northern West Virginia. The Utica Shale is an older formation at approximately 460 million years old and is over twice the size of the Marcellus Shale. The Utica Shale largely overlaps the range of Marcellus Shale at greater depths, but extends farther west into Ohio and farther north into New York. The Antrim Shale in Michigan was formed approximately 360 million years ago and covers approximately 39,000 square miles of the state. Over geologic time and with the pressure and temperature associated with deep burial, oil and natural gas is generated within organic-rich shale formations.

Because shale is generally impermeable (fluids do not readily flow through the formation), the oil and natural gas contained in these types of rocks cannot be economically produced using conventional well drilling and completion methods. Within the last 20 years, however, the petroleum industry has developed the horizontal drilling technique in conjunction with hydraulic fracturing (fracking), which has been in use for over 50 years, to recover natural gas from shale reservoirs. Fracking involves the injection of fluids and sand under high pressure to fracture the shale around the wellbore, thus enabling the flow of natural gas to the well. Where the Utica and Marcellus Shales overlap, the Marcellus Shale has been the first target of development since it occurs at shallower depths and is therefore easier to drill. Marcellus Shale development has focused on the formation in Pennsylvania, West Virginia, and New York, while the Utica Shale formation is a larger focus in Ohio because the Marcellus Shale is only located along the eastern edge of the state. The smaller Antrim Shale in Michigan has been the primary focus of development in that state.

The USGS has estimated that the Marcellus Shale contains about 84 trillion cubic feet of technically recoverable natural gas. An additional 38 trillion cubic feet of recoverable natural gas was estimated to be locked within the Utica Shale according to USGS estimates. For comparison, in 2015 the United States consumed approximately 27.5 trillion cubic feet of natural gas (EIA, 2015a); thus, the Marcellus and Utica

Shales represents a significant natural gas deposit in close proximity to the high population centers of the northeastern United States. Production and gathering activities, and the pipelines and facilities used for these activities, are not regulated by the FERC but are overseen by the affected region's state and local agencies with jurisdiction over the management and extraction of the Marcellus and Utica Shale gas resources. The FERC's authority under the NGA review requirements relate only to natural gas facilities that are involved in interstate commerce. Thus, the facilities associated with the production of natural gas are not under FERC-jurisdiction.

The EIA maintains records of energy production and usage on a national and state level. Those records document the rise in the production rates in the states where the NEXUS and TEAL Projects would be located. Although it does not identify the source of the shale gas, be it Marcellus or Utica Shale, the EIA does identify natural gas developed by "Shale Gas Wells" as a whole (EIA, 2015b). In Ohio gas development occurs primarily within the Utica Shale. Natural gas from shale gas wells in Ohio accounted for 441 bcf of production in 2014, which was an increase from the 101 bcf produced in the state in 2013. Michigan wells are drilled to tap into the Antrim Shale formation which sits in the state's Upper Peninsula. Although a sizeable formation, the production rates have been declining since 2007. Michigan produced 96 bcf from its shale gas wells in 2014, which was a slight decrease from 101 bcf produced in 2013.

Each of the states that contain Marcellus and Utica shale gas resource development have specific offices within their respective environmental departments that handle the permitting as well as and enforcement of applicable laws. In each of the states, there are specific branches of local government tasked with permitting of gas resources, which includes:

- in Michigan – DEQ's Office of Oil, Gas, and Minerals;
- in Ohio – ODNR's Division of Oil & Gas Resources

Each organization has developed BMPs for the construction and operation of upstream oil and gas production facilities as part of their permitting process. These BMPs include erosion and sediment control practices; setback requirements from springs, wetlands, and waterbodies; wetland and waterbody crossing procedures; access road construction practices; soil amendment procedures; and right-of-way restoration measures.

Although we do not examine the impacts of Marcellus and Utica Shale upstream facilities to the same extent as the NGT and TEAL Projects in this EIS, we considered the general development of the Marcellus and Utica Shale in proximity to the Projects within the context of cumulative impacts throughout section 4.14. A more specific analysis of Marcellus and Utica Shale upstream facilities is outside the scope of this analysis because the exact location, scale, and timing of future facilities are unknown.

4.14.3.2 Wells

Multiple FERC non-jurisdictional intrastate natural gas wells and gathering/interconnection systems are either proposed, under construction, or have been constructed in the vicinity of the NGT and TEAL Projects. It is likely that development activities would continue through the construction of the proposed Projects, but the exact extent of such drilling is unknown.

Based on our review of publicly available data (ODNR, 2016e), there are numerous wells permitted in proximity to the NGT and TEAL Projects. In the Utica-Point Pleasant shale play in Ohio, about 650 drilling permits have been issued. These wells are in various stages of production (permitted, drilling, or producing) in counties traversed by the Projects including Columbiana, Medina, Stark, Belmont, Jefferson, Wayne, and Monroe Counties. The Utica-Point Pleasant shale horizontal wells are varying distances from the proposed Projects. In the Marcellus shale play, there are 43 wells permitted, of which 22 have been drilled and 14 are producing. These wells are located in Monroe, Belmont, and Jefferson Counties, Ohio and are varying distances from the NGT and TEAL Projects.

Marcellus and Utica Shale production wells involve improvement or construction of roads, preparation of a well pad, and drilling and completion of the well. It is likely that drilling would continue through the construction of the proposed Projects. It is difficult to provide a qualitative analysis of well-drilling activities because the exact extent of such drilling is unknown; however, the potential impacts of well-drilling and associated activities are qualitatively analyzed in this EIS.

We received several comments regarding the proposed Projects and whether they would result in or cause additional well drilling in the Projects area. Indirect effects of shale formation development activities may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems (40 CFR 1508.8[b]). Typically, the growth-inducing potential of a project would be considered adverse if it fosters growth or a concentration of population above what is assumed in local and regional land use plans, or in projections made by regional planning authorities. Growth impacts could also occur if a project provides infrastructure or service capacity to accommodate growth levels beyond those permitted by local or regional plans and policies. The purpose of the proposed Projects is to meet market demand for the transportation of natural gas supplies from the production region to areas of higher demand, premium markets. The Projects area is already served by various natural gas transmission lines so the Projects would not extend public service to areas currently unserved by natural gas transmission lines. However, local distribution companies may build additional lines to serve new customers, but it is highly speculative to assume where the new lines would go and predict any resulting impacts. Further, economic activity is already taking place. The demand for energy and the proposed Projects are a result of, rather than a precursor to, development in this region. Therefore, the Projects would not result in adverse growth-inducing effects.

4.14.3.3 Intrastate Pipeline Systems

We received several comments regarding the cumulative impact of North Coast Gas Transmission, LLC's (a subsidiary of Somerset Gas Transmission Company, LLC) pipeline and the NGT and TEAL Projects. North Coast, an intrastate pipeline regulated by the Public Utility Commission of Ohio, operates 280 miles of pipeline in northern Ohio (North Coast Gas Transmission, 2014). The pipeline was originally used to transport petroleum products; however in September 1998, North Coast Gas Transmission, LLC acquired the pipeline and converted it to natural gas (North Coast Gas Transmission, LLC, 2013). Although North Coast Gas Transmission, LLC took ownership of the pipeline in 1998, it is unclear exactly when the pipeline was constructed. Because the pipeline has likely been in operation for at least 18 years, it is part of the baseline for the NGT and TEAL Projects.

4.14.4 FERC Jurisdictional Pipeline Projects

There are nine planned, proposed, or existing FERC-jurisdictional natural gas transmission projects that could potentially have cumulative environmental impacts with the proposed Projects. In addition to the following project summaries, additional details regarding each project filed with the Commission can be obtained through our website at http://www.ferc.gov/ by utilizing the docket number given for each project.

Energy Transfer's Rover Pipeline Project (FERC docket no. CP15-93-000) consists of 711 miles of pipeline, 10 compressor stations, numerous valves, M&R Stations, and auxiliary facilities in Ohio, Michigan, Pennsylvania, and West Virginia. The Rover pipeline specifically includes about 142 miles of pipeline in NEXUS and TEAL Projects-affected counties in Ohio (i.e., Monroe, Belmont, Wayne, Stark, and Fulton), and 56.8 miles in Washtenaw and Lenawee Counties, Michigan. The Rover Pipeline Project would be about 7 miles from the NEXUS Project at its closest point (i.e., Wood County, Ohio) and 0.1 mile from the TEAL Project.

Texas Eastern's Ohio Pipeline Energy Network (OPEN) Project (FERC Docket No. CP14-68-000) is currently under construction. A portion of the OPEN Project includes facilities in Columbiana, Belmont, Jefferson, and Monroe Counties, Ohio. Specifically 12.9 miles of 36-inch-diameter pipeline in Columbiana County, 24.5 miles of pipe in Belmont County, 35.5 miles of pipe in Jefferson County, and 2.7 miles of pipe in Monroe County. The OPEN Project would be approximately 0.3 mile from the proposed NEXUS pipeline and M&R Stations. In addition, Texas Eastern's Colerain Compressor Station was constructed under the OPEN Project. Other aboveground facilities, such as MLVs, a pig launcher, and pipeline taps, were constructed in Belmont, Jefferson, and Monroe Counties.

Columbia Gas Transmission, LLC's Leach XPress Project (FERC docket no. CP15-514-000) would involve construction of about 127 miles of greenfield pipeline as well as 2 loops totaling 30 miles, abandonment of 27 miles of pipeline, construction of 3 new compressor stations, and modifications at 2 existing stations. The Columbia Leach Xpress Project would consist of about 28 miles of pipeline in Monroe County, Ohio, approximately 0.1 mile from the TEAL Project pipeline loop.

Columbia Pipeline Group's Pipeline Improvement Project includes several pipeline replacements in Wood, Lucas, Huron, Erie, Medina, and Lorain Counties, Ohio. These projects range from 1 to 20 miles from the facilities associated with the NGT and TEAL Projects and involve replacements of up to about 18 mile-long pipeline segments.

Dominion Transmission, Inc.'s Clarington Project (FERC docket no. CP14-496-000) added an additional 10,000 hp of compression to the existing Mullett Compressor Station in Monroe County, Ohio and 6,130 hp at an existing station in West Virginia. In addition, Dominion will add two new M&R stations and 5,368 feet of suction/discharge pipe in Monroe County.

Texas Eastern's Access South, Adair Southwest, and Lebanon Extension Projects (Access South Project) (FERC docket no. CP16-3-000) consist of 15.8 miles of pipeline looping, modifications to 12 existing compressor stations, launchers/receivers and valves, and auxiliary facilities. Modification to the Berne Compressor Station, would be constructed in Monroe county Ohio. At its nearest point, these projects would be about 0.7 mile from the TEAL Project.

TransCanada Corporation's ANR East would include the construction of 320 miles of new pipeline and 140,000 hp of compression originating in Clarington or Cadiz, Ohio (depending on the final design), through northern Ohio, terminating at the ANR Joliet Hub in Lake County, Indiana. Since TransCanada has not yet filed with the FERC, there is no docket number associated with this project at this time.

Kinder Morgan's Utopia East Project (FERC docket no. OR15-28-000) would likely involve a 240-mile-long, 12-inch-diameter pipeline from Harrison County, Ohio, to Kinder Morgan's Cochin Pipeline near Riga, Michigan, where the company would then move product eastward to Windsor, Ontario, Canada. Kinder Morgan has not requested to enter the FERC's pre-filing process at this time. The project would cross several counties in Ohio affected by the NGT Project, including Fulton, Henry, Wayne, Stark, Sandusky, and Huron. Kinder Morgan has petitioned for a Declaratory Order with FERC.

Tennessee Gas Pipeline's Abandonment and Capacity Restoration (ACR) Project (FERC docket no. CP15-88-000) and Kinder Morgan's Utica Marcellus Texas Pipeline Project involve the abandonment and conversion of over 1,000 miles of natural gas service on Tennessee Gas pipelines to natural gas liquids.

These projects would involve construction of about 200 miles of new pipeline from Louisiana to Texas, and 155 miles of new laterals in Pennsylvania, Ohio, and West Virginia.

4.14.5 Non-jurisdictional Project-related Facilities

To support the NGT and TEAL Projects, DTE Gas would make modifications to three existing facilities: Willow Gate, Willow Run, and Milford Compressor Stations. In addition, Vector U.S. would make modifications to the existing Milford Meter Station in Oakland County, Michigan to support the NGT and TEAL Projects. While FERC has no jurisdiction over these planned modifications, we disclose the potential cumulative impacts below.

4.14.5.1 DTE Gas Company Modifications

DTE Gas would modify its existing Willow Gate Station, Willow Run Compressor Station, and Milford Compressor to accommodate the NGT and TEAL Projects. These modifications are non-jurisdictional and would be permitted through various federal and state agencies, including the MDEQ, Michigan Public Service Commission, PHMSA, FWS, and county/local agencies, among others.

Existing Willow Gate Station Modifications (Washtenaw County, Michigan)

Construction at the Willow Gate Station would occur in two phases. Phase 1 (bath line heaters, relocation of storage tank, and tie-in to existing DTE Gas pipelines) would begin in summer 2016 and Phase 2 (interconnecting pipeline, tie-ins for NEXUS pipelines, and metering facilities) would begin in summer 2017. Modifications to the Willow Gate Station would be constructed entirely within property currently owned by DTE Gas and would include:

- pipe additions totaling approximately 2,000 linear feet of 36-inch, 30-inch, 24-inch, 16-inch, and 12-inch-diameter pipe and necessary valves; and
- three new 10 MMBtu/hr water bath line heaters to replace two existing heaters.

Existing Willow Run Compressor Station Modifications (Washtenaw County, Michigan)

Construction at the Willow Run Compressor Station is planned to begin in fall 2016 and would be available for service by November 1, 2017. Modifications to the Willow Run Compressor Station would be constructed entirely within property currently owned by DTE Gas and would include:

- addition of up to 17,700-hp of gas compression and associated compressor buildings;
- miscellaneous station/unit piping; and
- about 2,500 linear feet of 30-inch-diameter station discharge piping to Willow Gate Station.

Table 4.14.5-1 provides the estimated cumulative emissions for the proposed Willow Run M&R Station and DTE Gas' Willow Run Compressor Station. The operational emissions associated with the modifications at DTE Gas' Willow Run Gate Station would be minor.

TABLE 4.14.5-1

Cumulative PTE Emissions from Willow Run M&R Station and DTE Gas' Willow Run Compressor Station (tpy)

Facility	NO_x	VOC	CO	SO_2	PM_{10}/ $PM_{2.5}$	CO_2e	Total HAPs
Willow Run Compressor Station Post-Project PTE [a]	159.7	104.2	124.0	2.8	5.0	90,855	12.8
Willow Run M&R Delivery Station PTE	3.0	2.9	0.4	<0.01	0.03	782	0.3
Cumulative Post-Project PTE	162.7	107.1	124.4	2.8	5.0	91,637	13.1
Willow Run Compressor Station Existing Station PTE [b]	89.0	89.0	89.0	0.1	0.02	24,462	12.5
Cumulative Change in PTE	73.7	18.1	35.4	2.7	5.0	67,175	0.6

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a Emissions represented are based on the air permit application submitted to the MDEQ and are based on current design; changes may occur to proposed equipment and emissions.

b Facility operates under a PTI with a permit site limit of 89 tpy of NOx, CO, and VOC.

Construction at the Willow Run Compressor and Gate Stations would result in cumulative air quality and noise impacts with construction at NEXUS' Willow Run M&R Station; however, these impacts would be localized and temporary. The common NSA for the compressor and M&R stations would experience a 0.4 dBA increase in ambient noise level during operation. The emissions associated with DTE Gas' Willow Run Compressor Station would be minor under PSD regulations. We conclude that DTE Gas' modifications and the NGT Project facilities in Washtenaw County, Michigan would not result in a significant cumulative impact on environmental resources.

Existing Milford Compressor Station Modifications (Oakland County, Michigan)

Construction at the Milford Compressor Station is planned to begin in fall 2016 and would be available for service by November 1, 2017. Modifications to the Milford Compressor Station would be constructed entirely within property currently owned by DTE Gas and would include:

- addition of up to 45,000 hp of new gas compression including associated compressor buildings;
- miscellaneous station/unit piping; and
- about 2,000 linear feet of 36-inch-diameter suction/discharge header piping to existing DTE Gas transmission pipeline(s) valve nest.

The Milford Compressor Station is approximately 20 miles from the nearest NGT Project facility. While there is the potential for some cumulative impact on air quality, it is not expected to be significant.

4.14.5.2 Vector U.S. Modifications

Vector U.S. would make modifications to the existing Milford Meter Station in Oakland County, Michigan to support the NGT and TEAL Projects. The Milford Meter Station is approximately 20 miles from the proposed NGT facilities. The modifications include replacing an existing 30-inch ultrasonic meter with two 20-inch ultrasonic meters; the addition of bi-directional meters; and station piping and valves. Vector would make these modifications under its blanket Certificate (issued by FERC in Docket No. CP98-135-000 on May 27, 1999). Modifications at Vector's facilities would result in minor impacts on air quality and noise during construction and operation. We conclude that Vector's modifications and the NGT Project facilities in Oakland County, Michigan would not result in a significant cumulative impact on environmental resources in the area.

4.14.6 Energy Projects

FirstEnergy Corporation's Hayes-West Fremont Transmission Project includes construction of about 30 miles of a 138-kV electric transmission line in Sandusky and Erie Counties, Ohio (FirstEnergy, 2016a). FirstEnergy states that its projects are needed (as identified by PJM, the region's regional transmission organization) to enhance system reliability due to the deactivation of several power plants in the region, including nine FirstEnergy plants. The power line would require a 60-foot-wide right-of-way and would be supported primarily by wood pole structures. Construction would begin in mid-2017, with an anticipated in-service date of August 31, 2018.

FirstEnergy Corporation's Glenwillow-Bruce Mansfield Transmission Project was constructed, in part, in Columbiana County, Ohio approximately 16.5 miles from the TEAL Project. The project involved construction of 119 miles of 345 kV electric transmission line from the Bruce Mansfield Plant in Pennsylvania to a new Glenwillow Substation in Ohio. According to FirstEnergy, 70 percent of the project involved adding a new line to existing infrastructure to minimize impact. FirstEnergy began construction in the spring of 2013 and placed the facilities in service on June 1, 2015.

FirstEnergy Corporation's Dowling Substation and Transmission Line involved extending an existing 345 kV and 138 kV electric transmission line by 150 feet, constructing a new substation, and extending a third 138 kV power line 3 miles to the new substation. The project was placed into service on June 1, 2015 and is approximately 5 miles from the nearest NGT Project facility in Wood County, Ohio.

4.14.7 Transportation and Commercial/Residential Development Projects

Transportation and commercial/residential development projects (see appendix N-1) typically consist of short-term, localized activities that require state or local approval and that BMPs would be implemented to minimize environmental impacts such as erosion and sedimentation.

4.14.7.1 Transportation Projects

ODOT and MDOT are overseeing multiple ongoing and proposed infrastructure projects in the region of influence for the NGT and TEAL Projects in addition, some counties and localities are performing transportation/road work in the Projects area. The scopes of these projects are limited to work on existing infrastructure, including road widening and additional highway lanes, bridge reconstruction, a new railroad underpass, culvert replacements, and repaving, among other activities.

The majority of the projects listed in appendix N-1 have been completed, are currently under construction, or would be completed prior to construction of the NGT and TEAL Projects. Of the listed transportation projects, those that are located in counties crossed by the NGT and TEAL Projects were evaluated according to the guidelines and criteria established for this cumulative analysis. These projects have the potential to impact traffic in the Projects area and are discussed in the relevant section of this cumulative analysis.

4.14.7.2 Commercial/Residential Development Projects

NEXUS and Texas Eastern contacted county planning departments and other sources to identify whether residential or commercial developments are planned near their Projects (see appendix N-1). There are several residential and commercial developments in various stages of planning along the Project routes. Many of these projects are in the conceptual and/or preliminary stages (no plans filed with the county). The commercial/residential projects range from small additions to single-landowner properties to large subdivisions and commercial spaces. The NGT and TEAL Projects would be adjacent to and potentially cross some of these planned projects. The potential cumulative impacts associated with these residential and commercial development projects are discussed in the relevant section of this cumulative analysis.

4.14.8 Potential Cumulative Impacts of the Proposed Action

The potential impacts that we consider as part of our cumulative review pertain to geology and soils; groundwater, surface water, and wetlands; vegetation; wildlife; land use, recreation, special interest areas, and visual resources; socioeconomics; cultural resources; and air quality and noise. In the following analysis, we discuss the potential cumulative impacts associated with the projects mentioned above and their contribution to impacts on sensitive resources in conjunction with NGT and TEAL Projects.

4.14.8.1 Geology and Soils

Cumulative effects on geology affected by the NGT and TEAL Projects would be limited primarily to the combined impacts of construction projects located within the same construction footprint as the proposed Projects, and recently completed or concurrent construction activities along the same route as the proposed Projects. These include natural gas wells, energy projects, and state DOT projects. The facilities associated with the NGT and TEAL Projects are expected to have a temporary but direct impact on near-surface geology and soils. The soil stabilization and revegetation requirements included in the NGT and TEAL construction plans would prevent or minimize any indirect impacts. Because the direct effects would be highly localized and limited primarily to the period of construction, cumulative impacts on geology and soils would primarily occur if other projects are constructed at the same time and place as the NGT and TEAL Projects. Construction of some of the projects listed in appendix N-1, such as some state DOT and local road construction projects as well as the Leach Xpress, Rover, and Access South Projects, would occur within 0.25 mile of either NGT or TEAL Projects facilities for limited distances. The OPEN Project, placed in service in November 2015, involved construction of the Colerain Compressor Station, which would be subsequently modified as part of the TEAL Project. As a result, direct cumulative impacts at this site would occur. In addition, projects that require significant excavation or grading would have temporary, direct impacts on near-surface geology and soils, although like the NGT and TEAL Projects, the duration and effect of these projects would be minimized by the implementation of erosion control and restoration measures. However, in general, the potential for cumulative soil impacts resulting from one or more of these projects is low and primarily temporary because construction of other pipeline facilities would generally not result in loss of soils.

The Marcellus and Utica shale well drilling activities are various distances from the NGT and TEAL Projects facilities. Ohio and Michigan have specific offices within their respective environmental departments that handle the permitting and enforcement of applicable laws. In each state, there are specific branches of local government tasked with permitting of gas resources, which include the ODNR's Division of Oil & Gas Resources and the MDEQ's Office of Oil, Gas, and Minerals. Each organization has developed BMPs for the construction and operation of upstream oil and gas production facilities as part of their permitting process. These BMPs include erosion and sediment control practices; setback requirements from springs, wetlands, and waterbodies; wetland and waterbody crossing procedures; access road construction practices; soil amendment procedures; and right-of-way restoration measures. Implementation of these measures, in combination with the measures outlined in NEXUS' and Texas Eastern's construction plans, would avoid or minimize cumulative impacts of shale development activities on geology and soil resources in the area of the NGT and TEAL Projects, particularly where there are adjacent workspaces.

The NGT and TEAL Projects, along with other projects described previously, could result in some loss of productive soils from the additions of impervious surfaces (e.g., compressor station sites and road widening/lane additions); however, these would be limited in scope. Furthermore, land impacted by pipeline projects would be restored to previous uses, with some exceptions (forested areas), thereby minimizing permanent impact. The potential for cumulative soil impacts resulting from the projects combined with the NGT and TEAL Projects is low and primarily temporary because construction of these projects would generally not result in loss of soils. NEXUS and Texas Eastern would follow the recommended procedures and take the necessary precautions to avoid and mitigate soil impacts, therefore, the NGT and TEAL Projects are not expected to significantly contribute to the potential cumulative impact on soils. Consequently, the cumulative effect of the NGT and TEAL Projects on geological resources and soils would be temporary and minor.

4.14.8.2 Water Resources

Construction and operation of the NGT and TEAL Projects would likely result in only short-term impacts on water resources (see section 4.3.2.2). These impacts, such as increased turbidity, would return to baseline levels over a period of days or weeks following construction.

Groundwater

Projects listed in appendix N-1 that are within the same watersheds as the NGT and TEAL Projects and involve ground disturbance or excavation could result in cumulative impacts on groundwater resources. The major pipeline construction activities that could affect groundwater include the clearing of vegetation, excavation and dewatering of the trench and bore pits, soil mixing and compaction, heavy equipment and associated fuels, and hazardous material handling. Implementation of proper storage, containment, and handling procedures would minimize the chance of such releases. NEXUS' and Texas Eastern's *SPCC Plans* address the preventative and mitigative measures that would be implemented to avoid or minimize the potential impacts of hazardous material spills during construction. In addition, NEXUS and Texas Eastern would adhere to FERC's *Procedures* to ensure protection of wetlands and waterbodies during construction. Therefore, impacts from the NGT and TEAL Projects are expected to be short-term and minor. All of the major projects (such as the other FERC projects and the Utica and Marcellus wells) would be required to obtain water use and discharge permits and would implement their various *SPCC Plans* as mandated by federal and state agencies.

For these reasons, we conclude that the NGT and TEAL Projects would only contribute to minor and temporary cumulative impacts on groundwater when combined with the planned projects in the area.

Wetlands, Waterbodies, Fisheries, and Aquatic Resources

Generally, impacts resulting from pipeline construction across waterbodies are localized and short-term. Cumulative impacts would only occur in the event that more than one project crossing the same waterbody are constructed within a similar period of time. The NGT and TEAL Projects would require 475 separate waterbody crossings in Ohio and Michigan. These include 208 perennial stream crossings and 8 major waterbody crossings (100 feet or greater), with the remaining crossings consisting of small intermittent or ephemeral streams. The majority of these would be crossed using either the open-cut method or a dry-cut method; however, waterbodies would be crossed via the HDD method at 18 locations.

Most of the projects listed in appendix N-1 are within watersheds crossed by the NGT and TEAL Projects and could result in impacts on wetlands and surface waters. Several of these could be under construction during the same time as the NGT and TEAL Projects, including some of the Marcellus and Utica Shale well drilling, several state DOT and local/county road projects, FirstEnergy's transmission projects, and FERC-jurisdictional pipeline projects. However, the NGT and TEAL Projects would contribute little to the long-term cumulative impacts on wetlands and waterbodies because the majority of construction impacts would be temporary and end shortly after pipeline installation. Further, FirstEnergy's transmission projects and non-jurisdictional project-related facilities would likely follow BMPs similar to those proposed by NEXUS and Texas Eastern, which would further minimize impacts on waterbodies. Other FERC-regulated projects would be required to adhere to our *Procedures*, which minimize impacts on waterbodies and wetlands. Therefore, we conclude that the cumulative impacts on wetland and waterbody resources would be temporary and minor.

We received comments regarding cumulative impacts on Ohio peatlands. Over a 100-year timeframe, impacts from mining and development activities only contributed approximately 3 percent of peatland loss in Ohio. Further, pursuant to 33 CFR 332.3(e)(3), impacts on difficult-to-replace resources (e.g., fens and peatlands) would need to be appropriately mitigated via in-kind methods. NEXUS would implement its *Wetland Mitigation Plan*, which we have recommended be filed with the Secretary prior to construction. The projects listed in appendix N-1 would likely be required to implement similar mitigation measures to minimize wetland impacts. Based on NEXUS' mitigation measures and adherence to its project-specific *E&SCP*, we do not believe there would be a significant cumulative impact on peatlands in Ohio.

The proposed Projects would minimize fisheries impacts through adherence to timing restrictions for construction, as well as implementation of appropriate setbacks, erosion and sediment control measures, BMPs, and restoration requirements. In addition, the other FERC-regulated projects, such as the Rover, ANR East, and Leach Xpress projects, would be designed to minimize impacts on waterbodies, and subsequently fisheries, to the extent possible. For example, Rover recommended dry crossings in cold water fisheries and trout sensitive fisheries. Any impacts on waterbodies that could not be avoided would be minimized through implementation of BMPs and restoration practices in accordance with the respective federal, state, and local regulatory requirements.

Therefore, we conclude that the fishery impacts discussed in this section are not expected to be cumulatively significant because of the limited overlap of construction activities affecting the same sensitive resources, the temporary nature of impacts, and the avoidance and mitigation measures that would be implemented. Further, operation of the proposed NGT and TEAL Projects would not result in any additional impacts unless maintenance activities occur in or near streams.

4.14.8.3 Vegetation

Cumulative impacts on vegetation disturbed by the NGT and TEAL Projects would be limited primarily to the combined impacts of construction projects located within the same region of influence (i.e., 10 miles) as the NGT and TEAL Projects and recently completed or concurrent construction activities along the same route as the NGT and TEAL Projects. While the vegetation impacts of the projects discussed previously and the NGT and TEAL Projects would not be inconsequential, the overall impact of these projects would be considered minor in comparison to the abundance of comparable habitat in the area. The applicants would be required to restore vegetation in temporarily disturbed areas, and non-jurisdictional project-related facilities would likely be held to similar standards by state permitting agencies. The FERC-jurisdictional projects would be held to the same restoration standards as the NGT and TEAL Projects.

Implementation of NEXUS' and Texas Eastern's *E&SCPs* would promote revegetation of rights-of-way and aboveground facilities following construction and each applicant would provide mitigation funding to address loss of forest habitat. Shale development and non-jurisdictional project-related facilities would also likely be required to implement mitigation measures designed to minimize the potential for long-term erosion and resource loss, increase the stability of site conditions, and revegetate disturbed areas, thereby minimizing the degree and duration of the impacts of the NGT and TEAL Projects. Thus, cumulative impacts on vegetation resulting from the NGT and TEAL Projects, Marcellus and Utica Shale development, state DOT and local road construction projects, the FirstEnergy projects, and the other FERC-jurisdictional projects are expected to be minor, with the exception of forested impacts discussed in section

4.14.8.6. Further, considering the limited area impacted within the region of influence and that these projects are expected to take the required precautions and mitigation measures in accordance with federal and state regulations, the incremental and cumulative impacts on vegetation would not be significant.

4.14.8.4 Wildlife

Cumulative impacts on wildlife would occur where projects are constructed in the same general proximity and timeframe, or which represent permanent or long-term loss of habitat types important to wildlife. These include the Marcellus and Utica Shale gathering systems projects, several state DOT projects, the Black Fork Wind Project, and the other FERC-jurisdictional projects listed in appendix N-1. Construction activities such as right-of-way and other workspace clearing and grading would result in loss of vegetation cover and soil disturbance, alteration of wildlife habitat, displacement of wildlife species from the construction zone and adjacent areas, mortality of less mobile species, and other potential indirect effects as a result of noise created by construction and human activity in the area. Overall impacts would be greatest where projects are constructed in the same timeframe and area as the NGT and TEAL Projects or that have long-term or permanent impacts on the same or similar habitat types.

In general, wildlife is expected to return to affected areas following construction of the NGT and TEAL Projects and other projects in the area. Clearing and grading of the construction rights-of-way for the NGT and TEAL Projects and other nearby projects would result in a loss of wildlife habitat. This is most likely to occur in locations where the NGT and TEAL Projects would be constructed in proximity to other projects. For example, the planned intersection at 53 and Ohio Turnpike in Sandusky County, Ohio, FirstEnergy’s planned power line in Erie County, Ohio, the Lucas County, Ohio road work, and the OPEN Project would each be within 1 mile of the NGT or TEAL facilities (see appendix N-1 for project details and locations). The effect of workspace clearing on forest-dwelling wildlife species would be greater than on open habitat wildlife species since forested lands could take decades to return to pre-construction condition in areas used for temporary workspace and would be permanently prevented from re-establishing on the permanent right-of-way. This may result in the cumulative loss of individuals of small mammal species, amphibians, reptiles, nesting birds, and non-mobile species. However, we expect that any projects constructed in the area would be required to restore some vegetation cover to the disturbed areas unless they are covered by buildings or impervious surfaces. Once the area is restored, some wildlife displaced during construction of any of the projects would return to the newly disturbed area and adjacent, undisturbed habitats after completion of construction.

NEXUS has verbally committed to fully mitigate the impacts to forested areas, including avoidance and minimization of impacts to the extent practicable, as well as provide mitigation funding to replace or provide substitute resources for the impacted forested habitat. Assuming the habitat impacts would be fully mitigated, the negative impacts of this project on wildlife would be considered minor by FWS.

The aboveground facilities associated with the NGT and TEAL Projects would result in some permanent impacts on wildlife habitat. The Rover, ACP, Clarington, OPEN, and Access South Projects would also have associated aboveground facilities; however, due to the limited size of these facilities, some of which include modifications to existing facilities, and the prevalence of similar habitats in adjacent areas, the permanent conversion of forested lands would not be a cumulatively significant impact on wildlife resources within the area of the NGT and TEAL Projects.

Construction of any shale development projects would also result in some long-term loss of wildlife habitat due to aboveground structures and well pads. The FirstEnergy projects (ranging from 0.5 to 17 miles from the NGT Project) would also result in impacts on wildlife habitat, but because the primary construction would be of overhead powerlines with limited vegetative clearing and permanent land requirements, only minor permanent impacts would occur.

Impacts on wildlife species from construction of any of the projects listed in appendix N-1 would be local, temporary, and minor; therefore, cumulative impacts are expected to be negligible for any individual wildlife species relative to the population in the region of influence.

4.14.8.5 Special Status Species

The species discussed in section 4.8 could potentially be affected by construction and operation of other projects occurring within the same area as the NGT and TEAL Projects. NEXUS and Texas Eastern, and all other companies, are required to consult with the appropriate federal, state, and local agencies to evaluate the types of species that may be found in the area of the projects; identify potential impacts from construction and operation of the projects on any species identified; and implement measures to avoid, minimize, or mitigate impacts on special status species and their habitat. Based on projected impacts and proposed mitigation measures, the majority of federally and state-listed endangered and threatened species were determined to be either unaffected or not adversely affected by the NGT and TEAL Projects.

All federal projects are required by law to coordinate with the FWS, which will take into account regional activity and changing baseline conditions in determining the extent of impacts on a federally listed or proposed species. Non-federal projects are also required to adhere to the ESA, although the FWS has a different mechanism for evaluating and minimizing impacts. Consequently, we conclude that past and present projects in combination with the NGT and TEAL Projects would have minor cumulative impacts on special status species.

4.14.8.6 Land Use and Visual Resources

Land Use

Projects with permanent aboveground components, such as turbines, buildings, residential projects, roads, and aboveground electrical transmission lines, would generally have greater impacts on land use than the operational impacts of a pipeline (such as gathering lines for Marcellus and Utica Shale development and other FERC-jurisdictional projects) that would be buried and thus allow for most uses of the land following construction. Therefore, with the exception of aboveground facilities and the permanent right-of-way, pipeline projects typically only have temporary impacts on land use. The majority of long-term or permanent impacts on land use are associated with vegetation clearing and maintenance of the pipeline right-of-way.

The projects listed in appendix N-1 would disturb hundreds of acres of land affecting a variety of land uses. Of the projects listed in appendix N-1, those with the greatest potential for impacts include the Marcellus and Utica Shale development projects, linear infrastructure facilities such as those associated with the FERC-regulated projects, the FirstEnergy electric transmission line projects, and the ANR East Project.

The OPEN Project impacted about 209 acres of agricultural lands, 590 acres of open lands, 10 acres of wetlands, and 610 acres of upland forested lands during construction; and 74 acres of agricultural lands, 186 acres of open lands, 6 acres of wetlands, and 225 acres of upland forested lands during operation. The ACR Project would impact about 105 acres of agricultural lands, 66 acres of open lands, 10 acres of wetlands, and 106 acres of upland forested lands during construction; and 36 acres of agricultural lands, 22 acres of open lands, 4 acres of wetlands, and 47 acres of upland forested lands during operation. We estimate the ANR East Project could impact 360 acres of forest land, 1,930 acres of agricultural lands, 70 acres of open lands, and 40 acres of wetlands during construction; and 160 acres of forest land, 780 acres of agricultural lands, 30 acres of open lands, and 20 acres of wetlands during operation. The Rover Project would impact 2,919 acres of forested land, 5,135 acres of agricultural land, 450.5 acres of open land, and

18 acres of open water during construction; and 1,172.6 acres of forested land, 1,939.8 acres of agricultural land, 178.9 acres of open land, and 12.6 acres of open water during operation. The Clarington Project would occur at existing aboveground facilities, so greenfield impacts would be minimal. Additionally, the Columba Pipeline Improvement Projects would generally involve in-ditch pipeline replacements of existing pipelines, thereby limiting new impacts.

Cumulative impacts on forested lands could occur if these projects are constructed around the same time as the NGT and TEAL Projects. Unlike other resources, the NGT and TEAL Projects' impacts on forested land would be long term. From 2006 to 2011, Ohio's overall land mass was recorded as consisting of 8.1 million acres of forested land, covering approximately 30 percent of the state (Widmann, et al., 2014). In that same timeframe, Ohio's forest cover increased by 2.1 percent and the net volume of trees increased by 7.0 percent, totaling 15.9 billion cubic feet (Widmann, et al., 2014). According to the study *Ohio Forests 2011*, Ohio will continue to see an increase in forested land, continuing a decades-long trend, as well as a net annual growth in tree volume; however, threats such as a shift in tree species (away from oak) and thousand cankers disease could be issues of concern moving forward. According to the MDNR, about half of Michigan's 36.4 million acres are forested. Construction and operation of the NGT Project would impact a very small portion of available forested land in Michigan.

Ohio currently has extensive forest cover that is projected to grow and the impact of the NGT and TEAL Projects on Ohio's forested area (375.3 of 8.1 million acres) would be limited. In Michigan, the forest impacts associated with the NGT Project would impact less than 0.1 percent of the available resource. Adding the NGT and TEAL Projects' impacts on forest with the forest clearing of other projects and actions would contribute to a cumulative impact within the region of influence. While there would be a large amount of forested land cleared when considering the proposed projects with other FERC-regulated projects, the impacts would occur over a large area. The actual amount and timing of forest clearing and the restoration or mitigation measures that other FERC non-jurisdictional project proponents may implement is unknown.

Constructing the NGT and TEAL Projects would affect, in aggregate, 405.0 acres of forest during construction, and about 178.8 acres (41 percent) would be permanently impacted during operation of the facilities. In Ohio, construction would impact 363.1 acres, with 163.2 permanently impacted during operation. In Michigan, construction would impact 41.9 acres of forested land and 15.6 would be permanently converted during operation of the facilities. However, the proposed Projects primarily impact agricultural land and avoids forested areas to the extent practicable. The NGT and TEAL Projects would impact 4,016.3 acres of agricultural land during construction and 1,331.8 acres for operation. Agricultural land would be restored to pre-construction conditions and would return to previous uses after construction. However, we do acknowledge that natural gas production in the region, including construction of well pads and access roads, contributes to deforestation and forest fragmentation. Impacts on migratory birds and BCCs would result from these ongoing activities. However, based on the linear nature of the NGT and TEAL Projects and the impacts of the projects as discussed in this section, we have determined that the NGT and TEAL Projects would not contribute to a significant cumulative impact on land use, including interior forest land.

The majority of the NGT and TEAL Projects' impacts on agricultural land and other non-forested land use types would be temporary, as most land uses would be allowed to revert to prior uses following construction. Any impacts would be minimized or mitigated to the greatest extent practicable through the use of construction plans and consultation with federal and state agencies and landowners. It is anticipated that other projects in the region of influence would be required to implement similar construction and restoration practices to minimize impacts on land use. The FERC-jurisdictional projects would be required to adhere to our *Plan* (or implement a plan that provides equal or greater protection) so as to minimize impacts on agricultural land and other non-forested land uses.

Interior Forest Impacts

Interior forest habitat is not managed as a federal- or state-regulated sensitive area, but does provide habitat for a variety of wildlife species. We are defining interior forests as forested areas greater than 300 feet from the influence of forest edges or open habitat (Jones et al., 2001). These habitats provide protection from disturbance and predation, food resources, and brooding habitat for wildlife. Clearing or fragmentation of interior forests creates more edge habitat and smaller forested tracts, which can impact availability and quality of feeding and nesting habitat for certain species as well as isolate species populations (Rosenberg et al., 1999). Interior forest has a higher habitat value for some wildlife species and is generally considered more rare in the environment compared to edge forest which has a lower habitat value for many species and can be created immediately with disturbance (Landowner Resource Center, 2000; Sprague et al., 2006).

Although breeding habitat for interior forest birds varies significantly, ranging in size from 3 to 6,200 forested acres, in general forest tracts of 100 acres or larger (Jones et al., 2001) represent adequate forest interior dwelling bird habitat.

In the late 1700s (pre-settlement), Ohio was approximately 95% forested; however, this forest cover steadily declined to a low of 12% in 1940 due to settlement (ODNR, 2013b). About 100 different bird species nest in various stages of forested habitat in Ohio, but forest fragmentation has impacted the number and distribution of bird species. Species restricted to the interiors of mature woodlands may disappear from fragmented forests or suffer high rates of nest predation or parasitism (ODNR, 2013b). Since 1940, Ohio has seen a dramatic increase in forest cover; however, this coverage occurs in isolated patches of 20 acr.es or less, and some forest interior birds require relatively large, contiguous expanses of forest (ODNR, 2013b)

In order to minimize and reduce impacts on sensitive habitat, NGT has implemented a number of measures to reduce adverse effects of construction and operation of the NEXUS Project on forest species, including interior forest species:

- Project facilities have been routed to avoid sensitive environmental resources where possible;
- Pipelines would be co-located with existing rights-of-way where possible;
- construction and operation rights-of-way widths and temporary land requirements for installation would be limited to the minimum necessary, e.g. 150 feet in agricultural land and 75 feet in forested wetlands;
- avoidance of forested areas, especially contiguous forested areas to the extent possible;
- providing mitigation for impacts on sensitive environmental resources, including compensatory mitigation for impacts on migratory bird and listed species habitat;
- following the measures outlined in NGT's and Texas Eastern's Plans and Procedures during construction and operation of the Project; and
- prohibiting right-of-way maintenance during the bird nesting season (April 15 through August 1).

In addition to direct impacts on interior forest tracts by the proposed clearing during construction and maintenance operations, indirect impacts also would occur on interior forest tracts. Newly created edge habitats would be established by maintenance of the permanent right-of-way and the indirect impacts could extend for 300 feet on each side (600 feet total) of the new corridor into remaining interior forest blocks. The actual indirect impacts could be less or more depending upon the size, shape, and post-construction status of the remaining, adjacent forested areas in relation to the permanent right-of-way. These adjacent areas could remain classified as forest interior blocks with some indirect impacts or their classification as forest interior could be changed altogether based on a reduction in block size. While the indirectly affected lands adjacent to the right-of-way would remain forested, they would have reduced habitat value compared to pre-construction conditions. The creation of edge habitat could increase the risk of establishment of invasive species and other impacts on wildlife species. Section 4.6.4 describes potential impacts of edge habitat on wildlife.

Although NEXUS and Texas Eastern have attempted to route the Project adjacent to existing disturbance and outside of forested areas, impacts on the upland forest habitat and migratory birds and other wildlife that use this habitat would still occur. In addition, the permanent clearing of a 30- to 50-foot-wide right-of-way may result in effectively disconnected forested tracts (Jones et al., 2001).

On July 6, 2015, NEXUS and Texas Eastern filed a Draft Migratory Bird Conservation Plan that details impacts on upland forest habitat and measures proposed to reduce impacts and offset temporary and permanent impacts through conservation.

To reduce impacts on forest habitat, NEXUS and Texas Eastern would implement its general avoidance and impact minimization measures and upland forest conservation measures as described in their respective *Migratory Bird Conservation Plans*. A final plan developed in coordination with the applicable agencies prior to construction would identify compensatory mitigation for forest habitat loss.

Visual Impacts

The visual character of the existing landscape is defined by historic and current land uses such as recreation, conservation, and development. The visual qualities of the landscape are further influenced by existing linear installations such as highways, railroads, pipelines, and electrical transmission and distribution lines. Within this context, the pipelines and electrical transmission lines listed in appendix N-1 would have the greatest cumulative impact on visual resources in the NGT and TEAL Projects area. The NGT and TEAL Projects' facilities (e.g., compressor stations and meter stations) would add incrementally to this impact, but the overall contribution would be relatively minor given that the majority of the NGT and TEAL Projects involve buried pipeline. Existing vegetation around the NGT and TEAL Projects' aboveground facilities would provide adequate visual shielding for surrounding areas, where appropriate. In addition, disturbed areas would be revegetated according to the NGT and TEAL Projects' *E&SCPs*. The impact of Marcellus and Utica Shale development activities on land use, recreation, special interest areas, and visual resources would vary widely depending on the location of specific facilities and access roads, but they would be minimized to the extent possible through the appropriate state's review and permitting process. One advantage of the type of drilling technique used in the Marcellus and Utica Shale is that numerous wells can be drilled from a single well pad, thereby reducing the land use requirements and visual impacts for access roads, gathering pipelines, and individual well pads.

Although the visual impact of Marcellus and Utica Shale production may be long-term, only a minor visual impact would occur due to the operation of the NGT and TEAL Projects, primarily resulting from the conversion of forested land to scrub-shrub or herbaceous vegetation types. Non-jurisdictional project-related facilities would restore disturbed areas in accordance with state permitting agency requirements, thereby limiting permanent visual impacts on those areas where previously existing forest would not be allowed to reestablish within the new permanent right-of-way. ANR East Project would be about 23 miles from the NGT Project at its nearest point; therefore, we do not anticipate any visual cumulative visual impacts. The OPEN Project involved construction of the Colerain Compressor Station (which would be subsequently modified as part of the TEAL Project) and four new meter stations, as well as modifications to five existing compressor stations and one existing meter station. Permanent visual impacts would also occur to a lesser extent as a result of the development projects listed, where permanent structures (e.g., transmission line posts) would remain. Other recently completed or proposed aboveground facilities would, for the most part, likely be located adjacent to an existing right-of-way, at existing paved commercial/industrial sites, in remote locations, and/or within a permanent right-of-way. Whereas these permanent visual impacts may be locally noticed, generally they would be consistent with the existing visual character of the area. Therefore, the NGT and TEAL Projects' contribution to cumulative impacts on land use, recreation, special interest areas, and visual resources would mostly be limited to the construction phase and would be temporary and minor.

4.14.8.7 Socioeconomics

Present and reasonably foreseeable future projects and activities could cumulatively impact socioeconomic conditions in the region of influence for the NGT and TEAL Projects. The socioeconomic issues considered in the area of the NGT and TEAL Projects were employment, housing, public services, transportation, property values, economy and tax revenues, and environmental justice.

Employment

The projects considered in this section would have cumulative effects on employment during construction if more than one project is built at the same time. NEXUS and Texas Eastern estimate that the NGT and TEAL Projects would create about 5,325 jobs with $565 million in labor income for construction and 59 jobs with $3.8 million in labor income for operation. Approximately 36 permanent employees would work in Ohio, with up to 60 percent being local hires.

Local hires and local union halls would supply approximately 50 percent of the workforce for such jobs as surveyors, welders, equipment operators, and general laborers. Approximately 38 new permanent employees would be hired to operate the new pipeline system, which would not have a measurable impact on the economy or employment.

The construction and operation of the projects listed in appendix N-1 would result in a temporary increase in employment during construction, including both local and non-local hires depending on the project. Operation of pipeline projects typically do not require a large local workforce as pipeline facilities are generally monitored remotely. The number of permanent employees required for any given project (e.g., residential, commercial, and energy projects) after completion would be limited and would not materially impact employment levels in the project areas.

Temporary Housing

Temporary housing would be required for construction workers drawn from outside the local area. Given the current vacancy rates, the number of rental housing units in the area, and the number of hotel/motel rooms available in the vicinity of the NGT and TEAL Projects, construction workers should not encounter difficulty in finding temporary housing. If construction occurs concurrently with other projects, particularly during peak tourist periods, temporary housing would still be available but may be slightly more difficult to find and/or more expensive to secure. These effects would be temporary, lasting only for the duration of construction, and there would be no long-term cumulative impact on housing.

Infrastructure and Public Services

The cumulative impacts of the NGT and TEAL Projects and the other projects listed in appendix N-1 on infrastructure and public services would depend on the number of projects under construction at one time. The small incremental demands of several projects occurring at the same time could become difficult for police, fire, and emergency service personnel to address. The problem would be temporary, occurring only for the duration of construction; however, if the projects are constructed consecutively, then this impact would likely be minimized. The NGT and TEAL Projects, along with other FERC-regulated projects and non-jurisdictional project facilities, would adhere to OSHA guidelines to ensure safety. Contractors for NEXUS and Texas Eastern would be required to attend safety and environmental training prior to entering the rights-of-way. Presumably other projects, such as FirstEnergy's transmission projects and Marcellus and Utica drilling work, would also adhere to OSHA's safety guidelines, further minimizing the need for public services. In addition, the need for public services would be mitigated, to some extent, by the fact that the NGT and TEAL Projects and those considered in this cumulative impacts analysis would occur over a large geographic area, reducing the impacts on any single locality. No long-term cumulative effect on infrastructure and public services is anticipated.

Increased use of local roadways from multiple projects could accelerate degradation of roadways and require early replacement of road surfaces. NEXUS and Texas Eastern would repair any roadways damaged during installation of the pipelines and would coordinate with local authorities regarding any project-related impacts on roads.

Transportation and Traffic

Construction of the NGT and TEAL Projects could result in temporary impacts on road traffic in some areas and could contribute to cumulative traffic, parking, and transit impacts if other projects are scheduled to take place at the same time and in the same area. The local road and highway system in the vicinity of the NGT and TEAL Projects is readily accessible by interstate highways, U.S. highways, state highways, secondary state highways, county roads, and private roads. However, portions of the NGT and TEAL Projects are located in rural areas and some of the impacted roads would be county or private roads. NEXUS and Texas Eastern would use major highways, as well as the construction right-of-way to the extent practicable, to reduce impacts on local roadways.

The addition of traffic associated with construction personnel commuting to and from the NGT and TEAL Projects could also contribute to cumulative regional traffic congestion; however, the cumulative traffic impacts would be temporary and short-term. Workers associated with the NGT and TEAL Projects would generally commute to and from the pipeline rights-of-way, pipe/contractor yards, or aboveground facility sites during off-peak traffic hours (e.g., before 7:00 AM and after 6:00 PM). It is unlikely that other projects listed in appendix N-1 would have similar commuting schedules or reach peak traffic conditions simultaneously. Highway and road work that would occur in the same timeframe and in the general vicinity of the NGT and TEAL Projects could result in additional traffic (above normal conditions) due to reroutes and road closures. NEXUS and Texas Eastern would adhere to regulations and guidance from state and local authorities with respect to traffic impacts (e.g., reroutes and closures). Increased traffic due to the NGT and TEAL Projects and/or state and local highway/road construction would be temporary.

The NGT and TEAL Projects would not contribute to any long-term cumulative impacts on the transportation infrastructure, because only a small number of new permanent employees would be required to operate the NGT and TEAL Projects at select locations.

4.14.8.8 Cultural Resources

Cumulative impacts on cultural resources would only occur if other projects were to impact the same historic properties impacted by the NGT and TEAL Projects. The currently proposed projects listed in appendix N-1 that are defined as federal actions would include mitigation measures designed to avoid or minimize additional direct impacts on cultural resources. Where direct impacts on significant cultural resources are unavoidable, mitigation (e.g., recovery of data and curation of materials) would occur before construction. The federal projects listed in appendix N-1 would be required to adhere to the NHPA, and non-federal actions would need to comply with any mitigation measures required by the affected states. NEXUS and Texas Eastern have each developed project-specific plans to address unanticipated discoveries of cultural resources and human remains in the event they are discovered during construction and have conducted surveys to identify sensitive cultural resources and historic properties. The NGT and TEAL Projects may incrementally add to the cumulative effects of other projects that may occur at the same time in proximity to the proposed facilities; however, this incremental increase would not be significant.

4.14.8.9 Air Quality and Noise

Air Quality

Construction of the NGT and TEAL Projects and the projects listed in appendix N-1 would involve the use of heavy equipment that would generate air emissions, including fugitive dust. The majority of these impacts, with the exception of HDD installations, would be minimized because the construction activities would occur over a large geographical area and would be transient in nature. The construction emissions associated with the NGT and TEAL Projects would be temporary and would be minimized by mitigation measures such as using properly maintained vehicles and commercial gasoline and diesel fuel products with specifications to control pollutants.

Air emissions resulting from diesel- and gasoline-fueled construction equipment and vehicles would be minimized by federal design standards required at the time of manufacture of the equipment and vehicles and would comply with the EPA’s mobile and non-road emission regulations found in 40 CFR Parts 85, 86, and 89. While fugitive dust impacts would also be temporary and not expected to affect local or regional air quality, implementation of NEXUS’ and Texas Eastern’s respective *Fugitive Dust Control Plans* in construction work areas would minimize the effects of fugitive dust emissions. Fugitive dust generated by other projects in the area would be limited to the vicinity of the construction activities. The NGT and TEAL Projects construction schedules would overlap with some of the projects listed in appendix N-1 and would be constructed in close proximity; however, many of those projects are minor (e.g., road construction) and would not result in significant cumulative impacts.

With the exception of GHG emissions, air impacts from construction of the NGT and TEAL Projects would be localized and confined primarily to the airsheds where the activities occur. In all counties crossed, the NGT and TEAL Projects’ estimated emissions would be below the *de minimus* threshold for a general conformity determination, therefore impacts would not be expected to result in a significant impact on local or regional air quality. The combined effect of multiple construction projects occurring in the same airshed, ACQR, and timeframe as the NGT and TEAL Projects could temporarily add to the ongoing air quality effects of existing activities. However, the contribution of the NGT and TEAL Projects to the cumulative effect of all foreseeable projects would be temporary. The projects listed in appendix N-1 have varying construction schedules and would take place over a relatively large geographic area, further reducing any potential cumulative impacts on air quality.

It is likely that mitigation measures similar to those employed for the NGT and TEAL Projects would be required for other projects to protect ambient air quality, thereby reducing the extent of cumulative impacts on air quality that could occur if projects are being constructed within the same timeframe and within the same region of influence. Industrial-type projects, including the project-related non-jurisdictional compressor station modifications to be constructed by DTE Gas, would be required to adhere with any applicable regulations promulgated by the CAA. As established throughout section 4.12.1 and further demonstrated by air quality modeling, construction of the NGT and TEAL Projects would not have a significant long-term, adverse impact on air quality and would not add significantly to the long-term cumulative impact of other projects.

Operation of the NGT and TEAL Projects' pipelines would generate emissions from maintenance vehicles and equipment, as well as vented and fugitive GHG emissions. The NGT and TEAL Projects' compressor stations would primarily generate GHG, NO_X, VOC, CO, HAP, and PM emissions, and to a lesser extent, SO_2 emissions. However, none of the NGT and TEAL Projects' compressor stations would trigger PSD permitting requirements for any pollutant. Emissions associated with the various FERC-regulated projects would result in cumulative operational impacts on air quality; however, each compressor station would be required to comply with permit conditions based on CAA regulations and Ohio and Michigan's State Implementation Plans. Fugitive pipeline emissions would be limited to GHG, which would not necessarily translate to impacts on local air quality (climate change and cumulative GHG emissions are discussed below). FirstEnergy's transmission line projects would not result in operational emissions.

Ongoing drilling activities of Marcellus and Utica Shale natural gas reserves and other projects in the area such as non-jurisdictional project-related facilities would involve the use of heavy equipment that would generate emissions of air contaminants and fugitive dust during construction. Because pipeline construction moves through an area quickly, air emissions associated with pipelines would be intermittent and short term. The majority of these impacts would be minimized further because the construction activities would occur over a large geographical area and, in many cases, construction schedules would not directly overlap. Although these projects would result in short-term construction air emissions, they are not likely to significantly affect long-term air quality in the region. Operation of the NGT and TEAL Projects, Marcellus and Utica Shale drilling activities, other FERC-jurisdictional projects, and other nearby projects would also contribute cumulatively to existing air emissions. As with the operational impacts of the NGT and TEAL Projects, operation of other nearby, similar projects would generate emissions from maintenance vehicles and equipment, as well as vented and fugitive GHG emissions, which would contribute to cumulative impacts on air quality within the region of influence. We expect that operation of nearby, similar projects would be required to comply with the same permit requirements and mitigation measures as the NGT and TEAL Projects.

We received comments requesting that we consider cumulative air quality impacts while taking into account the Ohio E-Check requirements. As discussed in section 4.12.1, the E-Check system was established specifically for passenger vehicles and would not be applicable to industrial-type projects.

Climate Change

We received several comments expressing concern about the NGT and TEAL Projects' contribution to global climate change. Climate change is the change in climate over time, whether due to natural variability or as a result of human activity, and cannot be represented by single annual events or individual anomalies. For example, a single large flood event or particularly hot summer are not indications of climate change, while a series of floods or warm years that statistically change the average precipitation or temperature over years or decades may indicate climate change.

The Intergovernmental Panel on Climate Change (IPCC) is the leading international, multi-governmental scientific body for the assessment of climate change. The United States is a member of the

IPCC and participates in the IPCC working groups to develop reports. The leading U.S. scientific body on climate change is the U.S. Global Change Research Program (USGCRP). Thirteen federal departments and agencies[17] participate in the USGCRP, which began as a presidential initiative in 1989 and was mandated by Congress in the Global Change Research Act of 1990.

The IPCC and USGCRP have recognized that:

- globally, GHGs have been accumulating in the atmosphere since the beginning of the industrial era (circa 1750);
- combustion of fossil fuels (coal, petroleum, and natural gas), combined with agriculture and clearing of forests, is primarily responsible for this accumulation of GHG;
- these anthropogenic GHG emissions are the primary contributing factor to climate change; and
- impacts extend beyond atmospheric climate change alone, and include changes to water resources, transportation, agriculture, ecosystems, and human health.

In May 2014, the USGCRP issued a report, *Climate Change Impacts in the United States*, summarizing the impacts that climate change has already had on the United States and what projected impacts climate change may have in the future (USGCRP, 2014). The report includes a breakdown of overall impacts by resource and impacts described for various regions of the United States. Although climate change is a global concern, for this cumulative analysis, we will focus on the potential cumulative impacts of climate change in the NEXUS and TEAL Project areas.

The USGCRP's report notes the following observations of environmental impacts with a high or very high level of confidence that may be attributed to climate change in the Midwest region:

- Average temperatures have risen about 1.5 °F between 1900 and 2010 and are projected to increase another 4 to 5 °F over the next several decades;
- an increase in health risks due to projected additional heat stress and poor air quality;
- the agricultural crop growing season has lengthened since 1950 and is projected to continue lengthening due to the earlier occurrence of the last spring freeze, potentially increasing crop production in the short term;
- increased temperature stress, wetter springs, and the continued occurrence of springtime cold air outbreaks are projected may reduce crop yields overall in the long term (particularly corn and soybeans);
- a change in range and/or elevation is projected for many tree species with potential declines in paper birch, quaking aspen, balsam fir, and black spruce and increases in oaks and pines;

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[17] The following departments comprise the USGCRP: the EPA, DOE, U.S. Department of Commerce, U.S. Department of Defense, USDA, U.S. Department of the Interior, U.S. Department of State, PHMSA, Department of Health and Human Services, National Aeronautics and Space Administration, National Science Foundation, Smithsonian Institution, and Agency for International Development.

- tree species in flat terrain may have difficulty migrating the long distances needed to reach temperatures suitable for the species, resulting in some potential decline in forests;

- increased insect outbreaks, forest fires, and drought may result in increased tree mortality and the reduction in beneficial carbon sinks;

- annual precipitation has increased by about 20 percent over the past century, particularly from increased high-intensity rainfall events, and this trend is projected to continue;

- surface water temperatures in the Great Lakes have increased several degrees between 1968 and 2002, and are projected to increase by about 7 to 12 degrees by the end of the century; and

- increased surface water temperatures, increased precipitation, and longer growing seasons are projected to result in an increase in blue-green and toxic algae in the Great Leaks, harming fish and reducing water quality.

The GHG emissions associated with construction and operation of the NGT and TEAL Projects are discussed in more detail in section 4.12.1.3. GHG emissions from the proposed Projects and other regional projects would not have any direct impacts on the environment in the Projects area. Currently, there is no standard methodology to determine how a project's relatively small incremental contribution to GHGs would translate into physical effects on the global environment.

Conversely, the USGCRP report states that in the Midwest region "per capita GHG emissions are 22 percent higher than the national average due, in part, to the reliance on fossil fuels, particularly coal for electricity generation" (USGCRP, 2014). Natural gas emits less CO_2 compared to other fuel sources (e.g., fuel oil or coal); therefore, the USGCRP report also notes that increased use of natural gas in the Midwest may reduce emissions of GHGs. We find that the Projects, along with other planned natural gas projects in the Midwest region, may result in the displacement of some coal use or encourage the use of lower carbon fuel for new growth areas, thereby regionally offsetting some GHG emissions.

The GHG emissions for construction of the NGT and TEAL Projects are small (less that 0.1 percent) when compared with the U.S. Greenhouse Gas Inventory of 6,873 million metric tons of CO_2e for 2014 (EPA, 2016). The estimated GHG emissions for operation of the NGT and TEAL Projects are also small (less than 0.1 percent) when compared with the U.S. Greenhouse Gas Inventory.

We received comments stating that our climate change analysis should include a lifecycle analysis of the NGT and TEAL Projects. The Commission staff's longstanding practice is to conduct an environmental review for each proposed project, or a number of proposed projects that are interdependent or otherwise interrelated or connected. Actions are "connected" if they: "automatically trigger other actions which may require environmental impact statements;" "cannot or will not proceed unless other actions are taken previously or simultaneously;" or "are interdependent parts of a larger action and depend on the larger action for their justification."[18] NEPA does not, however, require us to engage in speculative analyses or provide information that will not meaningfully inform the decision-making process. Even if we were to find a sufficient connected relationship between the NGT and TEAL Projects and upstream development or downstream end-use, it would still be difficult to meaningfully consider these impacts, primarily because emission estimates would be largely influenced by assumptions rather than direct parameters about the NGT and TEAL Projects. Stakeholders and interested parties should review the U.S. DOE's National Energy Technology Laboratory's May 29, 2014 report *Life Cycle Analysis of Natural Gas Extraction and*

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[18] 40 CFR § 1508.25(a)(1)(i)-(iii).

Power Generation. The report looks at the lifecycle of natural gas from various sources and compares the lifecycle GHG emissions to other fuels used for energy production (most notably coal). The report indicates that, although natural gas may have higher upstream GHG emissions than coal, the total lifecycle GHG emissions from electricity production using natural gas is significantly lower than that of electricity from coal. In addition, emissions of criteria pollutants and HAPs are significantly lower from natural gas combustion than from coal. For a typical (baseload) case, the report indicates that the lifecycle emissions of electricity from natural gas are less than half that of coal.

Based on these factors, we conclude that the NGT and TEAL Projects would not significantly contribute to GHG cumulative impacts.

Noise

The NGT and TEAL Projects could contribute to cumulative noise impacts; however, the impact of noise is highly localized and attenuates quickly as the distance from the noise source increases; therefore, cumulative impacts are unlikely unless one or more of the projects listed in appendix N-1 are constructed at the same time and location. Based on the schedule and proximity of these activities to the pipeline route, there may be some cumulative noise impacts. However, since the majority of noise impacts associated with the projects would be limited to the period of construction and most construction activities would occur during daytime hours and be intermittent rather than continuous, the contribution from the NGT and TEAL Projects to cumulative noise impacts would primarily be for only short periods of time when construction activities are occurring at a given location.

Operation of the NGT and TEAL Projects' compressor stations would result in noise from the engines, gas aftercoolers, utility coolers, fuel gas regulation skids, discharge and suction piping, blowdown vents, engine air intakes, engine exhaust systems, and compressor and engine casings. Based on the analyses conducted and mitigation measures proposed, we conclude that the compressor stations would not result in significant noise impacts on residents, or the surrounding communities during operation as noise levels are expected to be below our 55 dBA L_{dn} requirement, and they are not expected to result in a perceptible noise increase at the nearest NSAs. In addition, NGT and TEAL Projects' operations are not expected to result in a perceptible increase in vibration at any NSA. In order for there to be a cumulative impact, noise associated with the NGT and TEAL Projects and any of those listed in appendix N-1 would have to affect the same NSAs. The closest facilities to the NGT and TEAL Projects (within about 0.5 mile) are transportation (i.e., highway/road work) and pipelines, which would either have temporary noise impacts or no perceptible noise impacts at nearby NSAs. We did not identify locations where compressor stations for the NGT and TEAL Projects would impact the same NSAs as other projects during operation. In addition, construction and operation of other FERC-jurisdictional projects would be required to adhere to similar noise requirements and mitigations measures as the NGT and TEAL Projects.

4.14.8.10 Reliability and Safety

Impacts on reliability and public safety would be mitigated through the use of the DOT Minimum Federal Safety Standards in 49 CFR 192, which are intended to protect the public and to prevent natural gas facility accidents and failures. In addition, NEXUS' and Texas Eastern's construction contractors would be required to comply with OSHA's Safety and Health Regulations for Construction in 29 CFR 1926. No significant cumulative impacts on safety and reliability are anticipated to occur as a result of the NGT and TEAL Projects.

4.14.9 Conclusion

For the NGT and TEAL Projects, the majority of cumulative impacts would be temporary and minor when considered in combination with past, present, and reasonably foreseeable activities; however, some long-term cumulative impacts would occur on wetland and upland forested vegetation and associated wildlife habitats. Short-term cumulative benefits would also be realized through jobs and wages and purchases of goods and materials. There is also potential for contributing to a cumulative improvement in regional air quality if a portion of the natural gas associated with the NGT and TEAL Projects displaces the use of other more polluting fossil fuels.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF THE ENVIRONMENTAL ANALYSIS

The conclusions and recommendations presented in this section are those of the FERC environmental staff. Our conclusions and recommendations were developed with input from the EPA and FWS as cooperating agencies. A cooperating agency may adopt the EIS per 40 CFR 1506.3 if, after an independent review of the document, it concludes that its permitting requirements and/or regulatory responsibilities have been satisfied. However, each cooperating agency would present its own conclusions and recommendations in its respective and applicable record of decision. Otherwise, it may elect to conduct its own supplemental environmental analysis, if necessary.

We determined that construction and operation of the Projects would result in some adverse environmental impacts. Most of these environmental impacts would be temporary or short term during construction and operation, but long-term and potentially permanent environmental impacts on vegetation, land use, visual resources, and air quality and noise would also result from the Projects. However, if the Projects are constructed and operated in accordance with applicable laws and regulations, the mitigation measures discussed in this EIS, and our recommendations, these impacts would be reduced to less than significant levels. This determination is based on a review of the information provided by NEXUS and Texas Eastern and further developed from data requests; field investigations; scoping; literature research; alternatives analysis; and contacts with federal, state, and local agencies, as well as individual members of the public. As part of our review, we developed specific mitigation measures that we determined would appropriately and reasonably reduce the environmental impacts resulting from construction and operation of the Projects. We therefore recommend that our mitigation measures be attached as conditions to any authorization issued by the Commission. A summary of the anticipated impacts and our conclusions is provided below, by resource area.

5.1.1 Geology

The overall effect of the Projects on geologic resources would be minor. Geologic impacts would be limited to disturbance to the existing topography within the Project areas. All areas disturbed during construction, including in rugged terrain, would be returned as closely as possible to preconstruction contours during cleanup and restoration.

The removal of bedrock, including by blasting, may be required if bedrock is encountered within the pipeline trench or at aboveground facility sites. If uncontrolled, blasting could damage nearby pipelines and other structures, and could initiate landslides or ground subsidence over karst features or underground mines. However, blasting events would be designed to break up only the amount of bedrock needed for construction, and impacts on bedrock would be minor and limited to the immediate area of construction. NEXUS and Texas Eastern would comply with all federal, state, and local blasting regulations and have developed *Blasting Plans* that describe the measures that would be implemented to minimize potential blasting-related impacts. We have reviewed the applicants' *Blasting Plans* and find them acceptable. NEXUS and Texas Eastern also would prepare site-specific blasting plans where required by local permit requirements.

We do not anticipate that the Projects would impact active mineral resource operations.

The potential for seismic activity, active faults, or soil liquefaction to adversely affect the Projects is low due to the low probability of significant earthquakes in the area. The facilities would be designed and constructed with modern methods and materials and would be capable of withstanding the low level of ground movement that could occur in conjunction with earthquakes in the area.

The potential for landslides to adversely affect the NGT Project also is low; however, the TEAL Project is in an area of elevated landslide risk. During final design, Texas Eastern has committed to conducting geotechnical investigations to further evaluate landslide risk in areas of steep slopes, and would implement best management practices as outlined in its *E&SCP* to manage surface water and maintain slope stability. We have reviewed the *E&SCP* and found it consistent with our *Upland Erosion Control, Revegetation, and Maintenance Plan* and *Wetland and Waterbody Construction and Mitigation Procedures*. Where the *E&SCP* differed from our plans, we found the modifications acceptable. To ensure landslide risks are appropriately mitigated, Texas Eastern would file the results of the geotechnical studies and final landslide mitigation measures with the Commission for review and approval prior to construction.

There are areas along the NGT Project where a karst hazard may be present; no karst hazards exist along the TEAL Project. NEXUS has routed the NGT Project to avoid known sinkholes and conducted electromagnetic geophysical surveys to identify additional karst. All construction supervisory staff and inspectors would be trained to recognize the signs of sinkhole formation. If previously undocumented karst features are encountered during construction, NEXUS would implement a minor reroute if possible to avoid the feature, or stabilize the feature to avoid further sinkhole development.

Ground subsidence could occur in areas where abandoned underground mines are crossed. NEXUS has routed the NGT Project to avoid all known abandoned underground mines. Texas Eastern has routed the TEAL Project above abandoned underground mines at the same location as its existing facilities, which have been unaffected by mine subsidence. NEXUS would implement additional investigation (and mitigation, if necessary) in the event that a previously undocumented abandoned underground mine is discovered prior to, or during construction.

Flash flooding is a potential hazard in the Project areas. NEXUS and Texas Eastern would bury the pipeline to a depth that would provide at least 5 feet of cover below the existing streambed to minimize impacts from flash flooding, scouring, and high flow velocities. In addition, NEXUS and Texas Eastern would implement the measures in their respective *E&SCPs* to reduce the likelihood of sedimentation and erosion during flash flood events.

With the implementation of NEXUS' and Texas Eastern's *E&SCPs, Blasting Plans*, plans to further evaluate landslide risk, and procedures to be followed in the event of discovery of previously undocumented karst features or abandoned underground mines, we conclude that impacts on geological resources would be adequately minimized.

Paleontological resources in the vicinity of the NGT and TEAL Projects are limited to Pleistocene bones found in glacial sediments. No specific sites containing significant paleontological resources were identified in the NGT and TEAL Project areas, thus impacts on significant paleontological resources would be unlikely.

5.1.2 Soils

The Projects would traverse a variety of soil types and conditions. Construction activities could adversely affect soil resources by causing erosion, compaction, and introduction of excess rock or fill material to the surface, which could hinder restoration. However, the applicants would implement the mitigation measures contained in their respective *E&SCPs* to control erosion, segregate topsoil, enhance successful revegetation, and minimize any potential adverse impacts on soil resources, including any impacts on crop productivity. Additionally, the applicants would implement their respective *SPCC Plans* during construction and operation to prevent and contain, and if necessary clean up, accidental spills of any material that may contaminate soils. Given these measures, we conclude that construction of the

Projects would not significantly alter the soils of the region. We have reviewed the *SPCC Plans* and find them acceptable.

Permanent impacts on soils would mainly occur at the aboveground facilities where the sites would be graveled and converted to industrial use. Implementation of the *E&SCPs*, as well as other Project-specific plans, would adequately avoid, minimize, or mitigate construction impacts on soil resources in the remainder of the area of the Projects. Based on our analysis of the applicants' proposed measures, we conclude that potential impacts on soils would be avoided or effectively minimized or mitigated.

5.1.3 Water Resources

Groundwater

Groundwater resources in the Project areas include unconsolidated glacial, lacustrine, and alluvial deposits or consolidated and partially consolidated bedrock units confined by siltstone, shale, sandstone, limestone, and dolomite bedrock. None of the Projects' facilities would be within SSAs or state-designated aquifers. Construction of the Projects could result in increased turbidity and alteration of flow in shallow aquifers if encountered within trench depth or during grading and excavation at aboveground facilities. These impacts would be minimized by measures included in the applicants' *E&SCP*. An inadvertent release of fuel, lubricants, and other substances would be minimized and mitigated by implementing the applicants' Project-specific *SPCC Plans* that identify contractor training; the use of environmental inspectors; procedures for the safe storage and use of hazardous materials; and remedial actions that would be taken to address a spill.

A total of 245 wells and 6 springs were identified within 150 feet of the Projects. Additionally, the NGT Project would cross 16 wellhead protection areas; the TEAL Project would not cross any wellhead protection areas. To mitigate impacts on wells, springs, and wellhead protection areas, the applicants would offer to conduct pre- and post-construction testing of water quality and yield in all wells within 150 feet of the construction workspace. The applicants would also implement their *SPCC Plans* to avoid, minimize, and mitigate any chemical spills, and would prohibit fueling within 200 feet of a private well and within 400 feet of a public well. In addition, the applicants would repair or replace any wells that are adversely affected, or would otherwise compensate the well owner. We conclude that these measures would be protective of nearby wells and springs.

NEXUS proposes to use the HDD method at 18 locations, whereas Texas Eastern would not use the HDD method. An inadvertent release of drilling mud could occur during drilling operations, affecting groundwater turbidity, which would diminish with time and distance from the point of release. NEXUS would implement measures detailed in its Project-specific *HDD Design Report* and *HDD Monitoring and Inadvertent Return Contingency Plan* to avoid or minimize the inadvertent release of drilling mud. We have reviewed the plans and find that it would be protective of groundwater resources in the NGT Project area.

NEXUS identified 112 sites with known or suspected soil and groundwater contamination within 0.25 mile of the NGT Project. Texas Eastern did not identify any sites within 0.25 mile of the TEAL Project. The majority of these sites were determined to be unlikely to impact groundwater quality beneath the NGT Project. However, we recommend that NEXUS further assess the potential for 11 of the sites to impact groundwater quality beneath the NGT Project and to provide site-specific plans to manage pre-existing contamination, if applicable, to the Commission for our review and approval.

The Projects would not significantly affect groundwater resources because the majority of construction would involve shallow, temporary, and localized excavation. Potential impacts would be avoided or further minimized by the use of construction techniques and mitigation measures described in the applicants' *E&SCPs* and *SPCC Plans*, and NEXUS' *HDD Design Report* and *HDD Monitoring and Inadvertent Return Contingency Plan*, as well as our recommendations.

Surface Waters

The Projects would cross a total of 475 waterbodies (208 perennial, 156 intermittent, 95 ephemeral, 1 named reservoir, 5 ponds, and 5 unclassified). The applicants would use the HDD method to cross waterbodies at 18 locations, including all Section 10 navigable, NRI-designated, and Ohio EPA-designated outstanding and superior water quality streams. The applicants would use the conventional bore method to cross 69 waterbodies. The remaining waterbodies would be crossed using dry (dam-and-pump or flume) and open-cut wet crossing methods. Successful implementation of HDD or bore methods would avoid impacts on waterbodies. Impacts on waterbodies that would be crossed using dry and open-cut wet crossing methods would be minimized by implementing mitigation measures outlined in the applicants' *E&SCPs* and other project-specific plans. We recommend that NEXUS file additional geotechnical feasibility data at several locations prior to beginning HDD construction and also file, in the event of an unsuccessful HDD, contingency crossing plans for these waterbodies, for our review and written approval.

The Projects would cross 12 surface water protection areas and 5 waterbodies that have public water intakes within 3 miles downstream. The applicants would avoid or minimize impacts by implementing the BMPs detailed in each Projects' *E&SCP* and *SPCC Plan*, and the NEXUS Project *Blasting Plan*, if needed, and would use HDD and conventional bore crossing methods for several stream crossings.

The applicants requested use of additional temporary workspace (ATWS) in several areas where it concluded that site-specific conditions do not allow for a 50-foot setback of extra workspace from waterbodies. Based on our review, we believe that NEXUS has provided adequate justification for the need of the ATWS at all locations on the NGT Project. We recommend that Texas Eastern provide further justification for several ATWSs on the TEAL Project, or move the workspaces to a distance of 50 feet or greater from waterbodies.

No long-term effects on surface waters would result from construction and operation of the Project. No designated water uses would be permanently affected. During maintenance activities in or near streams, the applicants would employ protective measures similar to those proposed for construction of the Projects. Consequently, we conclude that any maintenance-related effects would be short term.

Surface Water Uses During Construction

The applicants would use both surface water and water trucks as sources for hydrostatic testing (about 68.3 million gallons), the HDD construction method (about 1.8 million gallons), and dust suppression (amount would be highly variable based on the conditions at the time of construction). The source of water transported by trucks could be from municipal or groundwater sources. Impacts associated with the withdrawal of surface water would be effectively minimized by using pumps placed adjacent to the waterbody with hoses placed into the waterbody with floating intake structures that would be screened to prevent the uptake of aquatic organisms and fish. Additionally, water withdrawals would be conducted in compliance with all necessary permits required for surface water extraction. Discharge of water to upland areas could contribute to erosion, which would be minimized by adhering to the measures contained in the Projects' *E&SCPs*.

Based on the mitigation measures developed by the applicants as described above, as well as our recommendations, we conclude that the Projects would not have a significant adverse impacts on surface water resources.

5.1.4 Wetlands

Construction of the pipeline facilities associated with the Projects would temporarily affect a total of 191.6 acres of wetlands, including 72.4 acres of PFO wetlands, 64.7 acres of PEM wetlands, 28.4 acres of PSS wetlands, 24.1 acres of AG-PEM wetlands, 0.2 acre of PUB wetlands, and 1.7 of PEM/PSS complex wetlands. No wetlands would be permanently filled. Impacts on emergent wetlands would be relatively brief because the emergent vegetation would regenerate quickly, typically within one to three years. Impacts on scrub-shrub and forested wetlands would be long-term or permanent because the woody vegetation would take several years to grow back. Additionally, the applicants would maintain a 10-foot-wide corridor centered over the pipeline in an herbaceous state and would selectively cut trees within 15 feet of the pipeline centerline. Approximately 39.9 acres would be converted from PFO or PSS to PEM or PSS wetland habitat.

Construction and operation-related impacts on wetlands would be mitigated by the applicants. NEXUS would create a project-specific *Wetland Mitigation Plan* in consultation with the USACE, MDEQ, and Ohio EPA, where mitigation would include the purchase of wetland mitigation credits from established wetland mitigation banks, the use of an in-lieu fee program, or a combination of the two. Texas Eastern would create a project-specific *Wetland Mitigation Plan* in consultation with USACE and Ohio EPA. Mitigation would include the purchase of wetland mitigation credits from established wetland mitigation banks, the use of an in-lieu fee program, or a combination of the two. We recommend that each applicant file its final *Wetland Mitigation Plan* with the Commission prior to construction.

The applicants requested use of ATWS in several areas where they concluded that site-specific conditions do not allow for a 50-foot setback of extra workspace from wetlands. Based on our review, we believe that NEXUS has provided adequate justification for the need of the ATWS at all locations on the NGT Project. We recommend that Texas Eastern provide further justification for several ATWSs on the TEAL Project, or move the workspaces to a distance of 50 feet or greater from wetlands.

Based on the types and amounts of wetlands that would be impacted and the applicants' measures to avoid, minimize, and mitigate wetlands impacts as described in their construction and restoration plans, as well as our recommendations, we conclude that impacts on wetlands would be effectively minimized or mitigated. These impacts would be further minimized and mitigated by the applicants' compliance with USACE section 404 and state permit requirements, including the purchase of wetland mitigation credits and use of in-lieu fee programs.

5.1.5 Vegetation

Construction of the Projects would affect 371.5 acres of forested upland, 43.3 acres of forested wetland, 571.8 acres of open upland, 43.8 acres of emergent wetland, and 19.5 acres of scrub-shrub wetland. The remaining 4,202.7 acres are agricultural land, developed land, or open water. Operation of the Projects would affect 148.0 acres of forested upland, 26.7 acres of forested wetland, 154.5 acres of open upland, 21.0 acres of emergent wetland, and 10.0 acres of scrub-shrub wetland. The remaining 1,347.4 acres are agricultural land, developed land, or open water.

Impacts on upland open land, emergent wetlands, and agricultural lands would be short-term as these vegetation cover types would likely return to their pre-construction states within one to three growing seasons after restoration is complete and typically not require maintenance mowing. The exception would be at aboveground facilities where construction would permanently convert existing vegetation cover into an industrial site.

Impacts on forested uplands, forested wetlands, and scrub-shrub wetlands would be long-term or permanent and would constitute the most pronounced change in vegetation strata, appearance, and habitat. Trees would be cleared with the construction area and replaced by herbaceous plants, shrubs, saplings, and other successional species until trees can again flourish, which can take several decades or longer to occur. Regeneration of scrub-shrub wetlands would take two to four years or longer. Forested uplands and wetland would take several more years to grow back. Moreover, the forest land on the permanent right-of-way would be permanently impacted by ongoing vegetation maintenance during operations, which would preclude the re-establishment of trees on the right-of-way. Due to the prevalence of forested habitats within the Project areas, the ability to co-locate the proposed facilities adjacent to existing rights-of-way (46 percent of the route would be co-located), and the eventual regrowth of forested areas outside of the permanent right-of-way, we conclude that the permanent conversion of forested lands would not result in a significant impact. In addition, impacts on forested and non-forested vegetation types would be further mitigated through implementation of the applicants' construction and restoration plans and our recommendations.

The NGT Project would cross approximately 9.7 miles of the Oak Openings Region in Henry and Fulton Counties, Ohio. Roughly 99 percent of the ecosystem has been altered and fragmented by agricultural development, primarily through tree clearing and wetland draining. Botanical surveys confirmed two remnant communities totaling about 0.5 miles in length would be crossed by the NGT Project: the Swamp White Oak-Pin Oak Flatwoods and the Black Oak-White Oak/Blueberry Forest Plant communities. Neither of these areas contained all of the indicative species that would be present in high-quality remnant communities, and most of the clearing would be adjacent to the existing forest edge. Therefore, based on our review, impacts on the Oak Openings Region would be minor.

Construction of the Projects would temporarily impact about 1,049.9 acres of pollinator habitat (including upland forest, forested wetland, upland open land, emergent wetland, and scrub-shrub wetland). The temporary loss of this habitat would increase the rates of stress, injury, and mortality experienced by honey bees and other pollinators. The applicants would revegetate both the temporary workspaces and permanent rights-of-way immediately after the pipeline facilities are installed with herbaceous and riparian seed mixes in consultation with the NRCS. Once revegetated, the restored workspaces and permanent rights-of-way would provide pollinator habitat after the first or second growing season, and may naturally improve pollinator habitat along the Project areas. 21. We recommended prior to construction of the Projects, the applicants shall provide plans describing the feasibility of incorporating plant seeds that support pollinators into the seed mixes used for restoration of construction workspaces.

The applicants have identified several areas where noxious weeds or invasive species are present or are located near the construction right-of-way. NEXUS and Texas Eastern have each developed an *ISMP* to minimize and control the spread of the noxious and invasive species, which we reviewed and find acceptable.

5.1.6 Wildlife and Aquatic Resources

The Projects could have both direct and indirect impacts on wildlife species and their habitats, including the displacement of wildlife, potential individual mortality, and reduction in habitat. Forest fragmentation would increase in certain locations due to clearing, thus reducing the amount of habitat available for interior forest species (i.e. movement and dispersal corridors). With habitat conversion and forest fragmentation, there is also a risk of intrusion by invasive or noxious species. To minimize wildlife impacts, the applicants have routed the pipelines to avoid a number of sensitive areas, co-locate with existing rights-of-way where practical, and reduce workspace in wetlands and interior forest areas. The applicants also would adhere to their *E&SCPs* and respective *Invasive Species Management Plans*.

A variety of migratory bird species, including Birds of Conservation Concern, are associated with the habitats that would be affected by the Projects. NEXUS has prepared a draft *Migratory Bird Conservation Plan* in coordination with the FWS Region 3 office for portions of the NGT Project in Michigan. The purpose of the plan is to reduce direct and indirect effects on migratory birds and their habitats. We recommend that NEXUS provide final *Migratory Bird Conservation Plans* for both Michigan and Ohio facilities prior to construction. During operations, the applicants would avoid mortalities or injuries of breeding birds and their eggs or young by conducting vegetation clearing and maintenance activities outside of the breeding season to the extent practicable, particularly in key habitat areas. Vegetative maintenance in the permanent right-of-way would take place no more than once every 3 years, and impacts on ground-nesting birds in upland areas would be minimized by conducting maintenance activities outside the nesting season (March 31 to August 1).

The Projects would involve 465 waterbody crossings, many of which support fisheries and aquatic habitat. All of the waterbodies are classified as warmwater fisheries. Construction and operation the Projects could result in temporary and permanent impacts on fisheries and aquatic habitat, including increasing sedimentation and turbidity, alteration or removal of instream and stream bank cover, stream bank erosion, introduction of water pollutants, water depletions, and entrainment of small fishes during water withdrawals resulting. These impacts could indirectly increase stress, injury, and mortality of stream biota. The degree of impact on fisheries from construction activities would depend on the waterbody crossing method, the existing conditions at each crossing location, the restoration procedures and mitigation measures employed, and the timing of construction. To minimize impacts on fisheries and aquatic habitat, the applicants would follow their respective *E&SCPs*. Further, all waterbodies identified as fisheries of concern (potentially containing federal or state-listed species) would be crossed using dry crossing methods or HDDs. Based on our review of the potential impacts, we conclude that construction and operation of the Projects would not significantly impact fisheries or aquatic resources.

Based on the presence of suitable adjacent habitat available for use and given the impact avoidance, minimization, and mitigation measures proposed by NEXUS, as well as our recommendations, we conclude that the construction and operation of the Projects would not have a significant adverse effect on wildlife or aquatic species.

5.1.7 Threatened, Endangered, and Other Special Status Species

To comply with section 7 of the ESA, we consulted either directly or indirectly (through the applicants' informal consultation) with the FWS and state resource agencies regarding the presence of federally listed, proposed for listing, or state-listed species in the Project areas. Based on these consultations, we identified 11 federally listed or proposed species as potentially occurring in the Project areas. We determined that the northern riffleshell, the snuffbox mussel, Mitchell's satyr butterfly, the Poweshiek skipperling, the Karner blue butterfly, and the eastern prairie fringed orchid would not be affected by construction and operation of the Projects. We also determined that the Projects may affect, but would not likely adversely affect the Indiana bat, Kirtland's warbler, the rayed bean mussel, and the eastern massasauga rattlesnake. The Projects may affect, and are likely to adversely affect the northern long-eared bat; however, under the current 4(d) rule, incidental take of this species is not prohibited.

The Indiana bat and the northern long-eared bat are known to occur in the Project areas. Portal surveys to identify hibernacula for both the Indiana bat and northern long-eared bat were conducted in 2015. No portals were identified during the surveys for either species, and therefore, no potential hibernacula would be affected by the Projects. Mist-net surveys for the Indiana bat also were conducted in 2015; no Indiana bats were detected during the summer presence/absence surveys, demonstrating probable absence of Indiana bats in these portions of the NGT Project area. Mist-net surveys were conducted for the northern long-eared bat in 2015; four northern long-eared bats were captured and radio-tagged; telemetry surveys successfully tracked three of the bats to roost trees. NEXUS would utilize the final 4(d) rule for the northern long-eared bat in the event that winter clearing timelines cannot be adhered to, and would institute the summer clearing restrictions as defined in the final 4(d) rule. NEXUS is preparing an Applicant Prepared Biological Assessment (APBA) as a contingency for adjustments to construction schedules and constraints regarding access to properties, and in the event the 4(d) rule is no longer applicable for the northern long-eared bat due to pending legal challenges. The APBA would define anticipated impacts to both Indiana bats and northern long-eared bats in the event that spring and/or summer clearing may be required, and would provide the data necessary for the FWS to calculate levels of take for both species. We recommend that NEXUS continue Section 7 consultations with the FWS and file all results of its consultation with the Commission for review prior to construction.

The Kirtland's warbler migrates through Ohio and primarily utilizes areas within 3 miles of the Lake Erie lakeshore. The NGT Project falls over three miles from Lake Erie, and therefore, impacts onthis species are expected to be minimal.

The rayed bean mussel is known to occur in the vicinity of the Project facilities. NEXUS conducted mussel surveys for this species in waterbodies crossed by the NGT Project in fall of 2015. Surveys identified both shell fragments and live individuals of the rayed bean mussel at one waterbody. NEXUS anticipates avoiding impacts at this location by using the HDD crossing method. Any potential impacts from inadvertent releases of drilling mud during the HDD activities would be minimized by the implementation of NEXUS' *HDD Monitoring and Inadvertent Return Contingency Plan*.

The eastern massasauga rattlesnake is currently proposed for listing under the ESA. The applicants performed a desktop analysis to identify potentially suitable habitat. No areas of potentially suitable habitat were found in Ohio; ten sites were identified along the NGT Project route in Michigan. Field surveys in 2015 confirmed that two of these sites provided suitable massasauga habitat. Presence/absence surveys conducted in the fall of 2015 did not identify any individuals; spring emergence surveys are planned for early 2016. We recommend that prior to construction of the NGT Project, NEXUS should file with the Secretary the 2016 survey results and any mitigation measures developed in consultation with the FWS for the eastern massasauga rattlesnake.

The bald eagle retains federal protection under the Bald and Golden Eagle Protection Act and the MBTA, which prohibit the taking of eagles, their eggs, or their nests. NEXUS conducted aerial bald eagle nest surveys along the NGT Project route in spring 2015. No bald eagle nests were identified within 660 feet of the NGT Project area; therefore, no impact on bald eagles is anticipated. However, we recommend that prior to construction, NEXUS should conduct additional bald eagle nest surveys to determine if any new eagle nests are present within 660 feet of the construction workspace.

A total of 91 state-listed species may occur in the Project areas. Seventy-seven species are listed at the state level only; 11 species are also listed as federally protected and are discussed above, while 3 are listed as federally protected, but are not present in the Project areas). Of these species, 58 species either do not have suitable habitat within the Project areas or have habitat would be avoided by implementing special construction techniques (e.g., HDD). For the remaining 19 species, the applicants have proposed measures to reduce habitat and species impacts, and continue to consult with resource agencies to identify and develop additional conservation and mitigation measures to further minimize impacts on state-listed species. State permitting agencies have further opportunity during their permit review and authorization processes to require additional conservation and mitigation measures that would further protect and conserve sensitive species and their habitats according to each agencies' mission and conservation goals.

Although a number of other candidate, state-listed, or special concern species were identified as potentially present in the Project areas, none were detected during surveys and we do not expect any adverse effects given the applicants' proposed measures and our recommendations. Based on implementation of these measures and our recommendations, we conclude that impacts on special-status species would be adequately avoided or minimized.

5.1.8 Land Use, Recreation, and Visual Resources

Construction of the Projects would affect a total of 5,223.7 acres of land. About 85.6 percent of this acreage would be utilized for the pipeline facilities, including the construction right-of-way (59.1 percent) and additional temporary workspace (26.5 percent). The remaining acreage affected during construction would be associated with contractor yards (4.5 percent), staging areas (0.9 percent), new and modified aboveground facilities (7.7 percent), and access roads (1.3 percent). During operation, the new permanent pipeline right-of-way, aboveground facilities, and permanent access roads would affect 1,741.9 acres of land.

The land retained as new permanent right-of-way would generally be allowed to revert to its former use, except for forest/woodland and tree crops. Certain activities, such as the construction of permanent structures or the planting of trees, would be prohibited within the permanent right-of-way. To facilitate pipeline inspection, operation, and maintenance, the entire permanent right-of-way in upland areas would be maintained in an herbaceous vegetated state. This maintained right-of-way would be mowed no more than once every 3 years, but a 10-foot-wide strip centered over the pipeline might be mowed more frequently to facilitate corrosion and other operational surveys.

The NGT Project's proposed construction work area is within 50 feet of 178 structures including 15 residences and/or their associated structures. The TEAL Project is not within 50 feet of any structure. NEXUS has developed site-specific residential construction plans for the residential structures within 50 feet of the construction work area. We reviewed these plans and find them acceptable. However, we are encouraging the owners of each of these residences to provide us comments on the plan specific for their property (see appendix E-5). Also, to further minimize effects on residences, we recommend that for all residences located within 10 feet of the construction work area, NEXUS provide evidence of landowner concurrence with the site-specific residential construction plans. NEXUS has also developed an *Issue Resolution Plan* that identifies how stakeholders can contact pipeline company representatives with questions, concerns, and complaints prior to, during, and after construction. We have reviewed this plan and find it acceptable.

Sixty-two planned or ongoing residential and commercial/industrial development projects have been identified within 0.25 mile of the proposed NGT Project facilities. We recommend that NEXUS continue discussions with landowners/developers and file updated correspondence with the Commission prior the end of the draft EIS comment period for review and approval. No planned or ongoing residential or commercial/industrial development projects were identified within 0.25 mile of the proposed TEAL Project facilities.

Construction of the Projects would affect a total of 4,016.3 acres of agricultural land, and 1,331.8 acres would be retained during operation of the Project. Agricultural land in the construction rights-of-way would generally be taken out of production for one growing season and would be restored to previous use following construction (except fruit and tree crops). NEXUS would provide agricultural monitors that would be on site to monitor construction activities within agricultural lands.

NEXUS developed a *Drain Tile Mitigation Plan*, which provides a general overview of the types of drain tile systems potentially encountered during construction, and describes NEXUS' drain tile mitigation strategy during pre-construction, construction, and post-construction. If drain tiles are damaged during construction, temporary repairs would be conducted immediately and permanent repairs would be completed following construction. Repairs and restoration to these systems conducted by NEXUS would be monitored for three years, or until restoration is considered successful, to ensure the system functions properly. We have reviewed this plan and find it acceptable.

The NGT Project crosses four certified organic farms and several specialty crop lands. The TEAL Project does not cross any certified organic farms or specialty crop lands. We recommend that NEXUS develop *Organic Farm Protection Plans* in coordination with organic farm landowners and applicable certifying agencies for each certified organic farm that would be crossed or be within 1.0 mile of the NGT Project that has the potential to experience direct and indirect effects as a result of construction or operation (e.g., pesticide drift, water migration, weeds). Operation of the NGT Project would affect 96.8 acres of specialty crops. NEXUS would compensate landowners for any project-related damages and lost production on organic farms and specialty crop lands.

The NGT Project crosses several parcels of land enrolled in the Current Agricultural Use Value program, the Ohio Forest Tax Law program, or are protected by conservation easements. The NGT Project also crosses a number of areas enrolled in a variety of Farm Service Agency (FSA) enrolled land including CRP/CREP lands. On program lands where tree clearing is necessary, NEXUS would reimburse the landowner the fair market value for any loss of crop or timber for any area disturbed due to the construction of the pipeline. Also, NEXUS would work with landowners and local program officials to determine how the crossing of enrolled lands by the NGT Project affects the continued participation in the program by landowners. Because the information is pending, we recommend that Texas Eastern file with the Commission for review and approval prior the end of the draft EIS comment period a list by milepost of the CRP lands that would be crossed by the TEAL Project, identify construction and operation impacts (acres), and identify mitigation measures specific to each CRP parcel crossed.

The NGT Project would directly affect numerous trails, conservation and recreation areas, sports facilities, state parks and forests, nature and heritage areas, municipal parks, and federal- and state-designated recreation areas. The TEAL Project would not cross or be located within 0.25 mile of any public or private lands that support recreation or special interests. In general, effects of the NGT Project on recreational and special interest areas would be temporary and limited to the period of active construction, which typically lasts several days to several weeks in any one area. These effects would be minimized by implementing the measures in NEXUS' *E&SCP* and site-specific crossing plans, and working with the landowners of the recreational and special interest areas to avoid, minimize, or mitigate impacts on these areas. In addition, NEXUS would continue to consult with the owners and managing agencies of recreation and special interest areas regarding the need for specific construction mitigation measures. While NEXUS has provided site-specific crossing plans for some recreational and special interest areas, similar plans have yet to be provided for trails (land and waterway) where closure would be required during construction. We recommend that NEXUS file with the Commission for review and approval prior to the end of the draft EIS comment period, site-specific crossing plans for trails (land and waterway) that would be closed during construction that shows where a detour or portage would be placed, shows where signage would be placed warning recreationalists of the detour or portage, and provide documentation that the plan was developed in coordination with the landowner or land-managing agency.

Portions of the NGT Project are subject to a federal Coastal Zone Consistency Review in Ohio; designated coastal zones in Michigan would not be affected. Because a consistency determination has not yet been received, we recommend that NEXUS file documentation with the Commission for review and approval prior to construction of concurrence from the ODNR that the NGT Project is consistent with the Coastal Zone Management Act.

The NGT Project would be within 0.25 mile of 112 sites listed as potential or known sources of contamination and hazardous wastes. There are no properties within 0.25 mile of the TEAL Project facilities that are listed as potential or known sources of contamination. In the event that construction activities encounter contaminated or hazardous wastes, NEXUS would implement its *Hazardous Waste Management Plan*, which includes measures that it would implement in the event contaminated media is encountered during construction. We have reviewed this plan and find it acceptable. The NGT Project would cross one site, the former Willow Run Powertrain Plant (also referred to as the Revitalizing Auto Communities Environmental Response (RACER) Trust site), for approximately 0.8 mile. The site is managed under the EPA's Resource Conservation Recovery Act and remediation is overseen by the Michigan Department of Environmental Quality (MDEQ). To avoid impacting the site and encountering contaminated media, NEXUS is proposing to cross under the site using the HDD method.

Impacts on visual resources would be greatest where the pipeline routes parallel or crosse roads and the pipeline rights-of-way may be seen by passing motorists; from residences where vegetation used for visual screening or for ornamental value is removed; and where the pipelines are routed through forested areas. A portion of pipelines (about 45 percent) would be installed within or parallel to existing rights-of-way. As a result, the visual resources along this portion of the Projects have been previously affected by other similar activities. In other areas, the visual effects of construction in forests would be permanent on the maintained right-of-way where the regrowth of trees would not be allowed, and would be long term in the temporary workspaces. After construction, all disturbed areas, including forested areas, would be restored in compliance with NEXUS and Texas Eastern's *E&SCP*s; federal, state, and local permits; landowner agreements; and easement requirements. Generally this would include seeding the restored areas with grasses and other herbaceous vegetation, after which trees would be allowed to regenerate within the temporary workspaces.

Visual effects also would occur at rivers, trails, railroads, roads, and historic properties that are valued for their scenic quality. These include the Maumee River, North Country National Scenic Trail, Cuyahoga Valley Scenic Railroad, America's Byway, Lincoln Highway Historic Byway, Maumee Valley Scenic Byway, and the Abbott-Page house. Visual impacts on these areas would be minimized by co-location with an existing corridor or use of HDD or bore construction method.

NEXUS has designed aboveground facilities to preserve existing tree buffers within purchased parcels to the extent practicable. To further mitigate visual impacts, NEXUS would install perimeter fences, directionally controlled lighting, and slatted fencing at its compressor station sites. Several residents expressed concern about the visual impacts of the Hanoverton, Wadsworth, and Waterville compressor stations. Therefore, we recommend that NEXUS develop visual screening plans for these stations and that the plans be filed with the Commission for review and approval prior to the end of the draft EIS comment period.

5.1.9 Socioeconomics

Construction of the Projects would not have significant adverse impacts on local populations, housing, employment, or the provision of community services. There would be temporary increases in demand for housing such as hotels, motels, and other rental units due to the influx of construction workers. Also, there would be temporary increases in traffic levels due to the commuting of the construction workforce to the areas of the Projects, as well as the movement of construction vehicles and delivery of equipment and materials to the construction right-of-way. To address and mitigate traffic impacts related to in-street construction, NEXUS and Texas Eastern would coordinate with local officials to avoid traffic interruptions and ensure the safety of pedestrians, motorists, and emergency vehicles in the Project areas.

We received comments concerning the potential effect of the Projects on property values, mortgages, and property insurance. We assessed available studies regarding property values and have not been able to document adverse effects of pipelines on property values, mortgages, or the ability of landowners to obtain mortgages for similar projects. In addition, we have no insurance industry data to suggest that the Projects would adversely affect homeowners' insurance rates, the ability to acquire a new homeowner's insurance policy, or that insurance policies would be discontinued due to the presence of a natural gas pipeline on a property.

We received comments expressing concern about potentially adverse impacts on environmental justice populations in the Project areas. Based on our research and analysis, there is no evidence that the Projects would result in disproportionately high and adverse health or environmental effects on minority or low-income communities.

The long-term socioeconomic effects of the Projects are likely to be beneficial, based on the increase in tax revenues that would accrue in the counties affected by the Projects.

Overall, we conclude that the Projects would not have a significant adverse effect on the socioeconomic conditions of the Project areas.

5.1.10 Cultural Resources

NEXUS and Texas Eastern conducted archival research and archaeological and architectural resource surveys for the Projects to identify previously recorded historic aboveground resources and locations with the potential for prehistoric and historic archaeological sites. Surveys have been completed for 85 percent of the NGT Project area and 100 percent of the TEAL Project area.

The applicants identified 178 archaeological sites within the study areas. Of the sites, the applicants recommended 9 as potentially eligible, 165 as not eligible, and 4 were not assessed. The Ohio SHPO provided comments on the Ohio portion of the NGT Project. The Ohio SHPO requested the eligibility of 12 sites be re-assessed and that 2 additional sites are potentially eligible for the NRHP and should be avoided or Phase II site evaluation would be necessary. The Ohio SHPO has not provided comments on the TEAL Project. The Michigan SHPO has not provided comments on the eligibility of the identified resources.

The applicants identified 210 historic architectural properties within the study areas. Of the properties, 3 are NRHP-listed districts, and 5 have been determined eligible. Of the remaining properties, the applicants recommended 34 as eligible or potentially eligible, 167 as not eligible, and 1 was not assessed. The Ohio SHPO provided comments on the Ohio portion of the NGT Project. The Ohio SHPO recommended 13 additional resources for further investigation in order to determine their potential NRHP eligibility. The Ohio SHPO has not provided comments on the TEAL Project. The Michigan SHPO has not provided comments on the eligibility of the identified resources.

Both we and NEXUS consulted with 42 federally recognized Native American tribes, as well as several other non-governmental organizations, local historical societies, historic preservation and heritage organizations, conservation districts, and other potential interested parties to provide them an opportunity to comment on the proposed Projects. TEAL consulted with 8 of the 42 federally recognized Native American tribes that we also contacted. Michigan's Washtenaw County Office of Community and Economic Development requested information on three historic properties within proximity to the NGT

Project. NEXUS confirmed all three properties would not be affected. Several tribes requested additional consultation or information, and the Delaware Nation, Miami Tribe of Oklahoma, and Peoria Tribe of Indians of Oklahoma requested notification if unanticipated discoveries are encountered during construction. The Chippewa-Cree Indians of the Rocky Boy's Reservation responded with a request to be consulted on the NGT Project due to the potential to affect properties of traditional and cultural significance. We will continue to consult with the tribes.

The applicants have planned the Projects to avoid impacting NRHP-eligible resources. If NRHP-eligible resources are identified that cannot be avoided, the applicants would prepare treatment plans. Implementation of a treatment plan would only occur after certification of the Project(s) and after the FERC provides written notification to proceed. Compliance with section 106 of the NHPA has not been completed for the Projects. To ensure that our responsibilities under section 106 of the NHPA are met, we recommend that applicants not begin construction until any additional required surveys are completed, survey reports and treatment plans (if necessary) have been reviewed by the appropriate parties, and we provide written notification to proceed. The studies and impact avoidance, minimization, and measures proposed by NEXUS and Texas Eastern, and our recommendation, would ensure that any adverse effects on cultural resources would be appropriately mitigated.

5.1.11 Air Quality and Noise

Air Quality

Air quality impacts associated with construction of the Projects would include emissions from fossil-fueled construction equipment and fugitive dust. Local emissions may be elevated, and nearby residents may notice elevated levels of fugitive dust, but these would not be significant, and air quality impacts would be temporary and localized. NEXUS and TEAL would implement their respective *Fugitive Dust Control Plans*. We have reviewed this plan and find it acceptable. In nonattainment and maintenance areas, estimated construction emission would not exceed general conformity applicability thresholds.

Operation of the Projects would result in long-term air emissions from stationary equipment (e.g., turbines, emergency generators, and heaters at compressor and M&R stations), including emissions of NO_X, CO, particulate matter, SO_2, VOCs, GHGs (including fugitive methane), and HAPs. The proposed and modified compressor stations and M&R stations would be a minor source of air emissions under federal air quality programs and would not have a significant impact on local or regional air quality.

Commenters requested that all compressor stations associated with the NGT Project be considered a single source with respect to federal air quality permitting. Michigan and Ohio have been delegated authority by the EPA to implement federal air quality regulations. NEXUS and Texas Eastern submitted air quality applications to MDEQ and Ohio EPA in accordance with federal and state requirements.

We received comments expressing concern with public health impacts resulting from operation of the Waterville Compressor Station, including blowdowns. The Waterville Compressor Station, along with all the compressor stations associated with the NGT and TEAL Projects, would be a minor source of air emissions under all federal air quality programs. The station would also comply with the NAAQS, which were established to protect human health. Methane, the primary component of natural gas, would be released during a blowdown event. Blowdown events are infrequent aspects of compressor station operation and can last for several minutes. However, methane is a GHG, which tend to have less localized effects. The estimated GHG emissions are relatively minor, because blowdowns occur infrequently (i.e., not part of normal, everyday operation), and we conclude they would not have a significant impact on air quality or public health.

Based on the analysis in the EIS and compliance with federal and state air quality regulations, we conclude that operational emissions would not have a significant impact on local or regional air quality.

Noise

Noise would be generated during construction of the pipeline and aboveground facilities. Construction noise associated with the pipeline would be spread over the length of the pipeline route and would not be concentrated at any one location for an extended period of time, except at the proposed HDD sites. Construction noise associated with aboveground facilities would be more concentrated in the vicinity of compressor and M&R stations and would extend for several months, but would vary depending on the specific activities taking place at any given time.

At HDD sites, construction activity and noise may be prolonged (several days to several weeks depending on site-specific conditions) and extend overnight. However, significant noise impacts on surrounding NSAs is not expected to be significant because mitigated noise levels attributable to the proposed HDDs are anticipated to be below the FERC 55 dBA L_{dn} sound criterion at all NSAs within a 0.5-mile radius of the HDD entry and exit points. Further, NEXUS indicated that landowners within 0.5 mile of the NGT Project would be notified in advance of planned nighttime HDD construction activities. We further recommend that NEXUS and Texas Eastern file the results of noise measurements for each HDD entry and exit site at the start of drilling operations. If the noise measurements exceed 55 dBA or results in a noise increase greater than 10 dB over ambient levels, NEXUS and Texas Eastern should implement additional mitigation measures to attenuate noise below those levels.

The Projects would likely require blasting in some areas of the proposed route to dislodge bedrock resulting in potential noise and vibration impacts. NEXUS' and Texas Eastern's *Blasting Plans* include mitigation measures related to blasting activity. Blasting would be conducted in accordance with applicable agency regulations, including advance public notification and mitigation measures as necessary.

To ensure that the noise levels during operation of the compressor stations and M&R stations do not exceed the FERC 55 dBA L_{dn} sound criterion, we recommend that NEXUS and Texas Eastern file noise surveys at full load conditions and install additional noise controls if the levels are exceeded.

We received comments regarding the potential for low frequency vibrations from compressor stations to cause or exacerbate health issues. FERC regulations state that a new compressor station or modification of an existing station shall not result in a perceptible increase in vibration at any NSA. This would apply to both the NGT and TEAL Project compressor stations. FERC staff would investigate noise and vibration complaints and, to the extent that a violation is documented, each company would be required to address the issue.

We received comments about potential impacts on residents due to low frequency sounds waves generated by high pressure natural gas flowing through a pipeline. This type of noise is typically associated with reciprocating engines. The proposed compressor units at all compressor stations are turbines, and this issue would not occur.

Based on the analyses conducted, the proposed mitigation measures, and our recommendations, we concluded that construction and operation of the Projects would not result in significant noise impacts on residents and the surrounding environment.

5.1.12 Safety and Reliability

The pipeline and aboveground facilities associated with the Projects would be designed, constructed, operated, and maintained to meet the DOT Minimum Federal Safety Standards in 49 CFR 192 and other applicable federal and state regulations. These regulations include specifications for material selection and qualification; minimum design requirements; and protection of the pipeline from internal, external, and atmospheric corrosion. Each compressor station would be enclosed within a chain-linked fence and equipped with security cameras, an alarm system, ventilating equipment, automatic shutdown systems, and relief valves. Several commenters expressed concern about how the pipeline would be maintained over time and the long-term safety of operations. The DOT rules require regular inspection and maintenance, including repairs as necessary, to ensure the pipeline has adequate strength to transport the natural gas safely. Based on NEXUS' and Texas Eastern's compliance with federal design and safety standards and their implementation of safety measures, we conclude that constructing and operating the pipeline facilities would not significantly impact public safety.

We received several comments about the safety of homes, schools, hospitals, etc., within the potential impact radius for the NGT Project. The potential impact radius for the NGT Project would be 1,100 feet. For the NGT Project compressor stations, the potential impact radius would be 943 feet. DOT safety standards specify more rigorous safety requirements for populated areas and areas where a gas pipeline accident could do considerable harm to people and their property (e.g., near multiple residences, schools, churches, retirement homes, airports). The pipelines and aboveground facilities associated with the Projects must be designed, constructed, operated, and maintained in accordance with these safety standards.

NEXUS would develop a *Public Awareness Program* for its system, which would provide outreach measures to the affected public, emergency responders, and public officials. NEXUS would also mail informational brochures to landowners, businesses, potential excavators, and public officials along the pipeline system each year to inform them of the presence of the pipeline and instruct them on how to recognize and react to unusual activity in the area. Texas Eastern already has a similar program in place.

We received comments regarding the potential for accidents resulting from pipeline leaks, particularly leaks near electric power lines. Pipeline leaks typically occur at valve sites, fittings, etc., where the gas disperses into the atmosphere (e.g., the gas does not accumulate as it would in an enclosed space). As a result, the concentration of gas is not likely to result in impacts on power lines.

5.1.13 Cumulative Impacts

Three types of projects (past, present, and reasonably foreseeable projects) could potentially contribute to a cumulative impact when considered with the proposed Projects. These projects include Marcellus Shale development (wells and gathering systems); FERC-jurisdictional natural gas pipelines; other natural gas facilities that are not under the Commission's jurisdiction; and other actions including electric transmission and generation projects, transportation projects, and residential and commercial developments. The region of influence for cumulative impacts varied depending on the resource being discussed. Specifically, we included:

- minor actions, such as residential development, small commercial development, and small transportation projects within 0.5 mile of the Projects;
- major actions, such as large commercial, industrial, transportation, and energy development projects within 10 miles of the Projects. This includes natural gas well permitting and development projects;

- major actions within watersheds that would be crossed by the Projects; and
- actions with potential to result in longer-term impacts on air quality (for example, natural gas pipeline compressor stations) located within an AQCR crossed by the Projects.

A majority of the impacts associated with the proposed Projects in combination with other projects such as residential developments, wind farms, utility lines, and transportation projects, would be temporary and relatively minor overall, and we included recommendations in the EIS to further reduce the environmental impacts associated with the Projects. However, some long-term cumulative impacts would occur on wetland and forested vegetation and associated wildlife habitats. Also, some long-term cumulative benefits to the community would be realized from the increased tax revenues, jobs, wages, and purchases of goods and materials. Emissions associated with the Projects would contribute to cumulative air quality impacts. There is also the potential, however, that the Projects would contribute to a cumulative improvement in regional air quality if a portion of the natural gas associated with the Projects displaces the use of other more polluting fossil fuels.

We received comments regarding cumulative impacts on Ohio peatlands. Over a 100-year timeframe, impacts from mining and development activities only contributed approximately 3 percent of peatland loss in Ohio. Further, pursuant to 33 CFR 332.3(e)(3), impacts on difficult-to-replace resources (e.g., fens and peatlands) would need to be appropriately mitigated via in-kind methods. We received comments regarding cumulative impacts on Ohio peatlands. NEXUS would implement its *Wetland Mitigation Plan*, which we recommend be filed with the Commission prior to construction. Other projects in proximity to the NGT Project would likely be required to implement similar mitigation measures to minimize wetland impacts. Based on NEXUS' mitigation measures and adherence to its project-specific *E&SCP*, we do not believe there would be a significant cumulative impact on peatlands in Ohio.

We received comments regarding the NGT and TEAL Projects' impacts on climate change. We also received comments stating that our climate change analysis should include a lifecycle analysis of the NGT and TEAL Projects. Currently, there is no standard methodology to determine how a project's relatively small incremental contribution to GHGs would translate into physical effects on the global environment. The GHG emissions for construction and operation of the NGT and TEAL Projects are small (less that 0.1 percent each) when compared with the U.S. Greenhouse Gas Inventory of 6,873 million metric tons of CO_2e for 2014. The Commission staff's longstanding practice is to conduct an environmental review for each proposed project, or a number of proposed projects that are interdependent or otherwise interrelated or connected. NEPA does not, however, require us to engage in speculative lifecycle analyses or provide information that will not meaningfully inform the decision-making process. Stakeholders and interested parties should review the U.S. Department of Energy's National Energy Technology Laboratory's May 29, 2014 report *Life Cycle Analysis of Natural Gas Extraction and Power Generation*. The report looks at the lifecycle of natural gas from various sources and compares the lifecycle GHG emissions to other fuels used for energy production (most notably coal). For a typical (baseload) case, the report indicates that the lifecycle emissions of electricity from natural gas are less than half that of coal.

We received comments concerning the development of natural gas reserves in the Marcellus and Utica Shale. Development of the Marcellus and Utica Shale natural gas resource is not the subject of this EIS nor is the issue directly related to the Projects. Production and gathering activities, and the pipelines and facilities used for these activities, are not regulated by FERC but are overseen by the affected region's state and local agencies with jurisdiction over the management and extraction of the Marcellus Shale gas resource. FERC's jurisdiction is further restricted to facilities used for the transportation of natural gas in interstate commerce and does not typically extend to facilities used for intrastate transportation.

We received comments requesting that we consider cumulative air quality impacts while taking into account the Ohio E-Check requirements. As discussed in section 4.12.1, the E-Check system was established specifically for passenger vehicles and would not be applicable to industrial-type projects.

5.1.14 Alternatives

We evaluated the no-action alternative, system alternatives, major route alternatives, aboveground facility site alternatives, minor route variations, and alternative compressor station locations as alternatives to the proposed action. While the no-action alternative would eliminate the short- and long-term environmental impacts identified in the EIS, the stated objectives of the applicants' proposals would not be met.

Our analysis of system alternatives included an evaluation of whether existing or proposed natural gas pipeline systems could meet the Projects' objectives while offering an environmental advantage. We determined that six existing and three proposed systems potentially could be used in various combinations to transport natural gas to and from the markets served by the Projects. However, none of existing pipelines have capacity available for transporting the required volumes of natural gas proposed by the applicants, nor do they service all the required receipt and delivery points. Consequently, there are no practicable existing or proposed system alternatives that are preferable to the proposed Projects.

During project planning, NEXUS incorporated many route alternatives and variations into its original route. In total, NEXUS adopted a total of 239 route changes totaling about 231 miles (91 percent of the pipeline route) for various reasons, including landowner requests, avoidance of sensitive resources, or engineering considerations. Texas Eastern did not incorporate route alternatives or variations because nearly all the pipeline is loop line.

We evaluated 12 major route alternatives to the proposed pipeline route. We found that none of these would offer a major environmental advantage over the proposed route, and we eliminated them from further consideration. We did not evaluate major route alternatives to the TEAL pipeline route because nearly all the pipeline is loop line and we did not receive stakeholder comments on the loop line route.

We evaluated 17 minor route variations to the proposed pipeline route. We determined that 15 of these minor route variations would not offer an environmental advantage over the proposed pipeline route and eliminated them from further consideration. We concluded that 2 of the minor route variation may have an environmental advantage and recommend that NEXUS complete more work and/or incorporate the variations into its route. We did not evaluate minor route variations to the TEAL pipeline route because nearly all the pipeline is loop line and we did not receive stakeholder comments on the loop line route.

Numerous stakeholders commented that the pipeline should be routed in less populated areas further to the south to minimize the risk of a pipeline incident to the public. DOT safety standards are intended to ensure adequate protection of the public regardless of proximity to development and pipelines must be designed, constructed, operated, and maintained in accordance with these safety standards.

The City of Green submitted an alternative route to the south of the proposed NEXUS pipeline route that would minimize the impacts of the pipeline on development in the vicinity of the city. We conclude that both the proposed route and City of Green Route Alternative are acceptable and recommended that NEXUS file a specific compressor station site for the City of Green Route Alternative. Landowners along the City of Green Route Alternative only recently have been added to the environmental review mailing list. Therefore, we encourage those landowners to provide us additional comments on the proposed route and City of Green Route Alternative during the draft EIS comment period.

NEXUS proposes to construct four new compressor stations, and Texas Eastern proposes to construct one new compressor station. We reviewed two or more alternative sites for each new compressor station and did not find a substantial environmental advantage over the proposed site in any of the cases; therefore, the alternative sites were eliminated from further consideration. We did, however, find both the proposed Hanoverton Compressor Station site and Alternative Site A to the Hanoverton Compressor Station acceptable and recommend that NEXUS file additional information on both sites.

We received comments suggesting that some of the compressor stations should be relocated to less populated area because of concerns about air and noise pollution; however, our analyses concluded that locating the compressor stations at the proposed sites would not have a significant impact on air quality or noise.

Construction and modifications of other aboveground facilities would primarily occur within or directly adjacent to existing facility sites or the pipeline right-of-way and either no new permanent land would be required or no sensitive resources we be affected; therefore, no alternative sites were identified or evaluated.

5.2 FERC STAFF'S RECOMMENDED MITIGATION

If the Commission authorizes the Projects, we recommend that the following measures be included as specific conditions in the Commission's Order. We conclude that these measures would further mitigate the environmental impacts associated with the construction and operation of the Projects. We have included several recommendations that require the applicants to provide updated information and/or documents prior to the end of the draft EIS comment period. We do not expect that the applicants' responses would materially change any of the conclusions presented in this draft EIS; instead, the requested information is primarily related to ensuring that our final EIS is complete with up-to-date information on the applicants' ongoing efforts to minimize the impacts of their Projects and to comply with FERC regulations.

1. The applicants shall follow the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests) and as identified in the EIS, unless modified by the Order. The applicants must:

    a. request any modification to these procedures, measures, or conditions in a filing with the Secretary;

    b. justify each modification relative to site-specific conditions;

    c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and

    d. receive approval in writing from the Director of OEP **before using that modification**.

2. The Director of OEP has delegated authority to take whatever steps are necessary to ensure the protection of all environmental resources during construction and operation of the Projects. This authority shall allow:

    a. the modification of conditions of the Order; and

b. the design and implementation of any additional measures deemed necessary (including stop-work authority) to assure continued compliance with the intent of the environmental conditions as well as the avoidance or mitigation of adverse environmental impact resulting from Projects construction (and operation).

3. **Prior to any construction**, each applicant shall file an affirmative statement with the Secretary, certified by senior company officials, that all company personnel, EIs, and contractor personnel would be informed of the EIs' authority and have been or would be trained on the implementation of the environmental mitigation measures appropriate to their jobs before becoming involved with construction and restoration activities.

4. The authorized facility location(s) shall be as shown in the EIS, as supplemented by filed alignment sheets. **As soon as they are available, and before the start of construction**, the applicants shall file with the Secretary any revised detailed survey alignment maps/sheets at a scale not smaller than 1:6,000 with station positions for all facilities approved by the Order. All requests for modifications of environmental conditions of the Order or site-specific clearances must be written and must reference locations designated on these alignment maps/sheets.

   NEXUS' and Texas Eastern's exercise of eminent domain authority granted under NGA Section 7(h) in any condemnation proceedings related to the Order must be consistent with these authorized facilities and locations. NEXUS' and Texas Eastern's right of eminent domain granted under NGA Section 7(h) does not authorize them to increase the size of their natural gas facilities to accommodate future needs or to acquire a right-of-way for a pipeline to transport a commodity other than natural gas.

5. Each applicant shall file with the Secretary detailed alignment maps/sheets and aerial photographs at a scale not smaller than 1:6,000 identifying all route realignments or facility relocations; staging areas; pipe storage yards; new access roads; and other areas that would be used or disturbed and have not been previously identified in filings with the Secretary. Approval for each of these areas must be explicitly requested in writing. For each area, the request must include a description of the existing land use/cover type, documentation of landowner approval, whether any cultural resources or federally-listed threatened or endangered species would be affected, and whether any other environmentally sensitive areas are within or abutting the area. All areas shall be clearly identified on the maps/sheets/aerial photographs. Each area must be approved in writing by the Director of OEP **before construction in or near that area**.

   This requirement does not apply to extra workspace allowed by the applicants' respective *E&SCPs* and/or minor field realignments per landowner needs and requirements that do not affect other landowners or sensitive environmental areas such as wetlands.

   Examples of alterations requiring approval include all route realignments and facility location changes resulting from:

   a. implementation of cultural resources mitigation measures;

   b. implementation of endangered, threatened, or special concern species mitigation measures;

   c. recommendations by state regulatory authorities; and

   d. agreements with individual landowners that affect other landowners or could affect sensitive environmental areas.

6. **Within 60 days of the acceptance of the Certificate and before construction begins**, the applicants shall file their respective Implementation Plans with the Secretary for review and written approval by the Director of OEP. The applicants must file revisions to their plans as schedules change. The plans shall identify:

   a. how the applicants would implement the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests), identified in the EIS, and required by the Order;

   b. how the applicants would incorporate these requirements into the contract bid documents, construction contracts (especially penalty clauses and specifications), and construction drawings so that the mitigation required at each site is clear to on-site construction and inspection personnel;

   c. the number of EIs assigned per spread and how the company would ensure that sufficient personnel are available to implement the environmental mitigation;

   d. the number of company personnel, including EIs and contractors, who would receive copies of the appropriate material;

   e. the location and dates of the environmental compliance training and instructions the applicants would give to all personnel involved with construction and restoration (initial and refresher training as the Projects progress and personnel change), with the opportunity for OEP staff to participate in the training session(s);

   f. the company personnel (if known) and specific portion of the applicants' organization having responsibility for compliance;

   g. the procedures (including use of contract penalties) the applicants would follow if noncompliance occurs; and

   h. for each discrete facility, a Gantt or PERT chart (or similar project scheduling diagram) and dates for:

      i. the completion of all required surveys and reports;
      ii. the environmental compliance training of on-site personnel;
      iii. the start of construction; and
      iv. the start and completion of restoration.

7. Each applicant shall employ a team of EIs (i.e., two or more or as may be established by the Director of OEP) per construction spread. The EI(s) shall be:

   a. responsible for monitoring and ensuring compliance with all mitigation measures required by the Order and other grants, permits, certificates, or other authorizing documents;

   b. responsible for evaluating the construction contractor's implementation of the environmental mitigation measures required in the contract (see condition 6 above) and any other authorizing document;

   c. empowered to order correction of acts that violate the environmental conditions of the Order, and any other authorizing document;

   - d. a full-time position, separate from all other activity inspectors;
   - e. responsible for documenting compliance with the environmental conditions of the Order, as well as any environmental conditions/permit requirements imposed by other federal, state, or local agencies; and
   - f. responsible for maintaining status reports.

8. **Beginning with the filing of the Implementation Plans**, the applicants shall each file updated status reports with the Secretary on a weekly basis until all construction and restoration activities are complete. On request, these status reports would also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:
   - a. an update on the applicants' efforts to obtain the necessary federal authorizations;
   - b. the construction status of each spread, work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally sensitive areas;
   - c. a listing of all problems encountered and each instance of noncompliance observed by the EIs during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other federal, state, or local agencies);
   - d. a description of the corrective actions implemented in response to all instances of noncompliance, and their cost;
   - e. the effectiveness of all corrective actions implemented;
   - f. a description of any landowner/resident complaints that may relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns; and
   - g. copies of any correspondence received by NEXUS and Texas Eastern from other federal, state, or local permitting agencies concerning instances of noncompliance, and the applicants' response.

9. Each applicant shall develop and implement an environmental complaint resolution procedure. The procedure shall provide landowners with clear and simple directions for identifying and resolving their environmental mitigation problems/concerns during construction of the Projects and restoration of the right-of-way. **Prior to construction**, the applicants shall each mail the complaint procedures to each landowner whose property would be crossed by the Projects.
   - a. In its letter to affected landowners, the applicants shall:
     - i. provide a local contact that the landowners should call first with their concerns; the letter should indicate how soon a landowner should expect a response;
     - ii. instruct the landowners that if they are not satisfied with the response, they should call NEXUS' and Texas Eastern's Hotline; the letter should indicate how soon to expect a response; and

        iii. instruct the landowners that if they are still not satisfied with the response from NEXUS' and Texas Eastern's Hotline, they should contact the Commission's Landowner Helpline at 877-337-2237 or at LandownerHelp@ferc.gov.

    b. In addition, the applicants shall include in their weekly status report a copy of a table that contains the following information for each problem/concern:

        i. the identity of the caller and date of the call;

        ii. the location by milepost and identification number from the authorized alignment sheet(s) of the affected property;

        iii. a description of the problem/concern; and

        iv. an explanation of how and when the problem was resolved, would be resolved, or why it has not been resolved.

10. **Prior to receiving written authorization from the Director of OEP to commence construction of any project facilities**, each applicant shall file with the Secretary documentation that it has received all applicable authorizations required under federal law (or evidence of waiver thereof).

11. Each applicant must receive written authorization from the Director of OEP **before placing its respective Project into service**. Such authorization would only be granted following a determination that rehabilitation and restoration of the right-of-way and other areas affected by the Project are proceeding satisfactorily.

12. **Within 30 days of placing the authorized facilities in service**, each applicant shall file an affirmative statement with the Secretary, certified by a senior company official:

    a. that the facilities have been constructed in compliance with all applicable conditions, and that continuing activities would be consistent with all applicable conditions; or

    b. identifying which of the Certificate conditions the applicant has complied with or would comply with. This statement shall also identify any areas affected by their respective Projects where compliance measures were not properly implemented, if not previously identified in filed status reports, and the reason for noncompliance.

13. **Prior to the end of the draft EIS comment period,** NEXUS should file with the Secretary:

    a. a specific compressor station site on the City of Green Route Alternative between MPs 1.8 and MP 98.7. NEXUS should attempt to avoid or minimize impacts on environmental resources while adequately meeting the requirements of the proposed pipeline system. NEXUS should identify the range of engineering and hydraulic flexibility it has in moving the compressor station site on the route alternative; and

    b. minor route adjustments and realignments to the City of Green Route Alternative in order to minimize impacts on residences, forests, and other environmental resources *(Section 3.3.3)*

14. **Prior to the end of the draft EIS comment period,** NEXUS shall incorporate into the NGT Project route:

a. the Chippewa Lake C Route Variation between MPs 66.1 and 72.5, as depicted in figure 3.4.10-4 of the draft EIS. NEXUS shall file with the Secretary revised alignment sheets and updated land use and resource tables. NEXUS should also provide documentation that newly affected landowners have been notified in accordance with 18 CFR 157.6(d). *(Section 3.4.10)*

b. the Reserve Road Route Variation between MPs 94.6 and 96.0, as depicted in figure 3.4.12-1 of the draft EIS. NEXUS shall file with the Secretary revised alignment sheets and updated land use and resource tables. NEXUS should also provide documentation that newly affected landowners have been notified in accordance with 18 CFR 157.6(d). *(Section 3.4.12)*

15. **Prior to the end of the draft EIS comment period,** NEXUS shall file with the Secretary an analysis indicating:

a. whether the proposed Hanoverton Compressor Station site at MP 1.4 could be developed without permanently filling or altering the waterbody on the site, and if not, the types of permanent waterbody impacts that would be required; and

b. whether Alternative Site A to the Hanoverton Compressor Station, as depicted on figure 3.5.1-1 of the draft EIS, could be purchased and developed without forest clearing, and what impacts would be associated with realigning the proposed pipeline to the site or building suction/discharge lines from the site to the proposed pipeline *(Section 3.5.1)*

16. **Prior to the end of draft EIS comment period,** NEXUS shall file with the Secretary geotechnical feasibility studies for the Nimisila Reservoir (MP 41.1), Tuscarawas River (MP 48.1), West Branch of the Black River (MP 92.4), and the U.S. Highway 12/RACER site (MP 254.3). *(Section 4.3.2.2)*

17. **Prior to the end of the draft EIS comment period,** NEXUS shall file with the Secretary an assessment of why HDD is the preferred crossing method for the Sandusky River (MP 145.9), Maumee River (MP 181.2), and Huron River (MP 250.9), as opposed to an alternative crossing method, such as winter wet trench construction or direct pipe installation. *(Section 4.3.2.2)*

18. In the event of an unsuccessful directional drill, NEXUS should file with the Secretary a plan for the crossing of the waterbody. This should be a site-specific plan that includes scaled drawings identifying all areas that would be disturbed by construction. NEXUS should file this plan concurrent with submission of its application to the USACE for a permit to construct using this plan. The Director of OEP must review and approve this plan in writing **before construction of the crossing.** *(Section 4.3.2.2)*

19. **Prior to the end of the draft EIS comment period,** Texas Eastern shall file with the Secretary additional justification for ATWS-13, 14, 18, 19, 35, 36, and 37 or move those workspaces to a distance of 50 feet or greater from wetlands and waterbodies. *(Section 4.3.2.2)*

20. **Prior to construction of the Projects,** the applicants shall file with the Secretary copies of their final *Wetland Mitigation Plans* including and comments and required approvals from the USACE, MDEQ, and OEPA, as applicable. *(Section 4.4.3.1)*

21. **Prior to construction of the Projects,** the applicants shall provide plans describing the feasibility of incorporating plant seeds that support pollinators into the seed mixes used for restoration of construction workspaces. The plans shall also describe the applicants' consultations with the relevant federal and/or state regulatory agencies. *(Sections 4.5.6.1 and 4.5.6.2)*

22. **Prior to construction of the NGT Project,** NEXUS shall conduct additional bald eagle nest surveys to determine if any new eagle nests are present within 660 feet of the construction workspace. If bald eagle nests are identified within 660 feet of the construction workspace, NEXUS shall consult with the relevant FWS Field Office and file with the Secretary the results of its consultation for review and written approval from the Director of OEP. *(Section 4.6.6.1)*

23. **Prior to construction of the NGT Project,** NEXUS shall file with the Secretary its final MBCPs developed in consultation with the FWS incorporating any additional avoidance or mitigation measures incorporated into the plans. *(Section 4.6.6.2)*

24. **Prior to construction of the NGT Project,** NEXUS shall file with the Secretary 2016 survey results and any mitigation measures developed in consultation with the FWS for the eastern massasauga rattlesnake. *(Section 4.8.1.1)*

25. The applicants shall not begin construction activities **until:**

    a. all outstanding biological surveys have been completed;

    b. the staff receives comments from the FWS regarding the proposed actions;

    c. the staff completes formal consultation with the FWS; and

    d. the applicants have received written notification from the Director of OEP that construction or use of mitigation may begin. (Section 4.8.1.3)

26. **Prior to construction of the Projects,** the applicants shall finalize its results of consultations with the applicable state agencies that identifies any additional mitigation measures for state-protected species in Ohio and Michigan, as applicable. The results of such consultations and any outstanding surveys shall be filed with the Secretary. *(Section 4.8.2)*

27. **Prior to construction of the NGT Project,** NEXUS shall provide updated consultation documentation from FirstEnergy regarding coordination of construction activities where the NGT Project and FirstEnergy's transmission lines would cross. *(Section 4.9.1.1)*

28. **Prior to construction of the NGT Project,** NEXUS shall file with the Secretary, for review and written approval by the Director of OEP, evidence of landowner concurrence with the site-specific residential construction plans for all locations in appendix K-2 of the draft EIS where NGT Project construction work areas would be within 10 feet of a residence. *(Section 4.9.4.1)*

29. **Prior to the end of the draft EIS comment period,** NEXUS shall provide revised *RCPs* that accurately show the distance and direction from the construction workspace and pipeline centerline of all structures on Drawings HANO-P-8004-1B (MP 6.3) and WADS-P-8033-1B (MP 113.2). *(Section 4.9.4.1)*

30. **Prior to Construction of the NGT Project,** NEXUS shall provide an update on consultations with developer(s) regarding development construction timing and any requested mitigation

measures for any planned developments that are crossed by the NGT Project and listed in Appendix K-3 of the EIS. *(Section 4.9.4.2)*

31. **Prior to the end of the draft EIS comment period,** NEXUS shall file with the Secretary site-specific Organic Farm Protection Plans developed in coordination with organic farm landowners and applicable certifying agencies for each certified organic farm that would be crossed or immediately adjacent to the Project that has the potential to experience direct and indirect effects as a result of construction or operation (e.g., pesticide drift, water migration, weeds). The plans shall, at a minimum, identify:

    a. prohibited substances (both during construction and operation);

    b. soil handling procedures;

    c. buffer zones;

    d. noxious invasive species control;

    e. erosion control;

    f. off right-of-way water migration;

    g. restoration methods, including seeding and preventing introduction of disease vectors; and

    h. operation and maintenance practices, including avoidance of herbicides or other agency or landowner approved methods.

    The plan shall also describe how properties would be monitored for compliance with the provisions of the plan (e.g., use of an agricultural monitor) during construction. *(Section 4.9.5.1)*

32. **Prior to the end of the draft EIS comment period,** Texas Eastern shall file with the Secretary a list by milepost of the forest management program or conservation easements that would be crossed by the TEAL Project, along with construction and operation impacts (acres), discussion of mitigation measures specific to each area crossed that Texas Eastern would use to restore the right-of-way and compensate for lost incentives, and discussion of how construction and operation of the TEAL Project would affect landowners' status pertaining to these programs or easements. *(Section 4.9.5.2)*

33. **Prior to the end of the draft EIS comment period**, NEXUS shall file with the Secretary a discussion of how construction and operation of the NGT Project would affect landowners' continued participation in the *Conservation Reserve Program*. *(Section 4.9.5.3)*

34. **Prior to the end of the draft EIS comment period**, NEXUS shall file a revised FSA-enrolled lands table and ensure the table includes the mileposts, tract number, type of program, and acres affected. For any FSA-enrolled lands crossed, provide an update on NEXUS' consultations with landowners and local FSA and NRCS officials regarding the landowners' continued participation in the program, and any requested mitigation measures. *(Section 4.9.5.3)*

35. **Prior to the end of the draft EIS comment period,** Texas Eastern shall file with the Secretary a list of the FSA lands that would be crossed by the TEAL Project by milepost, along with construction and operation impacts (acres), discussion of mitigation measures specific to each

FSA Program parcel crossed that Texas Eastern would use to restore the right-of-way, and discussion of how construction and operation of the TEAL Project would affect landowners' status pertaining to the FSA Program. *(Section 4.9.5.3)*

36. **Prior to construction of the NGT Project,** NEXUS shall file with the Secretary for review and written approval by the Director of OEP, site-specific crossing plans for trails that would be closed during construction that show where a detour or portage would be placed, shows where signage would be placed warning recreationalists of the detour or portage, and provide documentation that the plan was developed in coordination with the landowner or land-managing agency. *(Section 4.9.7)*

37. **Prior to the end of the draft EIS comment period,** NEXUS shall file with the Secretary an evaluation of the feasibility of crossing the Chippewa Rail Trail, Chippewa Inlet Trail, North Coast Inland Trail, and Creek Bend Farm using the bore method. If the bore method is not feasible, NEXUS shall file a site-specific alternate crossing plans that identifies the location(s) of a detour, public notification, signage, and consideration of avoiding days of peak usage. *(Section 4.9.7.3)*

38. **Prior to the end of the draft EIS comment period,** NEXUS shall file with the Secretary an evaluation of the feasibility of extending the bore further west to avoid impacting forest/woodland on the west side of Highway 77. *(Section 4.9.7.3)*

39. **Prior to construction of the NGT Project,** NEXUS shall file with the Secretary a site-specific crossing plan for the NCNST at MP 3.5 that identifies the location(s) of a detour, public notification procedures, signage, and consideration of avoiding days of peak usage. The crossing plan shall be developed in consultation with the landowner and trail managing agencies. *(Section 4.9.7.4)*

40. **Prior to construction of the NGT Project,** NEXUS shall file with the Secretary documentation of concurrence from the ODNR that the NGT Project is consistent with the Coastal Zone Management Act. *(Section 4.9.8)*

41. **Prior to the end of the draft EIS comment period,** NEXUS shall file with the Secretary results of file reviews for the 11 other sites identified by NEXUS and site-specific plans to properly manage any contaminated soil or groundwater in compliance with applicable regulations, if necessary. (Section 4.9.9)

42. **Prior to the construction of the NGT Project,** NEXUS shall coordinate with the landowner(s) near MP 51.2, where the dumping of unknown contaminants occurred, and file with the Secretary a site-specific plan to properly manage any contaminated soil or groundwater in compliance with applicable regulations or demonstrate that a site-specific plan is not needed. *(Section 4.9.9)*

43. **Prior to the end of the draft EIS comment period,** NEXUS shall file with the Secretary visual screening plans developed for the Hanoverton, Wadsworth, and Waterville Compressor Stations that would provide screening to nearby residences from the stations. *(Section 4.9.10.2)*

44. The applicants shall not begin implementation of any treatment plans/measures (including archaeological data recovery); construction of facilities; or use staging, storage or temporary work areas and new or to-be-improved access roads **until**:

a. Texas Eastern files with the Secretary, the Ohio SHPO's comments on the Phase I survey report for the TEAL Project;

b. NEXUS files with the Secretary:

   i. the Michigan SHPO's comments on the Michigan Phase I survey report and Addendum report, and the Ohio SHPO's comments on the Ohio Addendum report;

   ii. documentation addressing the Ohio SHPO's February 1, 2016 comments, and any resulting SHPO comments on the documentation;

   iii. all outstanding survey reports, special studies, evaluation reports, and avoidance/treatment plans; and

   iv. comments on survey reports, special studies, evaluation reports, and avoidance/treatment plans from the Michigan and Ohio SHPOs, as applicable, as well as any comments from federally recognized Indian tribes;

c. the ACHP is afforded an opportunity to comment on the undertaking if historic properties would be adversely affected; and

d. the FERC staff reviews and the Director of OEP approves all cultural resources reports and plans and notifies the applicants in writing that treatment plans/mitigation measures may be implemented and/or construction may proceed.

All material filed with the Commission that contains **location, character, and ownership** information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering "**CONTAINS PRIVILEGED INFORMATION – DO NOT RELEASE**." *(Section 4.11.4)*

45. NEXUS shall file in the **weekly construction status reports** the following for each HDD entry and exit site:

    a. the noise measurements from the nearest NSA for each drill entry/exit site, obtained at the start of drilling operations;

    b. the noise mitigation that NEXUS implemented at the start of drilling operations; and

    c. any additional mitigation measures that NEXUS would implement if the initial noise measurements exceeded an Ldn of 55 dBA at the nearest NSA and/or increased noise is greater than 10 dBA over ambient conditions. *(Section 4.12.2.1)*

46. NEXUS shall file a noise survey with the Secretary **no later than 60 days** after placing the new M&R stations into service. If the noise attributable to the operation of all of the equipment at each M&R station exceeds 55 dBA L_{dn} at the nearest NSA, NEXUS shall file a report on what changes are needed and shall install the additional noise controls to meet the level **within 1 year**

of the in-service date. NEXUS shall confirm compliance with the above requirement by filing a second noise survey for each station with the Secretary **no later than 60 days** after it installs the additional noise controls. *(Section 4.12.2.2)*

47. The applicants shall file noise surveys with the Secretary **no later than 60 days** after placing each of the compressor stations in service. If a full load condition noise survey is not possible, the applicants shall instead file an interim survey at the maximum possible hp load and file the full load survey **within 6 months**. If the noise attributable to the operation of all of the equipment at any station under interim or full hp load exceeds 55 dBA L_{dn} at any nearby NSA, the applicants shall file a report on what changes are needed and shall install the additional noise controls to meet the level **within 1 year** of the in-service date. The applicants shall confirm compliance with the 55 dBA L_{dn} requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. *(Section 4.12.2.2)*

APPENDIX A

DRAFT EIS DISTRIBUTION LIST

Appendix A
Draft EIS Distribution List

Federal Government Agencies

Advisory Council on Historic Preservation, Office of Federal Programs, Charlene D. Vaughn, Assistant Director for Federal Program Development, DC

Council on Environmental Quality, Edward Boling, Associate Director for NEPA Oversight, DC

Council on Environmental Quality, Manisha Patel, Deputy General Counsel, DC

U.S. Army Corps of Engineers, Buffalo District Office, Mark Scalabrino, Ohio Regulatory Cheif, NY

U.S. Army Corps of Engineers, Buffalo District Office, Shawn Blohm, Regulatory Branch Manager, NY

U.S. Army Corps of Engineers, Detroit District, Regulatory Division, Project Manager, MI

U.S. Army Corps of Engineers, Huntington District, Mark Taylor, Chief of Energy Resources, WV

U.S. Army Corps of Engineers, Pittsburgh Districts, Matt Mason, Regulatory Branch, PA

U.S. Army Corps of Engineers, Pittsburgh Districts, Nancy Mullen, Regulatory Branch, PA

U.S. Army Corps of Engineers, Pittsburgh Districts, Tyler Bintrim, Regulatory Branch, PA

U.S. Army Corps of Engineers, Planning and Policy Division, John Furry, Senior Policy Advisor, DC

U.S. Bureau of Indian Affairs, Pamela Snyder-Osmun, EMS/EMAP Program Manager, VA

U.S. Bureau of Indian Affairs, Terry McClung, NEPA Coordinator, DC

U.S. Department of Agriculture, Farm Service Agency, Conservation and Environmental Program Division, Nell Fuller, National Environmental Compliance Manager, DC

U.S. Department of Agriculture, Forest Service – Ecosystem Management Coordination, Joe Carbone, Assistant Director NEPA Ecosystems Management, DC

U.S. Department of Agriculture, National Resources Conservation Service, Andree DuVarney, National Environmental Coordinator, DC

U.S. Department of Energy, Division of Natural Gas Regulatory Activities, John Anderson, Director, DC

U.S. Department of Energy, Office of Environmental Management, Mark Whitney, Principal Deputy Assistant Secretary, DC

U.S. Department of Energy, Office of NEPA Policy and Compliance, Carol M. Borgstrom, Director, DC

U.S. Environmental Protection Agency, NEPA Compliance Division, Cliff Rader, Director, DC

U.S. Environmental Protection Agency, Natural Gas STAR Program, Jerome Blackman, DC

U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance, Cynthia Giles, Assistant Administrator, DC

U.S. Environmental Protection Agency, Office of Federal Activities, Susan E. Bromm, Director, DC

U.S. Environmental Protection Agency, Region 5, Kenneth Westlake, Chief, IL

U.S. Geological Survey, Environmental Branch, Ester Eng, Chief, VA

U.S. Department of Health and Human Services, Edward Pfister, Environmental Program Manager, DC

U.S. Department of Health and Human Services, National Center for Environmental Health, Division of Emergency and Environmental Health Services, Sharunda Buchanan, Director, GA

U.S. Department of Homeland Security, U.S. Customs and Boarder Protection, Christopher Oh, Branch Chief, DC

U.S. Department of Housing and Urban Development, Office of Environment and Energy, Danielle Schoop, Community Planner, DC

U.S. Department of the Interior, Bureau of Land Management, Division of Decision Support, Planning and NEPA, Kerry Rogers, Senior NEPA Specialist, DC

U.S. Department of the Interior, Bureau of Ocean Energy Management, Division of Environmental Assessment, James Bennet, Chief, VA

U.S. Department of the Interior, Bureau of Safety and Enviornmental Enforcement, Environmental Enforcement Division, Charles Barbee, Chief, VA

U.S. Department of the Interior, Fish and Wildlife Service, East Lansing Field Office, Burr Fisher, Fish and Wildlife Biologist, MI

U.S. Department of the Interior, Fish and Wildlife Service, East Lansing Field Office, Chris Mensing, Fish and Wildlife Biologist, MI

U.S. Department of the Interior, Fish and Wildlife Service, Michigan Field Office, Fish and Wildlife Biologist, MI

U.S. Department of the Interior, Fish and Wildlife Service, Midwest Region, Lynn Lewis, Assistant Regional Director, MN

U.S. Department of the Interior, Fish and Wildlife Service, Ohio Field Office, Angela Boyer, Endangered Species Coordinator, OH

U.S. Department of the Interior, National Park Service, Midwest Region, Mark Weekly, Deputy Regional Director, NE

U. S. Department of Justice, Environment and Natural Resources Division, Beverly Li, NEPA Coordinator DC

U.S. Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, Alexander Yuan, Foreign Affairs Officer, DC

U.S. Department of Transportation, Pipeline & Hazardous Materials Safety Administration, Bryn Karaus, Senior Attorney, DC

U.S. Department of Transportation, Pipeline & Hazardous Materials Safety Administration, Engineering and Research Divison, Kenneth Y. Lee, Director, DC

U.S. Department of Transportation, Pipeline & Hazardous Materials Safety Administration, Magdy El-Sibaie, Associate Administrator for Hazardous Materials Safety, DC

Appendix A
Draft EIS Distribution List

U.S. Department of Transportation, Pipeline & Hazardous Materials Safety Administration, Office of Pipeline Safety, Karen Lynch, National CATS Coordinator, DC

U.S. Department of Transportation, Pipeline & Hazardous Materials Safety Administration, Jeffrey Wiese, Associate Administrator for Pipeline Safety, DC

U.S. Department of Transportation, Pipeline & Hazardous Materials Safety Administration, Sherri Pappas, Senior Assistant Chief Counsel, DC

U.S. Department of Transportation, Pipeline & Hazardous Materials Safety Administration – Eastern Regional Office, Karen Gentile, NJ

U.S. Department of Transportation, Pipeline & Hazardous Materials Safety Administration, Engineering and Research Divison, Kenneth Y. Lee, Director DC

U.S. Department of Transportation, Surface Transportation Board, Section of Environmental Analysis, Victoria Rutson, Chief, DC

U.S. Department of Transportation, Pipeline & Hazardous Materials Safety Administration – Central Regional Office, Harold Winnie, Community Assistance and Technical Services Program Manager, MO

U.S. Department of Transportation, Office of Assistant Secretary for Transportation Policy, Camille Mittelholtz, Environmental Policy Team Coordinator, DC

U.S. Department of Transportation, Office of Assistant Secretary for Transportation Policy, Helen Serassio, Senior Environmental Attorney Advisor, DC

U.S. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Steve Leathery, National NEPA Coordinator, DC

U.S. National Oceanic and Atmospheric Administration, NEPA Policy and Compliance, Steve Kokkinakis, DC

U.S. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Donna Wieting, Director, Office of Protected Resources, DC

U.S. National Park Service, Enviornmental Planning and Compliance Branch, Patrick Walsh, Chief, CO

U.S. Senate Committee on Energy and Natural Resources, Lisa Murkowski, Chairwoman

Federal Representatives and Senators

U.S. House of Representatives, Representative Deborah Dingell

U.S. House of Representatives, Representative Bill Johnson

U.S. House of Representatives, Representative Bob Gibbs

U.S. House of Representatives, Representative Bob Latta

U.S. House of Representatives, Representative Jim Jordan

U.S. House of Representatives, Representative Jim Renacci

U.S. House of Representatives, Representative Tim Ryan

U.S. House of Representatives, Representative Tim Walberg

U.S. Senate, Senator Rob Portman

U.S. Senate, Senator Debbie Stabenow

U.S. Senate, Senator Sherrod Brown

Elizabeth Thames, Deputy State Director, Office of Senator Sherrod Brown

Jeanne Wilson, Office of Senator Sherrod Brown

Sarah Lowry, Office of Senator Sherrod Brown

Native American Tribes

George Blanchard, Governor, Absentee-Shawnee Tribe of Indians of Oklahoma

Joseph Blanchard, Cultural Preservation Director Tribal Historic Preservation Officer, Absentee-Shawnee Tribe of Indians of Oklahoma

Edith Leoso, Tribal Historic Preservation Officer, Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation

Michael Wiggins, Chairman, Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation

Levi Carrick, Sr., Chairman, Bay Mills Indian Community

Paula Carrick, Tribal Historic Preservation Officer, Bay Mills Indian Community

Kevin Leecy, Chairman, Bois Forte Band (Nett Lake) of the Minnesota Chippewa Tribe

Rosemary Berens, Tribal Historic Preservation Officer, Bois Forte Band (Nett Lake) of the Minnesota Chippewa Tribe

Alvin Windy Boy, Tribal Historic Preservation Officer, Chippewa-Cree Indians of the Rocky Boy's Reservation

Bruce Sunchild, Chairman, Chippewa-Cree Indians of the Rocky Boy's Reservation

John Barrett, Chairman, Citizen Potawatomi Nation

Kelli Mosteller, Tribal Historic Preservation Officer, Citizen Potawatomi Nation

C.J. Watkins, Vice President, Delaware Nation

Clifford Peacock, President, Delaware Nation

Nekole Alligood, Cultural Preservation Director, Delaware Nation

Tamara Francis-Fourkiller, Cultural Preservation Director, Delaware Nation

Dr. Brice Obermeyer, Director, Delaware Tribe of Indians

Paula Pechonick, Chief, Delaware Tribe of Indians

Glenna J. Wallace, Chief, Eastern Shawnee Tribe of Oklahoma

Robin Dushane, Tribal Historic Preservation Officer, Eastern Shawnee Tribe of Oklahoma

Karen Driver, Chairwoman, Fond du Lac Band of the Minnesota Chippewa Tribe

LeRoy Defoe, Tribal Historic Preservation Officer, Fond du Lac Band of the Minnesota Chippewa Tribe

Appendix A
Draft EIS Distribution List

Harold Frank, Chairman, Forest County Potawatomi

Melissa Cook, Tribal Historic Preservation Officer, Forest County Potawatomi

Mary Ann Gagnon, Tribal Historic Preservation Officer, Grand Portage Band of the Minnesota Chippewa Tribe

Norman Deschampe, Chairman, Grand Portage Band of the Minnesota Chippewa Tribe

Derek J. Bailey, Chairperson, Grand Traverse Band of Ottawa and Chippewa Indians

Kenneth Meshigaud, Chairperson, Hannahville Indian Community

Chris Chosa, Tribal Historic Preservation Officer, Keweenaw Bay Indian Community

Donald Shalifoe, Sr., Ogimaa, Keweenaw Bay Indian Community

Jerry Smith, Tribal Historic Preservation Officer, Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin

Michael Isham, Jr., Chairman, Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin

Melinda Young, Tribal Historic Preservation Officer, Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin

Tom Maulson, President, Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin

Alan Shively, Chairman, Lac Vieux Desert Band of Lake Superior Chippewa Indians

Giiwegiizhigookway Martin, Tribal Historic Preservation Officer, Lac Vieux Desert Band of Lake Superior Chippewa Indians

Carrie Jones, Chairwoman, Leech Lake Band of the Minnesota Chippewa Tribe

Gina Lemon, Tribal Historic Preservation Officer, Leech Lake Band of the Minnesota Chippewa Tribe

David Sprague, Chairman, Match-e-be-nash-she-wish Band of Potawatomi Indians of Michigan

Douglas Lankford, Chief, Miami Tribe of Oklahoma

George Strack, Tribal Historic Preservation Officer, Miami Tribe of Oklahoma

Melanie Benjamin, Chief Executive, Mille Lacs Band of the Minnesota Chippewa Tribe

Natalie Weyaus, Tribal Historic Preservation Officer, Mille Lacs Band of the Minnesota Chippewa Tribe

Norman Deschampe, President, Minnesota Chippewa Tribe

Homer Mandoka, Chairman, Nottawaseppi Huron Band of the Potawatomi

Jeff Chivis, Tribal Historic Preservation Officer, Nottawaseppi Huron Band of the Potawatomi

Ethel Cook, Chief, Ottawa Tribe of Oklahoma

Rhonda Dixon, Tribal Historic Preservation Officer, Ottawa Tribe of Oklahoma

John P. Froman, Chief, Peoria Tribe of Indians of Oklahoma

Matthew J. Wesaw, Chairman, Pokagon Band of Potawatomi Indians

Mike Zimmerman, Tribal Historic Preservation Officer, Pokagon Band of Potawatomi Indians

Liana Onnen, Chairperson, Prairie Band of Potawatomi Nation

Mike Jackson, President, Quechan Tribe of the Fort Yuma Indian Reservation

Larry Balber, Tribal Historic Preservation Officer, Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin

Rose Gurnoe-Soulier, Chairperson, Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin

Floyd Jourdain, Chairperson, Red Lake Band of Chippewa Indians

William Jahnaan, Saganaw Chippewa Indian Tribe of Michigan

Dennis V. Kequom, Chief, Saginaw Chippewa Indian Tribe of Michigan

William Johnson, Curator, Saginaw Chippewa Indian Tribe of Michigan

Aaron Payment, Chairperson, Sault Ste. Marie Tribe of Chippewa Indians of Michigan

Beverly Cook, President, Seneca Nation of Indians

Maurice John, President, Seneca Nation of Indians

Melissa Bach, Tribal Historic Preservation Officer, Seneca Nation of Indians

LeRoy Howard, Chief, Seneca-Cayuga Tribe of Oklahoma

Paul Barton, Tribal Historic Preservation Officer, Seneca-Cayuga Tribe of Oklahoma

Kim Jumpers, Tribal Historic Preservation Officer, Shawnee Tribe

Ron Sparkman, Chairperson, Shawnee Tribe

Garland McGeshick, Chairman, Sokaogon Chippewa Community

Stuart Bearheart, Chairman, St. Croix Chippewa Indians of Wisconsin

Darwin Hill, Chief, Tonawanda Band of Seneca Indians of New York

Roger Hill, Chief, Tonawanda Band of Seneca Indians of New York

Richard McCloud, Chairman, Turtle Mountain Band of Chippewa Indians of North Dakota

Erma Vizenor, Chairman, White Earth Band of Minnesota Chippewa Tribe

Renee Lampi, Tribal Historic Preservation Officer, White Earth Band of Minnesota Chippewa Tribe

Billy Friend, Chief, Wyandotte Nation

Sherri Clemons, Tribal Historic Preservation Officer, Wyandotte Nation

Appendix A
Draft EIS Distribution List

State Representatives and Senators

Michigan House of Represenatives, Representative Adam Zemke

Michigan House of Represenatives, Representative David Rutledge

Michigan House of Represenatives, Representative Nancy Jenkins

Michigan State Senate, Senator Mike Shirkey

Michigan State Senate, Senator Rebekah Warren

Michigan State Senate, Senator Dale Zorn

Ohio House of Represenatives, Representative Andy Thompson

Ohio House of Represenatives, Representative Barbara Sears

Ohio House of Represenatives, Representative Bill Reineke

Ohio House of Represenatives, Representative Christina Hagan-Nemeth

Ohio House of Represenatives, Representative Dan Ramos

Ohio House of Represenatives, Representative Dave Hall

Ohio House of Represenatives, Representative Jack Cera

Ohio House of Represenatives, Representative Marilyn Slaby

Ohio House of Represenatives, Representative Nick Barborak

Ohio House of Represenatives, Representative Ron Amstutz

Ohio House of Represenatives, Representative Steve Hambley

Ohio House of Represenatives, Representative Steven W. Kraus

Ohio House of Represenatives, Representative Terry Boose

Ohio House of Represenatives, Representative Tim Brown

Ohio House of Represenatives, Representative Tim Ginter

Ohio House of Represenatives, Representative Tony DeVitis

Ohio House of Represenatives, Representative Steven Arndt

Ohio House of Represenatives, Representative Timothy Ginter

Ohio House of Represenatives, Representative Robert McColley

Ohio State Senate, Senator Cliff Hite

Ohio State Senate, Senator Frank LaRose

Ohio State Senate, Senator Gayle Manning

Ohio State Senate, Senator Joe Schiavoni

Ohio State Senate, Senator Larry Obhof

Ohio State Senate, Senator Lou Gentile

Ohio State Senate, Senator Randy Gardner

Ohio State Senate, Senator Scott Oelslager

Ohio State Senate, Senator Tom Sawyer

State Agencies

Michigan

Rick Snyder, Governor

Brian Calley, Lieutenant Governor

Michigan Department of Enviornmental Quality, Jackson District Office

Michigan Department of Natural Resources, Wildlife Division

Michigan Department of Transportation, Develoment Services Division

Statewide Coordinator, Right of Way Construction & Utility Permit

Michigan Natural Features Inventory - Michigan State Extension, Rare Species Review Specialist

Michigan Office of Historic Preservation, State Historic Preservation Officer

Ohio

John Kasich, Governor

Mary Taylor, Lieutenant Governor

Ohio Department of Natural Resources, Office of Real Estate, Assistant Chief

Office of Coastal Management, MPA Federal Consistency Administrator

Ohio Department of Transportation, Utility and Railroad Program Manager

Ohio EPA - Northeast Distirct Office

Ohio Office of Historic Preservation, Project Reviews Manager

Department Head, Ohio Turnpike Commission

Appendix A
Draft EIS Distribution List

County Agencies

Michigan

- Lenawee County
  - Board of Commissioners
  - County Administrator
  - Drain Commissioner's Office, Drain Engineer
- Monroe County
  - Board of Commissioners
  - County Administrator
  - Monroe County Chamber of Commerce
- Washtenaw County
  - Board of Commissioners
  - County Administrator
  - Office of Community & Economic Development
  - Historic Preservation Planner
  - Water Resources Commission
  - Soil Erosion Control Officer

Ohio

- Belmont County
  - Board of Commissioners
- Columbiana County
  - Board of Commissioners
  - County Engineer
  - LEPC - Information Coordinator
- Erie County
  - Board of Commissioners
  - Auditor
  - Recorder
  - Engineer
  - Erie Metro Parks
- Fulton County
  - Board of Commissioners
  - Administrator
  - Auditor
  - Engineer
  - Recorder
  - Sheriff
  - Treasurer
  - Health Department
- Henry County
  - Board of Commissioners
- Huron County
  - Board of Commissioners
- Lorain County
  - Board of Commissioners
  - Administrator
  - Engineer
  - Sheriff
  - Metropolitan Park District
  - Board of Park Commissioners
- Lucas County
  - Board of Commissioners
  - Administrator
  - Auditor
  - Engineer
  - Sheriff
  - Treasurer
  - Regional Health District President
- Medina County
  - Board of Commissioners
  - Auditor
  - Economic Development Corporation
  - Engineer Department
- Sandusky County
  - Board of Commissioners
  - Administrator
  - Engineer
  - Recorder
- Sandusky County (*cont'd*)
  - Sheriff
  - Treasurer
  - Sanitary Engineer
  - Board of Park Commissioners
- Stark County
  - Board of Commissioners
  - Administrator
  - County Engineer
  - Park District Operations Manager
- Summit County
  - Council-At-Large

Appendix A
Draft EIS Distribution List

- County Engineer
- County Executive

Wayne County
- Board of Commissioners
- Administrator
- Engineer

Wood County
- Board of Commissioners
- Engineer

- Recorder
- Sheriff

Muskingum Watershed Conservancy District, Chief Engineer

Local Agencies

Augusta Charter Township Resident Advisory Committee
Blissfield Village President
Blissfield Village Clerk
Blissfield Village Tresurer
Blissfield Village Council Trustees
Deerfield Village President
Deerfield Village Clerk
Deerfield Village Treasurer
Deerfield Village Council Trustees
Macon Township Supervisor
Macon Township Trustees
Ogden Township Supervisor
Ogden Township Trustees
Palmyra Township Supervisor
Palmyra Township Trustees
Ridgeway Township Supervisor
Ridgeway Township Trustees
Milan Township Supervisor
Milan Township Trustees
Augusta Township Supervisor
Augusta Township Trustees
York Township Supervisor
York Township Trustees
Ypsilanti Township Treasurer
Ypsilanti Township Trustees
Amboy Township Trustees
Anthony Wayne Local Schools - Superintentent
Berlin Township Board of Trustees
Black Swamp Conservancy - Land Protection Specialist
Chippewa Township Trustees
City of Bowling Green
City of Brunswick, Division of Fire - Fire Chief
City of Doylestown
City of Green Council-At-Large
City of Green - GIS/Planner
City of Green, Parks & Recreation Division - Superintendent
City of New Franklin - Council-At-Large
City of New Franklin - Law Director
City of Oberlin - Council
City of Oberlin - Interim City Manager
City of Waterville - Clerk of Council
Colerain Township - Fiscal Officer
Colerain Township Trustees
East Township Trustees
Erie MetroParks - Attorney
Florence Township Board of Trustees
Franklin Township Trustees
Fulton Township Trustees
Grafton Township Board of Trustees
Groton Township Fiscal Officer
Groton Township Board of Trustees
Guilford Township Trustees
Hanover Township Trustees
Henrietta Township Trustees
Knox Township Trustees
Lafayette Township Board of Trustees
LaGrange Township Trustees
Lake Township Trustees
Litchfield Township Trustees
Marlboro Township Trustees
Middleton Township Trustees
Milan Township Trustees

Appendix A
Draft EIS Distribution List

Milan Township - Fiscal Officer
Montville Township Trustees
Montville Township Officials
New Russia Township Trustees
Nimishillen Township Trustees
Oberlin Public Utilities Commission
Oxford Township Board of Trustees
Pike Township Trustees
Pittsfield Township Trustees
Providence Township Trustees
Riley Township Trustees
Sandusky Township Trustees
Sunbury Township Trustees
Swancreek Township Trustees
Switzerland Township Trustees
Townsend Township Trustees
Troy Township Trustees
Village of Haskins Council
Village of Metamora Council
Village of Waterville Council
Village of Wellington Village Manager
Wadsworth Township Trustees
Washington Township Trustees
Waterville Township Trustees
Webster Township Trustees
Wellington Fire District - Fire Chief
West Township Township Trustees
Woodville Township Trustees
York Township Board of Trustees

Libraries

Lepper Library, Lisbon, OH
Monroe County Public Library, Woodsfield, OH
St. Clairsville Public Library, St. Clairsville, OH
Columbiana Public Library, Columbiana, OH
Stark County District Library - Main Library, Canton, OH
Akron-Summit County Public Library - Main Branch, Akron, OH
Wayne County Public Library - Wooster Main Library, Wooster, OH
Medina County District Library - Main Branch, Medina, OH
Lorain Public Library System - Main Library, Lorain, OH
Huron Public Library, Huron, OH
Sandusky Library, Sandusky, OH
Wood County District Public Library, Bowling Green, OH
Toledo-Lucas County Public Library - Main Library, Toledo, OH
Napoleon Public Library, Napoleon, OH
Wauseon Public Library, Wauseon, OH
Lenawee District Library - Main Branch, Adrian, MI
Monroe County Library System - Ellis Library Branch, Monroe, MI
Ypsilanti District Library - Whittaker, Ypsilanti, MI

Newspapers and Media

Review - East Liverpool, East Liverpool, OH
Canton Repository, Canton, OH
Akron Beacon Journal, Akron, OH
Daily Record - Wooster, Wooster, OH
Cleveland Plain Dealer, Cleveland, OH
Medina Gazette, Medina, OH
Chronicle-Telegram, Elyria, OH
Sentinel Tribune, Bowling Green, OH
Toledo Blade, Toledo, OH
Ann Arbor News, Ann Arbor, MI
Sandusky Register, Sandusky, OH

Landowners, Individuals, and Organizations/Companies

Barbara Holcomb, Adrian, MI
Carey Wood, Adrian, MI
Cindy Ladd, Lenawee County Road Commission, Adrian, MI
Conrad J. Moden, Adrian, MI
Cynthia Parran, Adrian, MI
Dave Craig, Lenawee County Road Commission, Adrian, MI
John Velner, Adrian, MI
Joseph Brezvai, Lenawee County Drain Commission, Adrian, MI
Larry Sayler, Adrian, MI
Mary Alice Naour, Adrian, MI
Patricia Horn, Adrian, MI
Tim Robinson, Lenawee Now, Adrian, MI

Appendix A
Draft EIS Distribution List

O. Ganun, L.L.C., Adrian, MI

The Horn Family Living Trust, Adrian, MI

The Rosann K. Moden Revocable Trust, Adrian, MI

Michael & Joanne Cromley, Afton, MI

John Beaty, Akron, MI

Kathleen Stephenson, Allegan, MI

Resident, Allen Park, MI

Vince Tyszka, Allen Park, MI

William J. Provenzano, Allen Park, MI

Jean Willick, Alpena, MI

Kathy Dunham, Alpena, MI

Heidi Gustafson, Alto, MI

Intervest Properties Inc., Ann Arbor, MI

A. Mervyn & Marilyn Carse, Ann Arbor, MI

Abraham Kayne, Ann Arbor, MI

Adam Williams, Ann Arbor, MI

Amanda Salvner, Ann Arbor, MI

Angela Bumpus, Ann Arbor, MI

Annabelle Herrada, Ann Arbor, MI

Brian K. Tasker, Ann Arbor, MI

Carol Johannes, Ann Arbor, MI

Cheryl Darnton, Ann Arbor, MI

Colette Slade, Ann Arbor, MI

Cynthia Edwards, Ann Arbor, MI

Daniel McCarter, Ann Arbor, MI

David Stone, Ann Arbor, MI

Donald C. Smith Jr. & Basil C. Babcock, The Stacie Lynn Smith Trust, Ann Arbor, MI

Harriet Hancock, Ann Arbor, MI

Isabell Kler, Ann Arbor, MI

Jeffrey Jones, Ann Arbor, MI

Jim Schultz, Ann Arbor, MI

John M. & Beverly Alexander, Life Estate, Ann Arbor, MI

John Posegay, Washtenaw County Road Commission, Ann Arbor, MI

Kristen Bauman, Ann Arbor, MI

Linda Taite, Ann Arbor, MI

Nancy Witter, Ann Arbor, MI

Ned Rollins, Ann Arbor, MI

Patrick L. O'Harris, Ann Arbor, MI

Paula Uche, Ann Arbor, MI

R. Ward Bissell, Ann Arbor, MI

Rachel Meadows, Mello Properties, Ann Arbor, MI

Rama Paruchuri, Ann Arbor, MI

Richard Frazin, Ann Arbor, MI

Richard Han, Ann Arbor, MI

Roth Woods, Ann Arbor, MI

Ruth Mohr, Ann Arbor, MI

Scott Miller, Washtenaw Office of Water Resources Commissioner, Ann Arbor, MI

Sue Parsell, Ann Arbor, MI

Thomas & Kristin Nowatzke, Ann Arbor, MI

Thomas Miskovsky, Ann Arbor, MI

Vasudevan Lakshminarayanan, Ann Arbor, MI

The Beverly Alexander Trust, Ann Arbor, MI

Washtenaw County Road Commission, Ann Arbor, MI

Washtenaw County Treasurer, Ann Arbor, MI

Yvonne Brown, Armada, MI

Chris Kimar, Au Train, MI

Italia Millan, Auburn Hills, MI

Sandra Grey, Bancroft, MI

Ed Powers, Bath, MI

Julia Villars, Bath, MI

Harold Nemecheck, Battle Creek, MI

Joanne Lowery, Battle Creek, MI

John Korstange, Battle Creek, MI

Vicki Dickinson, Battle Creek, MI

Carol Doty, Belding, MI

A. McGarry, Belleville, MI

Adam D. Woolf, Belleville, MI

David & Beverly J. Lundell, Belleville, MI

George C. Singleton, Belleville, MI

Harold E. Thomas, III, Belleville, MI

Harry & Ethel Pinter, Belleville, MI

Heather Hale, Belleville, MI

Kay Brainerd, Belleville, MI

Lawrence Gallo, Belleville, MI

Nicole A. Shelton, Belleville, MI

Robert K. & Sharon Y. Goodin, Belleville, MI

Sarah McDonals, Belleville, MI

Shirley Ann Collins, Belleville, MI

Pinters Flowerland Inc., Belleville, MI

The Estate of Ethel Pinter, Deceased, Belleville, MI

DTE GAS COMPANY, Bellville, MI

Janine Barringer, Bentley, MI

Darlene Byrd, Berlin, MI

Virginia L Latimer, Beverly Hills, MI

Chad Fordham, Big Rapids, MI

Kirsten Johnson, Big Rapids, MI

Carl Grenadier, Bingham Farms, MI

Marguerite Polidori, Bingham Farms, MI

Kathrina Spyridakis, Birmingham, MI

Philip Melcher, Birmingham, MI

FPC Investment Company, LLC, Birmingham, MI

Albert R. & Elsie Gentz, Blissfield, MI

Amy Schmidt, Blissfield, MI

Bailey Cassandra Ott, Blissfield, MI

Carma A. Marks, Blissfield, MI

Charles F. & Lynette S. Lievens, Blissfield, MI

Christopher L. & Pauline J. Bates, Blissfield, MI

Claudia R. Carpenter, Blissfield, MI

Craig R. & Karla K. Fisher, Blissfield, MI

David L. & Sandra Porter, Blissfield, MI

David N. Iffland, Blissfield, MI

Dean R. & Kristy L. Suiter, Blissfield, MI

Donald L. & Candace Fritz, Blissfield, MI

Donald V. & Mabel I. Isley, Blissfield, MI

Duane V. Isley, Blissfield, MI

Gary L. & Beverly A. Koppelman, Blissfield, MI

Geraldine N. Drefke, Blissfield, MI

Jason D. & Audrey K. Wegner, Blissfield, MI

Jeffrey E. & Linda Ehlert, Blissfield, MI

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Draft EIS Distribution List

Jerry Marlatt, Blissfield, MI

Joseph Gerten, Blissfield, MI

Joshua D. Iffland, Blissfield, MI

Keith A. & Dorothy J. Smith, Life Estate, Blissfield, MI

Keith A. Krause, Blissfield, MI

Kerwin S. & Mary Ann Leader, Blissfield, MI

Michael D. & Jacqueline S. VanLoocke, Blissfield, MI

Paul Friess, Blissfield, MI

Paul J. & Sharon M. Wingerd, Blissfield, MI

Ray Emrick, Blissfield, MI

Raymond R. DeNudt, Blissfield, MI

Ronald A. & Dianne F. Gentz, Blissfield, MI

Ronald A. Gentz & Dianne F. Gentz, The Ronald A. Gentz & Dianne F. Gentz Living Trust, Blissfield, MI

Shawn M. & Andrea R. Milner, Blissfield, MI

Timothy P. Vergote, Blissfield, MI

Clement Farms, LLC, Blissfield, MI

J & K Goetz, LLC, Blissfield, MI

Knoblauch Farm Enterprises, Blissfield, MI

Norris Klump Farms, Inc., Blissfield, MI

The Brubaker Family Trust, Blissfield, MI

The Bruce C. Porter Trust, Blissfield, MI

The Burgermeister Living Trust, Blissfield, MI

The Burton Sayler Trust, Blissfield, MI

The David N. Iffland Living Trust, Blissfield, MI

The Frank and Mary Novak Trust, Blissfield, MI

The James B. Warner Living Trust, Blissfield, MI

The Keith A. and Dorothy J. Smith Living Trust, Blissfield, MI

The Margaret M. Neuman Trust, Blissfield, MI

The Marvin L. Sell Trus, Blissfield, MI

The Norris J. Klump Living Trust, Blissfield, MI

The Paul T Vergote, Jr & Diana M Vergote Living Trusts, Blissfield, MI

The Porter Family Limited Partnership, Blissfield, MI

The Porter Trust, Blissfield, MI

The Robert L. Goetz Revocable Trust, Blissfield, MI

The Robert L. Goetz Revocable Trust, Blissfield, MI

Carol Hayford, Bloomfield Hills, MI

David Watson, Bloomfield Hills, MI

Julia Berman, Bloomfield Hills, MI

Mary V. Ensroth, Bloomfield Hills, MI

Grove Road, LLC, Bloomfield Hills, MI

Laura S Tilds, Boloomfield Hills, MI

Michael O'Brien, Boyne City, MI

Abigail Clark, Brighton, MI

Cathleen Lamerton, Brighton, MI

Diana M. Rodgers, Brighton, MI

Kim A. Simecek, Remainderman, Brighton, MI

Lorne Beatty, Brighton, MI

Michael Vogel, Brighton, MI

Pascal Bui, MDOT - Washtenaw, Brighton, MI

Catherine M. Wielfaert, Life Estate, Britton, MI

Daniel J. Prielipp, Britton, MI

Hugh M. & P. Gwen Patterson, Britton, MI

Irene Prielipp, Britton, MI

Jeffrey T. & Rita L. Judkins, Britton, MI

John Mulcahy, Britton, MI

Joyce L. McWilliams, Britton, MI

Kenneth W. & Cassandra D. Kormos, Life Estate, The Kenneth W. & Cassandra D. Kormos Trust, Remainderman, Britton, MI

Louis A. Jr. & Thelma L. Prielipp, Britton, MI

Mark Graves, Britton, MI

Mark S. Prielipp, Britton, MI

Paul F. & Teresa M. Kniffen, Britton, MI

Paul J. & Laurie A. Wielfaert, Britton, MI

Pauline Prielipp, Britton, MI

Robert B. Maschino, Britton, MI

Ronald Frank & Michelle Benham, Britton, MI

Thomas A. & Sherri L. Wielfaert, Britton, MI

Donald C. Dickerson and Charlene D. Dickerson Trust, Britton, MI

KSNJ Family LTD Partnership, Britton, MI

Prielipp Farms, Britton, MI

The Anthony and Stella M. Ivan Revocable Trust, Britton, MI

The Helen S. Wielfaert-Korb Trust, Britton, MI

The Kenneth W. & Cassandra D. Kormos Trust, Remainderman, Britton, MI

The L J Ivan Limited Partnership, Britton, MI

The Virginia B. Shaw Trust, Britton, MI

John Michael Timms, Brooklyn, MI

Gatha Pierucka, Burr Oak, MI

Joan Wascha, Burton, MI

Tim Shorkey, , Burton, MI

Tara Conaway, Byron Center, MI

Dan Valley, Cadillac, MI

Anne Throop, Caledonia, MI

Donald Garlit, Canton, MI

Frank & Elizabeth Okolo, Canton, MI

Gary D. Voiles, Remainderman, Canton, MI

John Martin, Canton, MI

Liana Heath, Cassopolis, MI

Marilyn Raffaele, Cedar, MI

Terri DeFilippo, Cedar, MI

Larry K. & Carol A. Wright, Cement City, MI

William Gardner, Central Lake, MI

Annelissa Gray-Lion, Chelsea, MI

Brittany Campbell, Chelsea, MI

David Gilbert, Chelsea, MI

Eric Campbell, Chelsea, MI

Jan Starr, Chelsea, MI

Patricia Mullaly, Chelsea, MI

Richard Blake, Chelsea, MI

Sandie Schulze, Chelsea, MI

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Draft EIS Distribution List

The Ann M. Sweet Revocable Trust Agreement, Chelsea, MI

Jan Ebersole, Chesterfield, MI

Ann FitzGerald, Clare, MI

Tyler Heard, Clare, MI

Clinton Roche, Clarkston, MI

Ege Family, Ege Family, LLC, Clarkston, MI

Jeffrey Fast, Clarkston, MI

Norman & R. Elaine Schmelzer, Clarkston, MI

Stephanie Friedl, Clarkston, MI

Jaclyn McClain, Clawson, MI

Rivergrove Village Condominiums, Clawson, MI

Carol Stoody, Clay, MI

The Robert D. Beagle Living Trust, Clayton, MI

The Kathy Szabo Schoen Revocable Trust Agmt #1, Climax, MI

Donald E. Sullivan, REMAINDERMAN, Clinton, MI

Kathryn Mary Stahl, Clinton, MI

Lawrence Purtzenski, Clinton, MI

Dave May, Clinton Township, MI

Mark Peltan, Clinton Township, MI

Dorothy Neff, Coleman, MI

Carolyn Rowlson, Commerce Township, MI

Lana Markulicz, Commerce Township, MI

Greg Collins, Coopersville, MI

Resident, Cottrellville, MI

Debbie Roth, Davison, MI

Streamco, Inc., Dearborn, MI

D Haltom, Dearborn, MI

Dennis Kranich, Dearborn, MI

Joseph P. Popp, Dearborn, MI

Liela Abass, Dearborn, MI

Lisa Zalenski, Dearborn, MI

Randy Ankenbauer, Ford Motor Company, Dearborn, MI

Steve Schroeder, Dearborn, MI

Susan Sullivan, Dearborn, MI

Tony Desantis, Dearborn, MI

Brian Dalton, Dearborn Heights, MI

Deborah L. Mroz, Remainderman, Dearborn Heights, MI

Ferrel D. & Nancy C. Voiles, Dearborn Heights, MI

Gloria LaFleur, Dearborn Heights, MI

Karen Kramarz, Dearborn Heights, MI

The Verginio Persicone Revocable Trust, Dearborn Heights, MI

Jon R. Gobba, Remainderman, Deerfield, MI

Michael J. Dusseau, Deerfield, MI

Randy J. Dusseau, Deerfield, MI

Richard & Shirley Gobba, Life Estate, Deerfield, MI

Scott & Kris Dusseau, Deerfield, MI

The Alan J. Schmidt Living Trust, Deerfield, MI

The Fischer Family Living Trust, Deerfield, MI

Andrew Baron, Detroit, MI

Charles Stonewall Potts, Detroit, MI

Claude Jones, Detroit, MI

Daniel Ferrier, Detroit, MI

Danita Echols, Detroit, MI

Ginny King, Detroit, MI

Ilene Kazak, Detroit, MI

Ja'Meka Armstrong, Detroit, MI

Kendal Kuneman, Detroit, MI

Kevin Rashid, Detroit, MI

Michelle Bradford, Detroit, MI

Naim Edwards, Detroit, MI

Noah Link, Detroit, MI

Detroit Edison Co. Inc, Detroit, MI

Detroit Edison Company, Detroit, MI

DTE Electric Company, FKA Detroit Edison Company, Detroit, MI

DTE Gas Company, Detroit, MI

RACER Properties, LLC, Detroit, MI

Mark Dietrich, Dewitt, MI

Beth Balogh, Dexter, MI

Ross Rhizal, Dexter, MI

Rick Bringham, Douglas, MI

Polly Ann Judd, Dowagiac, MI

Ray A. & Janice V. Russell, The Ray A. Russell & Janice V. Russell Trust, Dundee, MI

J Bahr, East Jordan, MI

Barbara Thibeault, East Lansing, MI

James F. Niblock, East Lansing, MI

Janice Szur, East Lansing, MI

Jeffrey R. & Katherine Slabaugh, East Lansing, MI

John D. Grolle, East Lansing, MI

Joyce Bartels, East Lansing, MI

Lauren Korte, East Lansing, MI

Maria Dellacorte, East Lansing, MI

Robert Wasserman, East Lansing, MI

Steven Sy, East Lansing, MI

Thomas Kaplan, East Lansing, MI

William Arnold, East Lansing, MI

Vern D Weller, East Tawas, MI

Anthony Tweedale, Eastpointe, MI

Darrel Harris, Eastpointe, MI

John Rokas, Eastpointe, MI

Sheila Larkins, Eastpointe, MI

Nancy Belanger-Iott, Eaton Rapids, MI

Peter N. Thompson, Eaton Rapids, MI

M & W Seeds Inc., Eaton Rapids, MI

Kristen Howard, Ellsworth, MI

Ted Gilmer, Empire, MI

Sarah Flum, Escanaba, MI

Pamela Schaberg, Essexville, MI

Heidi Zulderveen, Falmouth, MI

Claudia Pisani, Farmington Hills, MI

Daniel Watterson, Farmington Hills, MI

Ellen Stern, Farmington Hills, MI

Eloise Hirlemann, Farmington Hills, MI

Marcella Warner, Farmington Hills, MI

Martin & Sharon McGladdery, Farmington Hills, MI

Maureen Hicks, Farmington Hills, MI

Peggy Malnati, Farmington Hills, MI

Sid Moss, MM Augusta Woods, LLC, Farmington Hills, MI

Crescent Hills Associates, LLC, Farmington Hills, MI

Christine Mathews, Fenton, MI

Lon Herman, Ferndale, MI

Meredith Begin, Ferndale, MI

Veronica Hayes, Ferndale, MI

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Lori Lyles, Flint, MI

Sasikala Vemilapalli, Flint, MI

Marie Leven, Flushing, MI

Robert Klein, Flushing, MI

Ken Meinhardt, Fort Gratiot, MI

Jill Budzynski, Fountain, MI

Bobby Belknap, Frankfort, MI

Sarah Campbell, Frankfort, MI

William Gittlen, Frankfort, MI

Harold Smith, Freeland, MI

Jeff Wiesner, Garden City, MI

Dianne Yonan, Gaylord, MI

Jeffrey A. & Lynne Ellen Smetzer, Gaylord, MI

Dawn Bartok, Gibraltar, MI

Kaylee Moore, Gibralter, MI

Christopher Williams, Gobles, MI

Bonnie Hill, Grand Blanc, MI

Carole Pappas, Grand Blanc, MI

Resident, Grand Blanc, MI

Richard Sparkes, Grand Blanc, MI

Virginia Cowie, Grand Blanc, MI

Merrill Fisher, Grand Haven, MI

Robert Allen, Grand Haven, MI

Delores Reynolds, Grand Junction, MI

Al Calderon, Grand Rapids, MI

Cheryl Johnson, Grand Rapids, MI

Cyndee Kott, Grand Rapids, MI

David Peshlakai, Grand Rapids, MI

Glenn Freeman, Grand Rapids, MI

Jerry Soper, Grand Rapids, MI

Maria Miller, Grand Rapids, MI

Marijean Williams, Grand Rapids, MI

Marilyn J. Wells, Grand Rapids, MI

Marthea Jager, Grand Rapids, MI

Matt Burns, Grand Rapids, MI

Ramon Trumbull, Grand Rapids, MI

Robert & Mary Swain, Grand Rapids, MI

Scott Graham, Grand Rapids, MI

Terry Koslek, Grand Rapids, MI

Rosetta Strange Evans, Grass Lake, MI

The Estate of Larry Evans, Grass Lake, MI

Karen Whitt, Gregory, MI

Virginia Cook, Gregory, MI

Carol Costello, Grosse Ile, MI

Daly Carpenter, Grosse Ile, MI

Jennie deBeausset, Grosse Ile, MI

Richard Booth, Grosse Ile, MI

Theresa Hoffman, Grosse Ile, MI

Lydia Levinson, Grosse Point Park, MI

Timothy Schacht, Grosse Point Park, MI

William Cox, Grosse Pointe, MI

Michael Zeller, Grosse Pointe Farms, MI

Ann L. Parker, Grosse Pointe Park, MI

Gary Boyer, Hamtramck, MI

Paula Oye, Hancock, MI

Ronald K. Studer Trust, Hancock, MI

Pat Lauth, Harbert, MI

Jack Pierce, Harbor Springs, MI

Marie Roth, Harrison, MI

Corinne Jankowski, Harrison Township, MI

John Martich, Harrison Township, MI

Kirk Bails, Harrison Township, MI

Mario Maraldo, Harrison Township, MI

Arthur Thomas, Harrisville, MI

Robert Kennedy, Harrisville, MI

Paula Hutts, Hartland, MI

Kimberly L. Savage, Esq., Savage Law PLC, Haslett, MI

Rod McComber, Haslett, MI

William & Norma Blair, Hastings, MI

Jean Tittle, Hickory Corners, MI

John L. Gwizdala, Highland, MI

Lois Spiter, Highland, MI

Carol McGeehan, Holland, MI

John K Erskine, Holland, MI

Karen LaBarge, Holland, MI

Jane Webber, Holly, MI

Sally Barnhart, Horton, MI

Brice Grunert, Houghton, MI

Margery Drake, Houghton, MI

Barry John & Karen Lee Roeder, Houghton Lake, MI

Arlene Schindler, Howell, MI

Hugh Gurney, Howell, MI

Jan Chepeska, Howell, MI

Karen S. Bird, REMAINDERMAN, Howell, MI

Karline Rousseau, Howell, MI

Lawrence D. Hammond and Beverly A. Hammond, The Lawrence D. & Beverly A. Hammond Trust, Howell, MI

Timothy Walter, Panhandle Eastern Pipe Line Company, a Delaware Corporation, Howell, MI

Charles E. Sullivan, Life Estate, Howell, MI

Ron Cober, Ira, MI

Michael Bellmore, Iron Mountain, MI

Peggy Moody, Iron Mountain, MI

Joan Kendall-Rozman, Iron River, MI

Grace Strong, Ironwood, MI

Dave Cross, Jackson, MI

Jared Boll, MDOT (Lenawee), Jackson, MI

Karla Hair, Jackson, MI

Kathy David, MDEQ Water Resources Division, Jackson, MI

CONSUMERS POWER COMPANY, Jackson, MI

The Estate of Beverly Meyers, Deceased, Jackson, MI

Consumers ENERGY Company, Jackson, MI

Gene & Elaine Winzeler, The Gene W. and Elaine L. Winzeler Trust, Jasper, MI

Patrick & April Northcott, Jasper, MI

Laurie K. Jipping, Jenison, MI

Martha Ruesink, Jerome, MI

Any Sayles, Kalamazoo, MI

Ashley Yonker, Kalamazoo, MI

Barbara Toshalis, Kalamazoo, MI

David Claflin Sr., Kalamazoo, MI

David Graube, Kalamazoo, MI

Jean DeMott, Kalamazoo, MI

Jonna Johnson, Kalamazoo, MI

Karen Derhammer Schuur, Kalamazoo, MI

Ken Shuster, Kalamazoo, MI

Lyda Stillwell, Kalamazoo, MI

Michael Tenenbaum, Kalamazoo, MI

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Monica Evans, Kalamazoo, MI

Nancy Baker, Kalamazoo, MI

Rosalie Novara, Kalamazoo, MI

Steven Yankoviak, Kalamazoo, MI

Thomas Lopez, Kalamazoo, MI

Kathy Vigh, Kentwood, MI

Kay Steiner, Kentwood, MI

Heather Hewett, Kewadin, MI

William D. & Phyllis E. Briggs, Kewadin, MI

Elizabeth Koller, Kingsford, MI

James H. Perry, James H. Perry Family Trust, La Sallie, MI

Maxxcell Higdon, Lake Orion, MI

Ann Hunt, Lake Station, MI

Ann Breznai, Lambertville, MI

Robert Maki, Lanse, MI

Brent Brettrager, Lansing, MI

David Dunn, Lansing, MI

Geno Alessandrini, Sr., Michigan Laborers' District Council, Lansing, MI

James Slider, Lansing, MI

Michael Casler, Lansing, MI

Nancy Shiffler, Sierra Club Michigan Chapter, Lansing, MI

Raymond Ziarno, Lansing, MI

Steve Arwood, Michigan Economic Development Corporation, Lansing, MI

Timothy Hagerman, Lansing, MI

Valerie Brader, Michigan Agency for Energy, Lansing, MI

William Drescher, Lansing, MI

William Stelzr, Hanover Pipeline Company, Lansing, MI

State of Michigan, Lansing, MI

Jeann Saltzman, Lapeer, MI

Elaine A. & Patrick H. Gibson, Lathrup Village, MI

Thomas Bobitz, The Earl E. Bobitz Revocable Living Trust, Lathrup Village, MI

Rita Bober, Lawton, MI

Sharon Widigan, Lennon, MI

Leslie Edwards, Leslie, MI

Patti Weinlander Shafer, Leslie, MI

Robert Aguirre, Linden, MI

Donna Boris, Livonia, MI

Jerome Miller, Livonia, MI

Kara Norman, Livonia, MI

Margaret Bobicz, Livonia, MI

Nick Mouzourakis, Livonia, MI

Patricia Lindsay, Livonia, MI

Robert F. Smith, Vector Pipeline L.P., Livonia, MI

Jeffery Morgenthaler, Lowell, MI

K. Sneden, Lowell, MI

Gail J. Mistiatis, Luna Pier, MI

Dianne Rice, Macomb, MI

Gary Purcell, Macomb, MI

Mary Ann Kalamarz, Macomb, MI

Industrial Associates, LLC, Macomb, MI

Carol Gilchrist, Madison Heights, MI

Catherine Roberts, Manchester, MI

Claudia Damian, Manchester, MI

George F. Wilbur, Pittman Road Properties, LLC, Manchester, MI

Lorraine Coburn, Manchester, MI

Trudi Cooper, Manchester, MI

Jim Toczynski, Manistee, MI

Loree Stinson, Manistee, MI

Eva Vigo, Marquette, MI

Kathleen Davis, Marquette, MI

Kim Spencer, Marquette, MI

Ruth Schaut, Marquette, MI

Steven Niebuhr, Marquette, MI

Jeanne Mackay, Marysville, MI

Jay Doyle, Entrust Great Lakes LLC. FBO Hansen Kyle Lilly IRA #80525, Mason, MI

The Douglas E. and Helen L. Darling Revocable Trust, Maybee, MI

Maria Benoit, Mayville, MI

Faye Donnelly, Mc Bain, MI

Carrie Rozeveld, McBain, MI

Shawna Baas, McBain, MI

Earnest Humphrey, Mecosta, MI

Linda Travis, Mecosta, MI

Richard Smith, Melvindale, MI

Dennis Whipple, Mesick, MI

Sheila Morway, Middleville, MI

Bradford Bush, Midland, MI

Sarah Galt, Midland, MI

Bernard A. & Jean K. Miller, Milan, MI

Bradley S. Yannone, Milan, MI

Charles E. & Jean A. Shearer, Milan, MI

Charlie Haddad, Milan, MI

Clarence A. & Joan E. Meads, The Clarence A. & Joan E. Meads Trust with Life Estate, Milan, MI

Clyde & Linda Cislo, Milan, MI

David W. Hessler, Milan, MI

Dawn Kanitz, Life Estate, Milan, MI

Dawn M. Spack, Milan, MI

Dennis M. & Dianna L. Bennett, Milan, MI

Douglas A. & Leslie A. Hoffman, Milan, MI

Duth Nie, Milan, MI

Gary C. Brown, Marble Park Cemetery Association, Milan, MI

Gary Mayher, Milan, MI

George W. & Bethany L. McCalla, Milan, MI

Georgios P. Stergiadis, Milan, MI

Gerald D. and Debra L. Feeman, Milan, MI

Gerald Lee & Cheryl Shillair- Smith, Milan, MI

Heather M. Bohnett, Milan, MI

Jack Butler, The Jack D. & Margaret L. Butler Living Trust, Milan, MI

James & Karen Bolz, Milan, MI

James L. & Donna C. Carver, The James L. Carver & Donna C. Carver Revocable Living Trust, Milan, MI

James R. and Marilyn J. Onago, Milan, MI

Jeremy & Tammy Endicott, Milan, MI

Joan Marie Zornow, Milan, MI

John B. & Trudy K. Broadhurst, Milan, MI

John H. & Clara G. Neckel, Milan, MI

Keith A. Simecek, Life Estate, Milan, MI

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Kenneth & Rhonda Hall, Milan, MI

Kenneth J. & Martha S. Brown, Milan, MI

Kenneth R. Stuart, Milan, MI

Kimberly K. Estes, Milan, MI

Larry Roome, Milan, MI

Leslie J. Hosler, Milan, MI

Lewis O. & Dorothy J. Kempher, Jr., Milan, MI

Mark G. Sweet, Milan, MI

Marvin K. Wynn, Milan, MI

Mary C. Talladay, Mary C. Talladay Trust, Milan, MI

Mary Kerkes, Milan, MI

Matt & Sharon Gruden, Jr., Milan, MI

Matthew Byrd, Milan, MI

Michael & Maria Woods, Milan, MI

Michael J. & Brenda A. Schettenhelm, Milan, MI

Nancy A. Dailey, Milan, MI

Paul W. & Joyce A. Emerson, Life Estate, Milan, MI

Philip & Emily Bowerman, Philip & Emily M. Bowerman Trust, Milan, MI

Renee Gregory, Milan, MI

Richard L. & Joyce A. Vershum, Milan, MI

Richard Theodore & Dawn Marie Zornow, Milan, MI

Robert L. & Kathryn E. Viets, Jr., Milan, MI

Robert L. Stuart, Milan, MI

Robert L. Studnicka, Milan, MI

Robert T. & Connie L. Schrock, Milan, MI

Roger Lee Stuart, Milan, MI

Ronald & Susan Bies, Milan, MI

Rose Marie Bogi, Milan, MI

Russel M. Wilsey, Life Estate, Milan, MI

Sally J. Clark, Milan, MI

Scott C. & Jenny A. Heath, Milan, MI

Sharon L. Talladay, Milan, MI

Steven J. Bohnett, Milan, MI

Susan E. Cook, Milan, MI

Thomas W. & Sandra S. Behrmann, Milan, MI

Tonya Rose Ruth Gruden, Milan, MI

Barry L. Talladay Trust, Milan, MI

Daniel J. Shedd, LLC, Milan, MI

Joseph P. Porter and Myrna I. Porter Revocable Living Trust, Milan, MI

The Gwendolyn Kanitz Trust, Milan, MI

The Heath Investment Trust, Milan, MI

The Judith Ducharme Trust, Milan, MI

The Mary C. Talladay Trust, Milan, MI

The Paul W. Emerson and Joyce A. Emerson Revocable Trust, Milan, MI

The Robert L. Stuart Trust, Milan, MI

The Ruth A. Kiger Revocable Trust, Milan, MI

The Selter Family Living Trust, Milan, MI

The Sharon J. Thatcher Trust, Milan, MI

The Vincent Palmieri and Pamela Palmieri Revocable Trust, Milan, MI

Township of Milan a/k/a Rice Cemetery, Milan, MI

Chris Conley, DTE Energy, Milford, MI

Katherine Wright, Milford, MI

Shabbir & Shabnam Khambati, Ambassador Drive III, LLC, Milford, MI

Charles Brumleve, Mohawk, MI

Barry A. Buschmann, P.E., Mannik Smith Group, Monroe, MI

Chris Stanley, Monroe County Road Commission, Monroe, MI

Donna Richileau, Monroe Co. Road Commission, Monroe, MI

Douglas Link, Monroe County Drain Commission, Monroe, MI

Peggy L. Behrendt, Monroe, MI

Sue Balk, Monroe, MI

Ted Stojak, Montague, MI

Antoinette Ten Brink, Mount Clemens, MI

William C Vohwinkle, Mount Morris, MI

Stephen Scherer, Mount Pleasant, MI

Marie Kopin, Mt Pleasant, MI

E. James Nedeau, Muskegon, MI

Bill Childs, National City, MI

Mary Germain, Nazareth, MI

Maria Anne Wagtmann, Negaunee, MI

Mark A. Biggans, New Baltimore, MI

Great Lakes Farm Properties, LLC, New Boston, MI

Jones & Jones Leasing Company, New Boston, MI

Bobby Afton, Newaygo, MI

Barbara Kantola, Niles, MI

Bob Conway, Niles, MI

Carlotta Ripley, Niles, MI

William Cagle, Niles, MI

Rebecca Takacs, ITC Holdings, Nori, MI

Anne Pavlic, Northville, MI

Linda Mulder, Northville, MI

Ron Chelland, Norton Shores, MI

Perfect Appearance, LLC, Novi, MI

Doug Motely, ITC Holdings Corp, Novi, MI

Fernando Guevara, International Transmission Company, Novi, MI

Jo Ann Abate, Novi, MI

ITC Holdings Merger Sub, Inc., Novi, MI

Doris Aplebaum, Oak Park, MI

Frederic Peiss, Oak Park, MI

Leah Cohen-Belknap, Oak Park, MI

Michele Reynolds, Oak Park, MI

Heidi Peters, Oakland, MI

Anne Horn, Okemos, MI

David & Bonnie Reicosky, Trustees, David & Bonnie G W Reicosky Trust, Okemos, MI

Josephine Wojtowicz, Okemos, MI

Peter Sakura, Okemos, MI

Timothy Connors, Onaway, MI

Diana Duffy, Oscoda, MI

Paul Wohlfarth, Ottawa Lake, MI

Iffland Farms, LLC, Ottawa Lake, MI

Daniel R. & Tracy L. Stubli, Palmyra, MI

James J. & Laurie J. Isley, Remainderman, Palmyra, MI

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Kay C. Fisher, Palmyra, MI

Lambert M. & Annette L. LaVoy, Palmyra, MI

Lawrence E. Pixley, II, Palmyra, MI

Melvin E. & Patricia Wahl, Melvin E. Wahl and Patricia Joint Revocable Living Trust, Palmyra, MI

Robert D. & Mary Lou Fisher, Palmyra, MI

Judson Farms, LLC., Palmyra, MI

Lawrence W. & Kay C. Fisher Income Trust, Palmyra, MI

Sunrise Farms, Inc., Term Certain Interest, Palmyra, MI

The Estate of Lawrence W. Fisher, Palmyra, MI

The John A. Marks Living Trust, Palmyra, MI

The Merlin D. Wahl & Janette R. Wahl Trust, Palmyra, MI

Sharon Klotz, Parma, MI

Brian M Smith, Paw Paw, MI

Craig Owen, Paw Paw, MI

John Christopher, Paw Paw, MI

Amanda Ehrnst, Pellston, MI

James Plotts, D&P Communication, Petersburg, MI

Mark Hoover, Petersburg, MI

Sharon Blankenship, Petersburg, MI

Terry Iott, Petersburg, MI

The Kay A. Dailey Trust, Petersburg, MI

Bob Vance, Petoskey, MI

JoEllen Rudolph, Petoskey, MI

Lindsey Walker, Petoskey, MI

Lorraine Jung, Petoskey, MI

Toni Neill, Petoskey, MI

David Klingel, Pinckney, MI

H Baum, Pinckney, MI

Irene Robinson, Pinckney, MI

Jerry Gentry, Pinckney, MI

Karen Klingel, Pinckney, MI

Mary Susan Welker, Pinckney, MI

Robert D Fox, Pinckney, MI

Terry Richards, Pinckney, MI

Essie Adrian, Plainwell, MI

Sharon Thor, Plainwell, MI

Chris & Karen Byrd, Plymouth, MI

Ross Anderson, Plymouth, MI

William Hulme, Plymouth, MI

Don Doolittle, Pontiac, MI

Dorothy Delehanty, Pontiac, MI

Elaine Felts, Pontiac, MI

Tracey Kilburn, Pontiac, MI

Charles J. Knowlton, Knowlton Distributors, Port Huron, MI

John Gobel, Port Huron, MI

Mark M Morden, Port Huron, MI

CBL Development LLC, Portage, MI

John Willson, Portage, MI

Karl Fugate, Portage, MI

Theresa Lockhart, Portage, MI

William Wilson, Portage, MI

Gianine Casassa, Rapid City, MI

Christopher Raupp, Redford, MI

Georgiana Guziatek, Redford, MI

Kristin Wal, Redford, MI

Paul Jameson, Redford, MI

Stella Guziatek, Redford, MI

Tanya Jackson, Redford, MI

Janice Hanninen, Republic, MI

Gloria Zimny, Richmond, MI

Judith Woelke, Riverview, MI

Claudia Peters, Rochester, MI

Greg Franczak, Rochester Hills, MI

Janine Dulac, Rochester Hills, MI

Robert Bartell, Rochester Hills, MI

Lisa Degraff, Rockford, MI

R Lane, Rockford, MI

John Kelley, Roscommon, MI

Ruth Mutchler, Roscommon, MI

Tamala Gage, Roscommon, MI

James Chlubna, Roseville, MI

Pam Wilbourn, Roseville, MI

Jerry Mawhorter, Royal Oak, MI

Julia Sosin, Royal Oak, MI

Nancy Bahlman, Royal Oak, MI

Sara Sercombe, Royal Oak, MI

DiAnne Doyle, Saginaw, MI

Edna McIntyre, Saginaw, MI

Elaine Collins, Saint Clair Shores, MI

Jean Bails, Saint Clair Shores, MI

James Carrell, Saint Helen, MI

Gretta VanBree, Saint Joseph, MI

Aaron Rogers, Saline, MI

Alan L. Arndt, Saline, MI

Betty L. Walker, Saline, MI

Charles & Netia L. Haydon, Saline, MI

Jeffrey and Larry Smith, Saline, MI

Jon A. Arndt, Saline, MI

Kara Thornton, Saline, MI

Kathleen B. Blake, Saline, MI

Matthew K. & Angela M. Kimerer, Saline, MI

Richard J. Arndt, Saline, MI

Robert Tinker, Saline, MI

The Howard F. Braun Living Trust, Saline, MI

The Kelven G. Braun Living Trust, Saline, MI

George Salas, Sr., Samaria, MI

The Malburg Family Living Trust, Sand Creek, MI

Nathan Galbreath, Saranac, MI

Marilyn Anderson, Schoolcraft, MI

Yolanda Mitts, Scotts, MI

Mary Gibbons, Shelby Township, MI

Patricia Bitel, Shelby township, MI

Sylvia Graham, Shelby Township, MI

Patrick & Jody Prestine, Shouth Boardman, MI

David Gies, Skandia, MI

Ann Stickel, South Haven, MI

Wynona Allen, South Lyon, MI

Kinzerb Homes, LLC, Southfield, MI

Peggy S. Collins, Southfield, MI

Palomir Company, Southfield, MI

PeeBee, LLC, Southfield, MI

Strathmoor Investment Company, Southfield, MI

The Irving Glancy Trust, Southfield, MI

Debbie Balasko, Sparta, MI

Betty Anguiano, Spring Lake, MI

Karen Anderson, Spring Lake, MI

Sarah Goecke, Standish, MI

Appendix A
Draft EIS Distribution List

Christina Modrzejewski, Sterling Heights, MI

Joli Dimeglio, Sterling Heights, MI

Mary Vanassche, Sterling Heights, MI

Bradley Houseworth, Stevensville, MI

Andrea Stickney, Stockbridge, MI

Carol Mayor, Stockbridge, MI

The Edna H. Shoner Family Revocable Living Trust, Stockbridge, MI

Dimitri Marek, Sturgis, MI

Larry Rolfe, Sunfield, MI

Andrew Donaghy, Suttons Bay, MI

Linda Johnson-Hanson, Suttons Bay, MI

Dawn Sharif-Coon, Swartz Creek, MI

Roger King, Swartz Creek, MI

Christina Killgore, Taylor, MI

Kathleen Rupley, Tecumseh, MI

Larry D. & Mary Ann Bush, Tecumseh, MI

Larry Pickles, Tecumseh, MI

Lawrence D. and Betty Lou Bliesner, Jr., Life Estate, Tecumseh, MI

The Barry B. Brablec Trust, Tecumseh, MI

The Douglas L. Wegner Living Trust, Tecumseh, MI

The Ray A. Russell & Janice V. Russell Trust, Tecumseh, MI

Charlotte Vergiels, Temperance, MI

Alexandria Schroeder, Three Oaks, MI

James Haldy, Three Rivers, MI

Suzanne Wood, Three Rivers, MI

The Jerry P. & Barbara L. McCord Revocable Living Trust, Tipton, MI

Roderick Wood, Traverse, MI

Bonnie Smith, Traverse City, MI

Elaine Harmon, Traverse City, MI

Jordan Yeatts, Traverse City, MI

Josephine & Frank Tosiello, Traverse City, MI

Judy Murphy, Traverse City, MI

Ross Hammersley, Traverse City, MI

Ruth Jones, Traverse City, MI

Ruth Overdier, Traverse City, MI

Tom Emmott, Traverse City, MI

Jan Peterson, Troy, MI

Kitty Martin, TransCanada, Troy, MI

Leonard Heether, Trufant, MI

Robert Shelestovich, Uniontown, MI

Sue Nearing, Vassar, MI

Rebecca Kane, Wales, MI

Donna Stafford, Warren, MI

Kathy Kristofice, Warren, MI

Kimberly Brandimarte, Warren, MI

Michael Kwitt, Warren, MI

Michael Strawn, Warren, MI

Richard Krueger, Warren, MI

Scot Sieracki, Warren, MI

Tabatha Sieracki, Warren, MI

Anna Fliginskykh, Waterford, MI

Patrice Cole, Waterford, MI

Susan Koop, Waterford, MI

Adrianne Newland, Wayland, MI

Elizabeth Shelton, Wayne, MI

Travis Massey, Wayne, MI

Virginia Matteson, Wayne, MI

Edgardo Perez-De Leon, West Bloomfield, MI

The Richard and Juliet C. Najor Revocable Living Trust, West Bloomfield, MI

Cara Nims, Westland, MI

Glenn & Karen A. Stockdale, Westland, MI

Karen Merritt, Adrian & Blissfield RR, Westland, MI

Katherine Mouzourakis, Westland, MI

Supervisor Pete Halfer, Department Head, Augusta Charter Township Ulitilty Department, Whittaker, MI

Amos Snyder, Willis, MI

Ana Smallbergher, Willis, MI

Archie B. & Judy L. Tackett, Willis, MI

Chris Smalbergher, Willis, MI

Dale Darling, Willis, MI

Derek Vorbeck, Willis, MI

Euralana Goble, Willis, MI

Gary M. & Denise G. Riser, Willis, MI

Gary Riser, Willis, MI

Jennifer Jester, Willis, MI

Maja Reed, Willis, MI

Marcus Snyder, Willis, MI

Wendy Tobler, Willis, MI

Kilgour Land Company LLC, Willis, MI

The Elgin F. Darling Trust, Willis, MI

The Joanne M. Darling Trust, Willis, MI

Sharon Groves, Wixom, MI

Bryan Loveless, Wyoming, MI

Dynamic Property, LLC, Ypsilanti, MI

Greene Farms 6 and 7 Homeowners Association, Ypsilanti, MI

JBJ Property & Investment Group LLC, Ypsilanti, MI

LITW, LLC, Ypsilanti, MI

Abdulsalam M. Aqlan, Ypsilanti, MI

Adam D. and Natalie S. Woolf, Ypsilanti, MI

Alan Hogan, Ypsilanti, MI

Alita DeMarco, Ypsilanti, MI

Allison & Sean Lee, Ypsilanti, MI

Alyson Osbourne, Ypsilanti, MI

Andrea L. Fischer, Ypsilanti, MI

Angelina Ford, Ypsilanti, MI

Anna Wright, Ypsilanti, MI

Anthony & Brooke Publiski, Ypsilanti, MI

Anthony Peters-Ajeba, Ypsilanti, MI

Benjamin David Pedersen, Ypsilanti, MI

Benjamin Q. Jr. & Beatrice Bryant, Ypsilanti, MI

Brenda A. Price, Ypsilanti, MI

Brian Lee Howell, Ypsilanti, MI

Candace D. Steeb, Ypsilanti, MI

Carl R Reichelt, Jr, Ypsilanti, MI

Christopher R. Lowell, Ypsilanti, MI

Cristine Santanna, Ypsilanti, MI

Dale K. & Krista P. Goodwin, Ypsilanti, MI

Dannie Dew, Jr., Ypsilanti, MI

David Brown, Ypsilanti, MI

David C. & Billie Jo Burton, Ypsilanti, MI

David D. & Kathleen M. Smith, Ypsilanti, MI

David F. & Wilma L. Rossbach, Ypsilanti, MI

Appendix A
Draft EIS Distribution List

David Fuson, Ypsilanti, MI

David L. Baum, Ypsilanti, MI

Deborah I. Belaire, Ypsilanti, MI

Della Johnson, Ypsilanti, MI

Denise & Perry Nichols, Ypsilanti, MI

Dewey C. Sims, Ypsilanti, MI

Dianna & Timothy L Shunk, Ypsilanti, MI

Dianne E. Smith, Ypsilanti, MI

Donald Wood, Greene Farm Home Owners Association 1, 2 & 4, Ypsilanti, MI

Donna Cole, Ypsilanti, MI

Donna M. Wiechec, Ypsilanti, MI

Doris L. Tennyson, Ypsilanti, MI

Dorothy L. Harris, Ypsilanti, MI

Ebony T. & Ezekiel A. Montgomery, Ypsilanti, MI

Eric T. Williams, Ypsilanti, MI

Fanaye Ejeta Tumusa, Ypsilanti, MI

Felicia Ford, Ypsilanti, MI

Frank & Belinda Wells, Ypsilanti, MI

Gene E & Shirley J Scharp, Ypsilanti, MI

George A. Wallace, III, Ypsilanti, MI

Girma Abiyu Alemu, Ypsilanti, MI

Gladys Green, Ypsilanti, MI

Glenn & Carol Ladenberger, Ypsilanti, MI

Glenn Ladenberger, Ypsilanti, MI

Gloria & Michael Budimerovich, Ypsilanti, MI

Gordon E. & Brenda I. O'Leary, Jr., Ypsilanti, MI

Gregory R. Franzen, Ypsilanti, MI

Hanna Tadesse, Ypsilanti, MI

Hassel Couch, Ypsilanti, MI

Herbert G. Karnatz & Marie E. Karnatz, The Herbert G. Karnatz & Marie E. Karnatz Trusts, Ypsilanti, MI

Howard H. & Deloris Amrhein, Ypsilanti, MI

Jacob E. Wagner, Ypsilanti, MI

James D. & Tammy A. Opfermann, Ypsilanti, MI

James E. & Vonna Sue Goold, Ypsilanti, MI

James G. & Debra S. Lucas, Ypsilanti, MI

James G. & Paula M. Robinette, Ypsilanti, MI

James H. Power, Ypsilanti, MI

James M. & Sandra K. Downing, Ypsilanti, MI

James T. & Phyllis E. Hinman, Ypsilanti, MI

Jane Gay, Ypsilanti, MI

Jay & Tracy Gillette, Ypsilanti, MI

Jeff Slag, Ypsilanti, MI

Jeffrey A. & Sarah A. Kaatz & Rigg, Ypsilanti, MI

Jennifer Gray O'Dell, F/K/A Jennifer Gray Herndon, Ypsilanti, MI

Jerry L. & Pamela Armstrong, Ypsilanti, MI

John D. Biggans, Ypsilanti, MI

John Dillon, Community Free Will Baptist Church, Ypsilanti, MI

John M. Dunn, Ypsilanti, MI

John M. Gores, Ypsilanti, MI

John Thompson, Ypsilanti, MI

Joseph & Lauren LaPointe, Ypsilanti, MI

Joseph Taylor, Ypsilanti, MI

Karen Lovejoy-Roe, Charter Twp of Ypsilanti, Ypsilanti, MI

Karyn S. Baker, Ypsilanti, MI

Katherine G. Arnold, Ypsilanti, MI

Kathy Szabo Schoen, Ypsilanti, MI

Keith Wiljanen, Ypsilanti, MI

Kimberly Merrill, Ypsilanti, MI

Kimberly Taylor, Ypsilanti, MI

LaMont Stone, Ypsilanti, MI

Larry Elie, Ypsilanti, MI

Larry J. & Lavon B. Domas, Ypsilanti, MI

Laura Lynn Gordon, Ypsilanti, MI

Leo E. Durham, Ypsilanti, MI

Lester J. Jr. & Patricia M. Hardy, Ypsilanti, MI

Lizabeth A. Simmons, Ypsilanti, MI

Louis Albert Lankton, Ypsilanti, MI

Louise I. Schock, Ypsilanti, MI

Luka & Gena S. Juncaj, Ypsilanti, MI

Lynette Kidder, Ypsilanti, MI

Mark & Penny Wilms, Ypsilanti, MI

Martha A. Cook, Ypsilanti, MI

Mary Ann Deacons, Ypsilanti, MI

Mary K. Jones, Ypsilanti, MI

Mary L. Dodich, Ypsilanti, MI

Matthew E. Lamkin, Ypsilanti, MI

Melissa Stepchuk, Ypsilanti, MI

Merrill & Alene Waldrop, Ypsilanti, MI

Michael P. Belaire, Ypsilanti, MI

Michael T. Kaplan, Ypsilanti, MI

Michael W. & Susan A. Butzin, Ypsilanti, MI

Mitchell P. Knotts, Ypsilanti, MI

Nicholas T. Babo, Ypsilanti, MI

Nicole Corbell, Ypsilanti, MI

Paul E. & Juanita M. Ramey, Ypsilanti, MI

Paul M. Giles, Ypsilanti, MI

Phillip H. Selter, Ypsilanti, MI

Rajweet Bedi, Ypsilanti, MI

Ralph C. & Berneice Y. Stitman, Ypsilanti, MI

Randy & Amber O'Leary, Ypsilanti, MI

Raylene Gwen Kruger, Ypsilanti, MI

Raymond Schultz, Ypsilanti, MI

Renee S. Plant, Ypsilanti, MI

Robert E. Lowell, Ypsilanti, MI

Robert H. Schultz, Ypsilanti, MI

Robert L. & Victoria L. Wagner, Jr., Ypsilanti, MI

Robert Leaveck, Ypsilanti, MI

Robert Woodburn Elliott, Jr., Ypsilanti, MI

Roland J. & Ruth E. Blackburn, Ypsilanti, MI

Ronald A. & Sharon K. Collino, Ypsilanti, MI

Ronald C. Lunsford, Ypsilanti, MI

Ronald James Pearson, Ypsilanti, MI

Ronald L Jewell, Ypsilanti, MI

Ronald L. Ramey, Ypsilanti, MI

Ronald T. Delsh, Ypsilanti, MI

Rosaline & Curtis Meeks, Ypsilanti, MI

Ryan and Jessica Edwards, Ypsilanti, MI

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Samuel W. & Angela C. Rich, Ypsilanti, MI

Scott D. Westover, Ypsilanti Community Utilities Authority, Ypsilanti, MI

Scott Duhaime, Ypsilanti, MI

Sean McNatt, Lincoln Consolidated Schools, Ypsilanti, MI

Sharen & Todd Wilson, Ypsilanti, MI

Sidney J. Phillips, Ypsilanti, MI

Silas Lee & Linda C. Goad, Ypsilanti, MI

Sonya L. Odom-Barbee, Ypsilanti, MI

Stephen & Rhonda Rogowski, Ypsilanti, MI

Stephen L. Hackett, Ypsilanti, MI

Tamara Rush, Ypsilanti, MI

Tambra Kirk, Ypsilanti, MI

Timothy & Shelly Biggans, Ypsilanti, MI

Timothy J. & Mary Ann-Phyllis Elie, Ypsilanti, MI

Tommy J. & Lynne L. Meyers, Ypsilanti, MI

Tracy Matthewson, Ypsilanti, MI

Virgil Ray & Janice K. Scott, Ypsilanti, MI

Walter D. Sangster, Ypsilanti, MI

Wendy H. Hopper, Ypsilanti, MI

Wilbur P. & Luanne M. Winkle, Jr., Life Estate, Ypsilanti, MI

William C. McKenzie, Jr., Ypsilanti, MI

William C. Sr. & Barbara McKenzie, Ypsilanti, MI

William H. Foote, Ypsilanti, MI

William R. & Naarah K. S. Sampson, III, Ypsilanti, MI

2 K Properties, Ypsilanti, MI

A-1 Auto Salvage & Scrap, LLC, Ypsilanti, MI

Alpha Packaging (Michigan), Inc., Ypsilanti, MI

B & W Tooling Services Inc., Ypsilanti, MI

Christopher W. & Brandyn K. Creager Revocable Trust, Ypsilanti, MI

Edward D. & Carole E. Purcell Trust, Ypsilanti, MI

Estate of Roy A. Britton, AKA Roy Allen Britton, Ypsilanti, MI

Lighthouse Baptist Temple, Ypsilanti, MI

Luanne M. Winkle Revocable Living Trust, Ypsilanti, MI

Marsh Plating Corporation, Ypsilanti, MI

Nanak Real Estate LLC, Ypsilanti, MI

New Covenant Missionary Baptist Church, Ypsilanti, MI

Niemi Holdings LLC, Ypsilanti, MI

Rowe Enterprises, L.L.C., Ypsilanti, MI

RT'S Automotive Inc., Ypsilanti, MI

The Alexander Revocable Trust, Ypsilanti, MI

The Charter Township of Ypsilanti, AKA the Township of Ypsilanti, Ypsilanti, MI

The Dennis R. Galinis Revocable Trust, Ypsilanti, MI

The George Parsons Trust, Ypsilanti, MI

The Glenn H. Rowe Revocable Living Trust, Ypsilanti, MI

The Joyce Louise Schultz Trust, Ypsilanti, MI

The Raymond Earl Schultz Trust Agreement, Ypsilanti, MI

The Thurman Ramey and Joanne Ramey Trust, Ypsilanti, MI

True Vine Church of God in Christ, Ypsilanti, MI

Eva French, Zeeland, MI

Jennie Stephenson, Zeeland, MI

Hamric Living Trust, North Canton, OH

John K. & Keely A. Krumwiede, Wakeman, OH

Dan B. & Judy L. Jones, Adena, OH

Kathy Bartek, Adena, OH

Martin J. Mckim, Adena, OH

Peter A. Shutler, Adena, OH

A R Lockhart Development Company, Akron, OH

Toledo Edison Company, Akron, OH

Allan Guest, Verizon, Akron, OH

Benita Musleve, Akron, OH

Bill Congrove, Akron, OH

Billy Pool, Akron, OH

Bob Downing, Akron, OH

Bridget Hinojosa, Akron, OH

Calvin K. & Gail L. McNutt, Akron, OH

Carol Haley, Akron, OH

Charles Wright, Akron, OH

Daniel & Donna Testa, Akron, OH

David A. Mucklow, Akron, OH

Denyse Click, Ohio Department of Transportation District #4, Akron, OH

Eric Schickendantz, Akron, OH

Fred S. Littleton, Jr., Akron, OH

Gary Ruble, Akron, OH

Helene S. Carmany, Akron, OH

Jeffrey A. Aman, Akron, OH

Jeffrey Moshier, FirstEnergy, Akron, OH

Lauren Berlekamp, Akron, OH

Linda Murphy, County Of Summit, Akron, OH

Luther & Michele Lutrell, Trustees, Michele A Lutrell Trust, Akron, OH

Mary Long, Dominion East Ohio Gas Company, Akron, OH

Melissa Whitaker, Akron, OH

Morgan Parke, FirstEnergy Service Company, Akron, OH

Paul Adamson, Akron, OH

Robert Chula, Jr., Akron, OH

Roger Bacon, Metro Regional Transit Authority, Akron, OH

Shellie Blevins, Akron, OH

Shirley Alexander, Akron, OH

Stacey L. Tyrewala, FirstEnergy Service Company, Akron, OH

Susan M. Shondel, Akron, OH

Visane Kongmanichanh, Akron, OH

William & Christina Knezevich, Akron, OH

William Hoffman, Akron, OH

American Transmission Systems, Akron, OH

Ohio Edison Company, Akron, OH

Shaffers R E, LLC, an Ohio limited liability company, Akron, OH

State Of Ohio (Dept Of Transportation), Akron, OH

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The Mitchell A. Booth Revocable Trust, Akron, OH

Young Mens Christian Association of Akron, Akron, OH

Andrew A. & Peggy Zufall, Alliance, OH

Anthony L. & Sarah C. Miller, Alliance, OH

Betty Montgomery, Alliance, OH

Brian L. Custer, Alliance, OH

Brian M. & Tracy Frank, Alliance, OH

Bruce W. & Susan G. Parrish, Alliance, OH

Chad M. & Katherine E. Burton, Alliance, OH

Charles L. & Ann M. Kesterke, Alliance, OH

Chervenak & Fogle & Waers & Chervenak, Alliance, OH

Daniel Holibaugh, Alliance, OH

David L. & Tina M. Miller, Alliance, OH

Dieter Teutsch, Alliance, OH

Dorothy M. Monter, Alliance, OH

Dorothy Whitney, Alliance, OH

Dwight S. & Ruth A. Brugger, Alliance, OH

Edgar R. Johnson, Alliance, OH

Ferrele Brownlee, Alliance, OH

Gerald A. Markle, Alliance, OH

Harold T. & Teresa L. Greaves, Alliance, OH

James L. & Debra J.D. Hatherill, Alliance, OH

Jeffrey S. & Franelyn S. Calvin, Alliance, OH

JoAnn Leeman, Alliance, OH

John C. & June L. Porter, Alliance, OH

John J. Destefano, Jr., Alliance, OH

Joseph J. Skolosh, Alliance, OH

Larry F. & Julia D. Johnson, Alliance, OH

Linda Chain, Alliance, OH

Lowell A. Johnson, Alliance, OH

Margaret L. Charlton, Alliance, OH

Mary E. Rohr Destefano, Alliance, OH

Matthew A. Markle, Alliance, OH

Paul Burger, Alliance, OH

Paul O. Burger, Alliance, OH

Richard J. Johnson, Alliance, OH

Richard L. Linder, Alliance, OH

Robert C. & Joanne M. Knam, Alliance, OH

Ron Frank, Washington Township, Stark Co. Board of Trustees, Alliance, OH

Ronald C. & Doris J. Geiselman, Alliance, OH

Ronald J. Hoffman, Jr. & Becky A. Hoffman, Alliance, OH

Ronald Lee Salaski, Alliance, OH

Sher Mohammed, Alliance, OH

Stephen P. & Deborah K. Daskalov, Alliance, OH

Stephen T. Skolosh, Jr, Alliance, OH

Steve & Deborah Daskalov, Alliance, OH

Steven Lacher & Lisa Rinard, Alliance, OH

Terry L Rastetter, Alliance, OH

Tim Lanzer, Quality Oil & Gas Corporation, Alliance, OH

William Skolosh, Alliance, OH

Dieter Teutsch, Alliance, OH

Oakway Farms, LLC, Alliance, OH

Running Water Farms LLC, Alliance, OH

The Borland Family Revocable Living Trust, Alliance, OH

The Wolfe Family Trust, Alliance, OH

Westview Properties LTD, Alliance, OH

Diane L. Howell, Alliance, OH

Bev B Stoffers, Amherst, OH

Carol S. and Rick J. Lalonde, Amherst, OH

Howard A. Born, Amherst, OH

Howard A. Born, III, H.A. Born Irrevocable Farm Land Trust, Amherst, OH

Richard W. & Kathryn M. Coolbaugh, Jr., Amherst, OH

Richelle Reitter, Amsterdam, OH

Adrian Hochstetler, Apple Creek, OH

Alvin & Mary Yoder, Apple Creek, OH

Ammon & Suzie Stutzman, Apple Creek, OH

Andy & Mary Troyer, Apple Creek, OH

Chriss Miller, Apple Creek, OH

Dan & Mary Swartzentruber, Apple Creek, OH

Daniel Schlabach, Apple Creek, OH

David & Rachel Mast, Apple Creek, OH

David Hostetler, Apple Creek, OH

David Mast, Apple Creek, OH

Ervin & Mary Yoder, Apple Creek, OH

Eugene Smith, Apple Creek, OH

Herman & Mary Ginerich, Apple Creek, OH

James & Francis Yoder, Apple Creek, OH

John & Delila Miller, Apple Creek, OH

Jonas & Emma Miller, Apple Creek, OH

Larry & Rebecca Reber, Trustees, Apple Creek, OH

Levi & Fannie Miller, Apple Creek, OH

Lori Klintworth, Apple Creek, OH

Melvin Yoder, Apple Creek, OH

Menno Hershberger, Apple Creek, OH

Norman Miller, Apple Creek, OH

Roman Hostetler, Apple Creek, OH

Roman Yoder, Apple Creek, OH

Ruth Masters, Trustee, Apple Creek, OH

Stanley Orr, Apple Creek, OH

Steven Hostetler, Apple Creek, OH

Stuart & Theresa Swinehart, Apple Creek, OH

Uria Petersheim, Apple Creek, OH

Wayne & Arlene Chupp, Apple Creek, OH

Colt Investments Ltd, Apple Creek, OH

Corelogic, Apple Creek, OH

Yoder Real Estate Holdings LLC, Apple Creek, OH

John & Neva Troyer, Applecreek, OH

Louis Tumblin, Ohio Department of Transportation District #3, Ashland, OH

Marilyn June Price, Atwater, OH

Clare Votava, Avon, OH

James R. & Pearl A. Weiland, Avon, OH

Mike Grisa, Avon, OH

Regis Alfons Klingshirn, Avon, OH

Richard Ross Danburg, Avon, OH

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Thomas J. & Nicole Nagel, Jr., Avon, OH

Ying Hua Tang, Avon, OH

Hugh Donald & Lynn Nagel, Jr., Avon, OH

Thomas J., Sr. & Jeannette M. Nagel, Avon, OH

Raymond Alan Jupina, Avon Lake, OH

R & F Coal Company, Bannock, OH

Almeda Weigand, Francis E. Sage & Ada M. Sage Living Trusts, Barberton, OH

Christopher Tenney, Barberton, OH

David & Betsy Smith, Barberton, OH

Dennis R. & Josephine A. Winchell, Barberton, OH

James D. Nice, Barberton, OH

Marilyn Crenshaw, Barberton, OH

Philip Alexander, Barberton, OH

Bishop of Byzantine Catholic Diocese Pitts, Barberton, OH

Sharon E. Hendershot, Barnesville, OH

Charles R. Marshall, Beacon Marshall Construction Company, Bath, OH

Michael J & Carol C Hronek, Bay Village, OH

Jonas & Mattie Swartzentruber, Beach City, OH

Loretta Romesberg & Donna Marcinek, Beach City, OH

Philip R & Ginger P Lautzenheiser, Trustees, Beach City, OH

Gary & Marjorie Baumberger, Beallsville, OH

Garry L., II, Nolan & Wendy J. Arnold, Beallsville, OH

Mark Hoffman, Beallsville, OH

Donald E. Ackerman, Bellaire, OH

Roger Wade, Bellaire, OH

PHIL.AND.DOUG LLC, Bellevue, OH

Andrea L. and James E. Colvin, Jr., Bellevue, OH

August J. Sani, Jr., Bellevue, OH

Barbara A. Clark, Clark-Vue Agricultural Holdings, LLC, Bellevue, OH

Clarence Mullins, Bellevue, OH

Curtis & Linda Close, Close Grain Farms, Inc., Bellevue, OH

Donald L. & Michelle D. Fabian, Bellevue, OH

Douglas S. Smetzer, Bellevue, OH

Gary L. Hirt, Gary L. Hirt Trust, Bellevue, OH

Herman Daniels, Bellevue, OH

James A. & Lori S. Dauch, Bellevue, OH

Jonathan S. Valko & Erin E. Gardner, Bellevue, OH

Jonathon Valko, Bellevue, OH

Laura A. & Morrison L. Dillender, Bellevue, OH

Leroy Weiss, Jr., Bellevue, OH

Mark Rowland, Bellevue, OH

Matthew S. & Cynthia M. Orshoski, Bellevue, OH

Phil Smetzer, Phil & Doug, LLC, Bellevue, OH

Philip M. Smetzer, Bellevue, OH

Scott R. Clark, Clark-Vue Agricultural Holdings, LLC, Bellevue, OH

Sheldon Smetzer, Bellevue, OH

Travis J. & Kendra C. Hartman, Bellevue, OH

William L. Hartley, Hartley Family Properties Ltd., Bellevue, OH

Clark-Vue Agricultural Holdings, LLC, Bellevue, OH

Aaron Shock, Bellevue, OH

Richard T. & Anna M. Meyer, Bellevue, OH

Roger Rowland, Row-Land Farms Real Estate, LLC, Bellevue, OH

Julius Szahlender & Joseph Disantis, Ohio Turnpike Commission, Berea, OH

Marilyn H. Miller, Berea, OH

State of Ohio, Berea, OH

Margaret A Najarian, Berkey, OH

Paul W. & Vicki L. Barnes, Berkey, OH

Berlin Mineral Co LLC, Berlin, OH

Amy S. Hunter, Berlin Heights, OH

Carl M. Krueger, Berlin Heights, OH

Christopher K. & Phyllis J. Bauer, Berlin Heights, OH

Daryl R. Shinsky, Berlin Heights, OH

David G. Moon, David G. Moon, Trustee, Berlin Heights, OH

David S. & Rose M. Pinkerton, Berlin Heights, OH

Deborah L McGinnis, Berlin Heights, OH

Delight A Heckelman, Berlin Heights, OH

Diana M. and Robert A. Croll, Jr., Berlin Heights, OH

Edward A. Wlodarsky, Berlin Heights, OH

Frederick W. & Brenda A. Hast III, Berlin Heights, OH

G. David Moon, Life Estate, Berlin Heights, OH

Gary McGinnis, Jr., Berlin Heights, OH

Gene C. and Ruth E. Sprague, Berlin Heights, OH

George G Grega, Berlin Heights, OH

George J. & Donna M. Hall, Berlin Heights, OH

Henry R. Ostheimer & Deanna Ostheimer, Henry R. Ostheimer & Deanna Ostheimer Revocable Trust, Berlin Heights, OH

Howard & Anita Harlan, Berlin Heights, OH

Howard Schuster, Schuster Land Company, Berlin Heights, OH

Jack T. & Mary R. Colvin, Berlin Heights, OH

James D. & Lora H. Lowry (Life Estate), Berlin Heights, OH

James M. & Susan A. Suhanic, Berlin Heights, OH

James Ross & Georgeann Louise Lutz, Berlin Heights, OH

Jason P. & Colleen E. (fka Colleen E. Butler) Shupe, Berlin Heights, OH

Jeffrey D. & Cynthia L. Keller, Berlin Heights, OH

Jeffrey D. & Shari L. Bowers, Berlin Heights, OH

John & Tonya Myers, Berlin Heights, OH

John P. Zarvis, Berlin Heights, OH

Joseph T. Burnham, Burnham Farms, LLC., Berlin Heights, OH

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Draft EIS Distribution List

Larry J & Donna L Mark, Berlin Heights, OH

Larry W Harris, Berlin Heights, OH

Mary Delaney, Berlin Heights, OH

Matthew M. Smith, Berlin Heights, OH

Melvin N. & Charlotte J. Hall, Berlin Heights, OH

Michael & Jackie Mullins, Berlin Heights, OH

Michael Ray & Kathy Ann Old, Berlin Heights, OH

Nicholas & Pamela J. Costello, Berlin Heights, OH

Peter Spooner, Berlin Heights, OH

Richard & Bonnie Malone, Berlin Heights, OH

Richard S. & Rebecca L. Hillis, Berlin Heights, OH

Roy & Twyla Towns, Berlin Heights, OH

Scott & Heather J Harris, Berlin Heights, OH

Shiron K & Anita L Turner, Berlin Heights, OH

Steven P. & Beverly D. Grega, Berlin Heights, OH

Terri Lowry, Berlin Heights, OH

Thomas I. & Kathlene R. Cikotte, Berlin Heights, OH

Vickie Y. Harris, Berlin Heights, OH

Victoria L McGinnis, Berlin Heights, OH

Wayne W. Weiss, Berlin Heights, OH

William D. Gammie, William D. Gammie Revocable Living Trust, Berlin Heights, OH

William M. & Shirley F. Straight, Berlin Heights, OH

Donald L., Jr. & Alice M. Miner, Bethesda, OH

Craig Northcott, Blissfield, OH

Jay Lugibihl Properties, LLC, Boardman, OH

David M. & Julie A. Gingerich, Bolivar, OH

Louise Pearl Bolyard, Bolivar, OH

Andrew D. & Jessica L. Wiles, Bowling Green, OH

Andrew D. Sattler, Bowling Green, OH

Cheryl Peters, Bowling Green, OH

Dale K. Moser, Bowling Green, OH

Dale R. & Diane M. Brown, Bowling Green, OH

David A. & Danielle N. Luce, Bowling Green, OH

David L. Moon, Bowling Green, OH

Dustin D. Brown, Bowling Green, OH

Edward J. & Rita C. Steinberger, Bowling Green, OH

Eleanor P. Burrows & Michael W. Burrows, Bowling Green, OH

Gary M. & Barbara J. Asmus, Bowling Green, OH

Harmon E. Downard, Jr., Bowling Green, OH

James A. Long, Bowling Green, OH

James Bostdorff, Bowling Green, OH

James D. & Selene M. Bostdorff, Bowling Green, OH

James F. & Nancy M. Bostdorff, Bowling Green, OH

Jean Lafarree, Bowling Green, OH

Jeffrey A. & Cathy D. Hall, Bowling Green, OH

Jessica Bidinger, Ohio Department of Transportation, Bowling Green, OH

John and Amy Hofner, Bowling Green, OH

John R. & Deborah R. Robertson, Bowling Green, OH

John W. Cajka, Bowling Green, OH

Joseph C. & Roberta J. Kirkman, Bowling Green, OH

Joshua Niemer, Bowling Green, OH

Justin DuMond, Bowling Green, OH

Kenneth P. & Karen S. Podolak, Bowling Green, OH

Lawrence R Steyer Roth Catherine M Roth, Bowling Green, OH

Michael E. & Beth A. Ware, Bowling Green, OH

Michael R. Malinowski, Bowling Green, OH

Michael Sibbersen, Wood County, Bowling Green, OH

Norma H. Best, Bowling Green, OH

Perry R. & Anita M. Fletcher, Bowling Green, OH

Phillip Mintz, Bowling Green, OH

Richard A. & Joyce L. Almester, Bowling Green, OH

Richard H. & Joyce L. Dauer, Bowling Green, OH

Rick L. Snyder, Bowling Green, OH

Ronald D. Podolak, Bowling Green, OH

Sally H. Meier, Bowling Green, OH

Scott & Joann Nuzum, Bowling Green, OH

Theodore E. Dauer, Jr, Bowling Green, OH

Thomas R. German, Bowling Green, OH

Tim Murphy, Wood County, Bowling Green, OH

Timothy D. Smith, Bowling Green, OH

Travis L. Brown, Bowling Green, OH

Vince P & Deborah L Moracz, Bowling Green, OH

Warner G. & Carol L. Evers, Bowling Green, OH

William M. & Nancy A. Villalta, Bowling Green, OH

Charles H. Schulze Living Trust, Bowling Green, OH

Charlotte S. Long Trust, Bowling Green, OH

Frederick J. Speck Living Trust, Bowling Green, OH

Harold W. Weihl Trust, Bowling Green, OH

Harriet H. Hatfield Trust, Bowling Green, OH

James A. Long Trust, Bowling Green, OH

Mary L. Weihl Trust, Bowling Green, OH

Ohio Department Of Transportation, Bowling Green, OH

Richard A. Meier Revocable, Bowling Green, OH

Gerald A. Euler, Bowling Green, OH

David J. & Cynthia L. Kistner, Bowling Green, OH

James L Cajka, Bowling Green, OH

Keith & Lee Sundermeier, Sunweb Farm, an Ohio Partnership, Bowling Green, OH

Mark E. & Ginger L. Grolle, Bowling Green, OH

Paul F. & Marlene F. Brinker, Bowling Green, OH

Appendix A
Draft EIS Distribution List

Marlene F. Brinker Trust, Bowling Green, OH

Paul F. Brinker Trust, Bowling Green, OH

Wheeling & Lake Erie Railway Company, Brewster, OH

Wheeling and Lake Erie Railway, Brewster, OH

Albert E. & Gayle A. Joseph, Bridgeport, OH

Andrew C. & Rhonda M. Garner, Bridgeport, OH

Charles R., Jr. & Karen L. Probst, Bridgeport, OH

Charles William & Katherine Lousie Glatzer, Bridgeport, OH

Danford E. & Allison I. Powell, Bridgeport, OH

Darrin S. Sawchuk, Bridgeport, OH

David M. Volan, Bridgeport, OH

Donna L. Kaiser, Bridgeport, OH

James Ellis & Carolyn R. Kain, Bridgeport, OH

James P. Mohney, Bridgeport, OH

Joseph A. Bazar, Bridgeport, OH

Judith Ann Elizeus, Bridgeport, OH

Julie A. & Wilson S., III Adams, Bridgeport, OH

Kevin L. & Marcie L. Wilson, Bridgeport, OH

Kirk D. Bennett, Bridgeport, OH

Lawrence J. & Joyce A. Roy, Bridgeport, OH

Lugene A. Chine, Etal, Bridgeport, OH

Mallory D. & Martha M. Sinoski, Bridgeport, OH

Paul R., Jr. Guzik, Bridgeport, OH

Randall L. Walker, Bridgeport, OH

Richard M., II & Jennifer M. Theaker, Bridgeport, OH

Robert M. Bowen, Bridgeport, OH

Samuel R., II & Kelly L. Fox, Bridgeport, OH

Willard M. & Julie L. Nelson, Bridgeport, OH

Tary & Dorothy Labyk, Labyk Family Revocable Living Trust, Broadview Heights, OH

Ann C McGill, Brunswick, OH

David W. Morris, Brunswick, OH

Dorothy J. Morris, Brunswick, OH

Pamela Stiles, Brunswick, OH

Ray Hemeyer, Brunswick, OH

Resident, Brunswick, OH

Thomas D. Williams, Trustee, Thomas D. Williams Trust Agreement, Brunswick, OH

Lorraine E. Brown & Lyle Meintzer, Bryan, OH

E. Lenhoff, Burbank, OH

Caleb Lucas, Blue Racer Midstream, Cambridge, OH

Ken Schalmo, Canal Fulton, OH

Quin A. Wychanko, Canal Fulton, OH

William & Sandra Nemer, Canal Fulton, OH

AB3 Homes, LLC, Canal Fulton, OH

DJS Family Properties LTD, Canal Fulton, OH

George Strawn, Everflow Eastern Partners, LP, Canfield, OH

The Thomas B. Kubiac Revocable Trust, Canfield, OH

Anne Weeks, Canton, OH

Beth Inboden, Canton, OH

C. George & Michele R. Volkman, Canton, OH

Charles D. Hall, III, Hall Law Firm, Canton, OH

Charles Mullen, Canton, OH

Daniel T. & Caitlin M. Knop, Canton, OH

Daryl K. & Susan E. Witmer, Canton, OH

David J. & Bonnie L. Eigel, Canton, OH

David J. Eigel, Denergy, Ltd., Canton, OH

David M. Wargo, Canton, OH

Delores Seabolt, Canton, OH

Don Bendetta, Stark County Engineer, Canton, OH

Edward E. Waterfall, Canton, OH

Eric Calvert, Clinton Oil Company, Canton, OH

Ernest B. Douglas, Canton, OH

Gay Nebo, Etal - Trustees, Chester E & Norma J Nebo Irrevocable Trust, Canton, OH

George D. & Hallie P. Seanor, Canton, OH

Gerald A. & Trisha A. Gainey, Jr., Canton, OH

Heidi S. Gresh, Canton, OH

James Lee Thompson, Canton, OH

Jim Jackson, Canton, OH

Joe Sirgo, Canton, OH

John G. Selzer, Canton, OH

Joseph L. & Amanda Willmott, Canton, OH

Joseph W. & April R. Cook, Canton, OH

Juanita S. Weisel, Canton, OH

Judy Jane Hamrick, Canton, OH

Kevin L. Kobie, Canton, OH

Marilyn Ruthrauff, Etal, Canton, OH

Mark L. & Susan C. Bruce, Canton, OH

Matthew Hohman, Canton, OH

Michael A. Neidert, Canton, OH

Michael Hohman, Canton, OH

Mike Cody, Stark Metropolitan Housing Authority, Canton, OH

Pam Naylor, Canton, OH

Pattie Riegler, Canton, OH

Peggy Rovella Mayle, Canton, OH

Regina Riley, Canton, OH

Richard & Mary Ann Rohrig, Canton, OH

Richard C. & Shelly L. Griffith, Canton, OH

Robert B. & Sandra K. Tharp, Canton, OH

Robert L. & Karen J. Kroupa, Canton, OH

Rodney & Terrie Crilow, Canton, OH

Sandra R. Praznik, Canton, OH

Scott E. & Stacey M. Peters, Canton, OH

Scott Steepleton, M.A.S.S. Holdings LLC, Canton, OH

Shelly Griffith, Canton, OH

Stephen Paquette, Stark Development Board, Canton, OH

Steven & Cynthia Everetts, Canton, OH

Steven Eustathios, Canton, OH

Teresa Reno, Canton, OH

Terrie Crilow, Canton, OH

Appendix A
Draft EIS Distribution List

Thomas E. Hartnett, Day Ketterer LTD., Canton, OH

Valerie Luckner, Trustee, The Norma Kathryn Walker Irrevocable Trust, Canton, OH

Canton City, Canton, OH

Charles E. And Beverly Jeanne Swartz Irrevocable Trust, Canton, OH

Day Ketterer LTD., Canton, OH

Eden Church Of The Brethern, Canton, OH

Kuntz Properties, Inc, Canton, OH

Ohio State, Canton, OH

Royal G. And Janet V. Weisel Living Trust, Canton, OH

Russ Kiko Associates, Inc., Canton, OH

Stark County Commissioners (Board Of County Commissioners), Canton, OH

Stark County Commissioners (Canal Lands), Canton, OH

Stark County Park District, Canton, OH

Stark County Park District, Canton, OH

The Cross Family Trust, Canton, OH

Black Gold Group LLC & Volusia Property LLC/Eigg Land Limited LLC, Carrollton, OH

Apache Acres LLC, Castalia, OH

Guy W. Miller, Castalia, OH

James E. & Raelene S. Colvin, Castalia, OH

John E Ensley, Castalia, OH

Margaret Sharkey, Castalia, OH

Martin Smith, Castalia, OH

Ryan M. Miller, Castalia, OH

Allen V. Wightman, Castalia, OH

Brandon D. Biehl, Castalia, OH

Brenda Ruthsatz, Castalia, OH

Daniel & Deborah S. Westcott, Castalia, OH

David D. & Rebecca L. McMurray, Castalia, OH

David M. Hartwig, Castalia, OH

Douglas C. & Charlene D. Cullen, Castalia, OH

Jerold E. & Debbie L. Crum, Sr., Castalia, OH

Mitchell R. & Sara M. Watson, Castalia, OH

Patrick S. & Jane E. Cullen, Castalia, OH

Paul D. Agsten, Castalia, OH

Richard I. Miller, Castalia, OH

Rickey Lee & Lerenda Marie Thomas, Castalia, OH

Robert R. & Gail J. Arheit, Sr., Castalia, OH

Ronald C. & Karen M. Lippert, Castalia, OH

Stephen R. & Georgetta M. Meyer, Castalia, OH

Thomas E. & Gail Cullen, Castalia, OH

William T & Amy L. Aldrich, Castalia, OH

William T. & Amy L. Aldrich Jordan, Castalia, OH

Willie C. & Ella V. Holbrook, Castalia, OH

KDE Holdings, LLC, Castalia, OH

Wallace A. & Donna L. Miller, Chardon, OH

Andrew C. & Cynthia D. Kason, III, Chippewa Lake, OH

Clyde & Jean Letner, Jr., Chippewa Lake, OH

Kenneth T. & Elaine M. Zaremba, Chippewa Lake, OH

Matthew Williams, Chippewa Lake, OH

Michael C. & Melanie K. Gardiner, Chippewa Lake, OH

Raymond K. Schwarz, Chippewa Lake, OH

Stephen D. & Barbara J. Walkuski, Chippewa Lake, OH

The Randy W. Malburg Living Trust, Cincinatti, OH

United Methodist Financial Credit Union Inc., Cincinnati, OH

Clinton & Sarah Rossell, Clarington, OH

Harry & Christine Smith Family Irrevocable Trust, Clarington, OH

Mark & Terri Milosavljevic, Clarington, OH

Nelson J. Fisher, Clarington, OH

Sandra A. Dietrich, Clarington, OH

Zolar & Sarah Marus, Clarington, OH

Evalyn Gates, Cleveland Museum Of Natural History, Cleveland, OH

Glenn W. Hutchinson, Cleveland, OH

Jeffrey Murphy, Dominion East Ohio, Cleveland, OH

Kim Coursey, Secretary Of Housing & Urban Development, Cleveland, OH

Louise Unterzuber, Cleveland, OH

Patrick Sink, International Union of Operating Engineers, Cleveland, OH

Timothy Warner, Cavitch Law Firm, Cleveland, OH

Central National Bank Of Cleveland Trust, Cleveland, OH

Alan V. Skye, Clinton, OH

Amber M. Collins, Clinton, OH

Arlena Gibson, Clinton, OH

Barbara Lohmeyer & Thomas Ruzics, Clinton, OH

Brad & Bruce Bennett, Clinton, OH

Bradley N. Bennett, Clinton, OH

Brett A. & Tiffany J. Bogner, Clinton, OH

Brian W. & Melissa K. Underwood, Clinton, OH

Bruce A. Bennett, Clinton, OH

Bruce Bennett, Clinton, OH

C. Jane Carl, Clinton, OH

Candy Zawada, Clinton, OH

Carle D. Tuckerr, Clinton, OH

Carol Mcvey, Clinton, OH

Carol R. Dolan, Clinton, OH

Carolyn Carasea, Clinton, OH

Chad W. & Amy J. Johnson, Clinton, OH

Charles C. Dunlap, Clinton, OH

Charles M. & Pauletta Hoffman, Clinton, OH

Charles R. & Donna L. Mallery, Clinton, OH

Charles Sinley, Clinton, OH

Charlotte M. Cummings, Clinton, OH

Christine C. Vincent-Evans, Clinton, OH

Clark E. & Barbara A. Hall, Clinton, OH

Clydie Dippel, Clinton, OH

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Draft EIS Distribution List

Connie & Peter Schanz, The Connie B. Schanz Marital Trust, Clinton, OH

Coretha J. Silveous, Clinton, OH

D. Scott Brubaker, Clinton, OH

Dale A. Balazowich, Clinton, OH

Dale E. Palmer, Clinton, OH

Dana R. Howell, Clinton, OH

Daniel A. Vincent, Clinton, OH

Daniel E. & Amy D. Werntz, Clinton, OH

Daniel E. Czartoszewski, Clinton, OH

Daniel R. & Carolyn S. McGuire, Clinton, OH

David A. & Bonnie L. Schaub, Clinton, OH

David G. & Tiffany M. Krock, Clinton, OH

David L. Galloway, Clinton, OH

David V. & Jessica T. Bailey, Clinton, OH

Deborah A. Webb & Gregor A. Webb, Clinton, OH

Debra T. Banner, Clinton, OH

Delvin T. & Elaine M. George Pickett, Clinton, OH

Dennis D. Hartong, Clinton, OH

Dennis H. Bittaker, Clinton, OH

Derek M. Crine, Clinton, OH

Don M. & Julie Knight, Clinton, OH

Donald & Debra L. Schneider, Clinton, OH

Donald E. Brown, Clinton, OH

Donald O. & Shirley H. Brumblough, Clinton, OH

Donna Phillippi, Clinton, OH

Douglas F. Riggle, Clinton, OH

Earl T. Bell, Clinton, OH

Ellery & Greer Langkamp, Clinton, OH

Eric & Sherry Goodman, Clinton, OH

Ernest D. & Twila K. Shimer, Clinton, OH

Evelyn K. Nelson, Clinton, OH

George J. & Robin S. Pribanich, Clinton, OH

Gerald E. & Sandra K. Schmelzer, Clinton, OH

Gloria M. Williams, Clinton, OH

Gordon Endicott, Clinton, OH

Gregory A. Roach, Clinton, OH

Harlan L. & Deborah L. Oakes, The Harlan and Deborah Oakes Trust, Clinton, OH

Harold Pyle, Clinton, OH

Irene A. Wilkinson, Clinton, OH

Isaac L. & Charlotte J. Teter, Clinton, OH

James A. & Ann M. Tedrick, Clinton, OH

James E. & Andrea L. Wagner, Clinton, OH

James E. & Cathy A. Bartzi, Clinton, OH

James E. & Rebecca L. Sparks, Clinton, OH

James E. Carmany, Jr., Clinton, OH

James H. & Denise L. Miller, Jr., Clinton, OH

James J. Helms, Helms Family Revocable Living Trust, Clinton, OH

James S. Smyth, Clinton, OH

James W. & Margaret A. Creed, Clinton, OH

Janette J. Henrey, Clinton, OH

Janice S. Dippel, Clinton, OH

Jeffery A. & Lori L. Edgell, Clinton, OH

Jeffery Koerner, Clinton, OH

Jeffrey A. & Sheryl A. Bonk, Clinton, OH

Jeffrey Steven Farner, Clinton, OH

Jennifer E. Cummings, Clinton, OH

Joel A. Helms, Clinton, OH

Joey L. Norman, Clinton, OH

John D. & Michelle A. Wilson, Clinton, OH

John W. & Victoria A. Feesler, Clinton, OH

Jon K. & Cheryl H. Duer, Clinton, OH

Joseph E. & Amy L. Bologa, Clinton, OH

Julie A. Joyce, Clinton, OH

Julie A. Pinter, Clinton, OH

Kathy S. Brown, Clinton, OH

Keith A. & Patricia K. Palmer, Clinton, OH

Keith A. & Teri L. Kaufman, Clinton, OH

Kenneth J. & Debora A. Dishman, Clinton, OH

Kenneth P. Mong, II, Clinton, OH

Kenneth T. Kennedy, Clinton, OH

Kris M. Ledford, Clinton, OH

Kyra Jean Riddle, Clinton, OH

Larry N. Deborah K. Young, Clinton, OH

Laura D. Urban, Clinton, OH

Leslie & Tammy Chapman, Clinton, OH

Louis J. Brandt, Clinton, OH

Mark E. Dippel, Clinton, OH

Mark R. & Lynn M. Podnar, Clinton, OH

Marykay & Donald J. Pleskach, Clinton, OH

Michael J. Morton, Clinton, OH

Michael J. Rekai, Clinton, OH

Michael V. & Susan C. Rosinski, Clinton, OH

Michelle D. Koerner, Clinton, OH

Michelle L. Harvey, Clinton, OH

Nick Kechkes, Clinton, OH

Norman A. & Carol R. First, Clinton, OH

Pamela James, Edward Gintling, Clinton, OH

Patricia A. Bender, Clinton, OH

Patrick D. & Theresa A. Popovich, Clinton, OH

Patrick M. & Mary A. Conahan, Clinton, OH

Paul Alan & Dana L. Biro, Clinton, OH

Paul Fledderjohann, Clinton, OH

Penny J. Sterner, Clinton, OH

Perry L. & Donna G. Stone, Clinton, OH

Phillip L. Stark, Clinton, OH

Randy J. Watt, Clinton, OH

Raymond & Bonnie R. Pierce, Clinton, OH

Regina K. Whited, Clinton, OH

Richard D. Buck, Clinton, OH

Ricky D. & Theresa M. Scholl, Clinton, OH

Appendix A
Draft EIS Distribution List

Robert E. and Virginia L. Reedy, Clinton, OH

Robert G. & Jodie L. Berger, Clinton, OH

Robert J. Morton, Clinton, OH

Robert Lee & Margaret E. Baker, The Robert Lee Baker Living Trust, Clinton, OH

Robert P. & Kelly Lynn Pillitiere, Clinton, OH

Robert R. Schilling & Gale S. Schilling, The Schilling Trust, Clinton, OH

Robert W. & Roxanne Knotts, Clinton, OH

Roger D. & Michelle R. Chappell, Clinton, OH

Roland P. & Fern Richards, Jr., Clinton, OH

Ronald J. & Rosemarie Kuner, Clinton, OH

Ronald L. Stewart, Clinton, OH

Roy D. & Wendy J. Jones, Clinton, OH

Roy E. Hathaway, Clinton, OH

Roy G. & Eileen M. Jones, Clinton, OH

Sarah M. Schutte, Clinton, OH

Sheila Wenhart, Clinton, OH

Sherwin & Judith K. Alberts, Clinton, OH

Steve A. Oliphant, Clinton, OH

Susan I. Scott, Clinton, OH

Susan R. McCormack Chapman, Clinton, OH

Susan R. Yovichin, Clinton, OH

Susan W. Deitrick, Clinton, OH

Terrence R. & Barbara Ann Ritter, Clinton, OH

Theresa L. Burdette, Clinton, OH

Theresa M. Smith, Clinton, OH

Thomas D. & Kelly M. Culp, Clinton, OH

Thomas E. & Lia A. Fleming, Clinton, OH

Thomas W. & Cathryn M. Hutchinson, Clinton, OH

Timothy J. Harvey, Clinton, OH

Timothy S. & Kelly M. Byers, Clinton, OH

Timothy W. & Angelina K. Samples, Clinton, OH

Tina Anna Link, Clinton, OH

Toni Bethann Sholley, Clinton, OH

Toni M. King, Clinton, OH

Virgil E. Bennett, Clinton, OH

Virginia J. McClure, Clinton, OH

Vivian A. Taylor, Clinton, OH

Walter S. Shaffer, Clinton, OH

William E. & Andrea L. Foulk, Clinton, OH

William H. & Bonnie E. Taylor, Clinton, OH

William H. & Melva M. Stone, Jr., Clinton, OH

William L. Charlton, Clinton, OH

William R. & Amber K. Briggs, Jr., Clinton, OH

Comet Lake Club Inc., Clinton, OH

D & D Hartong Farms, LLC, Clinton, OH

Equity Trust Company, Clinton, OH

Mountain of Hope-Faith Church, Clinton, OH

Paul Lucas Landscape & Co., Clinton, OH

The Barbara J. Yingling Revocable Trust, Clinton, OH

The Elinor J. Harris Living Trust, Clinton, OH

The Everett C. Fleming Trust, Clinton, OH

The Helms Family Revocable Living Trust, Clinton, OH

The Joan T. Cook Living Trust, Clinton, OH

The Lena A. Parsons Trust, Clinton, OH

The Rayl Family Trust, Clinton, OH

The Werner H. Hennze Revocable Living Trust, Clinton, OH

Woods At Silver Creek Ltd, Clinton, OH

Donna M. Zeh, Clinton, OH

Michael W. Simmons, Clinton, OH

Andrew T. & Kimberly S. Wright, Clyde, OH

Anna Marie Tackett, Clyde, OH

Betty Wobser Brown, Trustee, Betty Wobser Brown Revocable Trust, Clyde, OH

Brian Harr, Clyde, OH

Charles Gibson, Clyde, OH

Christopher M. & Roberta A. Wiedle, Clyde, OH

Christopher M. Wiedle, Clyde, OH

Christopher Wiedle, Clyde, OH

Commodore G. & Norma J. Wade, Clyde, OH

Commodore Wade, Clyde, OH

Daniel Elwood, Clyde, OH

Daniel J. Schroer, Clyde, OH

David J. & Kathy S. Russell, Jr., Clyde, OH

Donald A. and Marian L. Beier, Life Estate, Clyde, OH

Douglas Waterfield, Clyde, OH

Dustin Dearth, Clyde, OH

Eilene K. Perry, Clyde, OH

Gary Fisher, Clyde, OH

Gary L. & Mark J Fisher, The Marie R. Fisher Living Trust, Clyde, OH

Hal D. & Carolyn Lovins, Clyde, OH

Helen Jean Gallagher, Clyde, OH

Jack Scott, Clyde, OH

Jason Fischer, Clyde, OH

John C. Parkhurst, Clyde, OH

Jon Slack, Clyde, OH

Joseph W. Parkhurst, Clyde, OH

Katelyn Wiedle, Clyde, OH

Katelyn York Wiedle, Clyde, OH

Kelly A. Parkhurst, Clyde, OH

Lawrence & Joyce P. Nyfenger, Clyde, OH

Linda H. Pugh, Clyde, OH

Margaret Harmon, Clyde, OH

Margaret Tucker, Clyde, OH

Marilyn Huston, Clyde, OH

Mark Fisher, Clyde, OH

Mark H. & Gail A. Payne, Clyde, OH

Mary Hamilton, Clyde, OH

Mary M. & James S. Hamilton, Clyde, OH

Michael P. & Nancy L. Beier, Remainderman, Clyde, OH

Michael Wade, Clyde, OH

Mildred J. Parkhurst, Clyde, OH

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Draft EIS Distribution List

Patrick J. & Tracey C. Kusser, Clyde, OH

Randall Holbrook, Clyde, OH

Richard Grafton, Clyde, OH

Robert J. Gysan, Clyde, OH

Robert Missler, Jr., Clyde, OH

Ronald Kenne, Clyde, OH

Samuel J. Bard, Clyde, OH

Stephen Clapp, Clyde, OH

Steven Smith, Clyde, OH

Thomas E. & Son Hui H. Kwiatkowski, Clyde, OH

Thomas W. & Cheryl A. Ferkel, Clyde, OH

Troy Albright, Trendy Holdings Llc, Clyde, OH

Troy Johnson, Clyde, OH

William Ensign, Clyde, OH

A & P Farms LLC, Clyde, OH

Anna L. Bodemann Trust, Clyde, OH

Monica L. Wright Trust, Clyde, OH

Thomas L. Wright Trust, Clyde, OH

Tower Grain, LLC, Clyde, OH

W R Enterprises LLC, Clyde, OH

Colerain Volunteer Fire Company Inc, Colerain, OH

Brenda K. Witchey, Colerain, OH

David P., Jr. & Gregory W. Lash, Colerain, OH

Ernest D., Jr. & Lisa M. Kapiskosky, Colerain, OH

Fredrick W. Gould, Colerain, OH

Judith L. Messenger, Colerain, OH

Martin P. & Lori Morrison, Colerain, OH

Maryann Kunze, Colerain, OH

Paul Yourko, Colerain, OH

Ralph & Patricia Jones, Colerain, OH

Rebecca Herndon, Colerain, OH

Shirley Spoon, Colerain, OH

Burdette D. Schmidt, Collins, OH

Heilmann Henry L., Elizabeth H. McKernan Trust, Collins, OH

Emery Krog Jr., Columbia Station, OH

Frank Geisler, Columbia Station, OH

Joseph Goss, Columbia Station, OH

Mary Snow, Columbia Station, OH

Carl Howard, Columbus, OH

Carolyn M. Fisher, Columbus, OH

Goldman & Braunstein, LLP, Columbus, OH

Jerry T. & Nancy L. Davidson, Columbus, OH

John C. Fisher, OH Farm Burea Federation, Columbus, OH

Kay Barton, Columbus, OH

Ohio Chamber of Commerce, Columbus, OH

Richard C. Sahali, Columbus, OH

Robert Schaller, A Schaller Limited Partnership, Columbus, OH

Tara Paciorek, The State of Ohio, Columbus, OH

Broad Street Energy Company, Columbus, OH

Columbia Gas Of Ohio, Inc., Columbus, OH

Columbia Gas Transmission, Columbus, OH

State Of Ohio, Columbus, OH

State Of Ohio ODOT, Columbus, OH

The Doris Linerode Irmiter Trust, Columbus, OH

William Cagle, Somerset Gas Transmission, LLC, Columbus, OH

Jeff Harmon, Medina Fuel Company, Inc., Coshocton, OH

Ohio Central Railroad Inc, Coshocton, OH

Beth Hoffman, Cuyahoga Falls, OH

Catherine Basile, Cuyahoga Falls, OH

Eva F. Stouffer, Cuyahoga Falls, OH

Jeff Luckay, Cuyahoga Falls, OH

Karen Wagner, Cuyahoga Falls, OH

Paul Hefferon, Cuyahoga Falls, OH

Richard & Shirley Culp, Cuyahoga Falls, OH

New Grill Road Properties LLC, Cuyahoga Falls, OH

Daniel & Elizabethe Slabaugh, Dalton, OH

Jacob Miller, Dalton, OH

Joseph & Anna Miller, Dalton, OH

Lori Troyer, Dalton, OH

William & Lavina Swartzentruber, Dalton, OH

Raymond Steede, The M. Jay Frederick Trust, Damascus, OH

Kathy Sue Spanfellner, Danville, OH

Art Komorowski, Dayton, OH

John & Martha Jane Leask, Deerfield, OH

Pat Ervin, Resource Energy, Inc., Deerfield, OH

Alan Falor, Delta, OH

Andrew L. Brehm & Nathan A. Brehm, Jenny L. Brehm Irrevocable Trust, Delta, OH

Bob & Jan Bratton, Delta, OH

Carol Goldsmith, Delta, OH

Cheryl Falor, Delta, OH

Cheryl Falor, Alan Falor & Carol Bensch, Life Estate, Delta, OH

Christopher Bratton, Delta, OH

Clifford C. Keil, Clifford C. Keil Trust Agreement, Delta, OH

Darrel G. Willson, Darrel G. Willson Revocable Living Trust, Delta, OH

Jay Budde, North-Western Ohio Rails To Trails Association, Inc., Delta, OH

Larry J. Welch & M. Arthur Welch, Delta, OH

Matthew Falor, Delta, OH

Norman W & Vicky Bratton, Jr., Delta, OH

Patricia S. Stanley, Trustee, Delta, OH

Paula S. Willson, Paula S. Willson Trust Agreement, Delta, OH

Richard W. Snyder, Trustee, Delta, OH

Seth William-Harold Brehm, Trustee, Delta, OH

Shirley A. Keil, Shirley A. Keil Trust Agreement, Delta, OH

Wesley E. Willson, Willson Trust Agreement, Delta, OH

Alberta A. Padyjasek, Dillonvale, OH

Allen K. Jaworski, Jr., Dillonvale, OH

Barbara & Thomas Isiminger, Dillonvale, OH

Benjamin J. & Dorrie A. Bintz, Dillonvale, OH

Bob R. Oline, Dillonvale, OH

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Draft EIS Distribution List

C. Cory Nicely, Dillonvale, OH

Dan G. & Cathie S. Jones, Dillonvale, OH

Donald K. & Janet D. Kinnan, Dillonvale, OH

Donald W., Jr. Dlesk, Dillonvale, OH

George J. & Jackie Peterson, Dillonvale, OH

George L., Jr. & Michelle R. Halaja, Dillonvale, OH

George Lollathin, Dillonvale, OH

Gerald C. & April L. Booth, Dillonvale, OH

German & Anna Nydia Ortiz, Dillonvale, OH

Grace M. Luginski, Dillonvale, OH

James A. & Jacqui A. Sall, Dillonvale, OH

James E. Nalley, Dillonvale, OH

John Freeman Holmes, Dillonvale, OH

Marilyn K. Zupko, Dillonvale, OH

Mark W. & Mary R. Mussard, Dillonvale, OH

Nicholas & Sheryl L. Stankovich, Dillonvale, OH

Richard D. Stobbs, Dillonvale, OH

Roger G. & Lois J. Thompson, Dillonvale, OH

Stephen M. & Nelva Lattocha, Dillonvale, OH

Ronald L & Kimberly Cronebach, Dover, OH

Terry Brown, EnerVest Energy Partners, Dover, OH

Albert Paul & Dianne Hatala, Doylestown, OH

Alex S. Kulcsar, The Alex S. Kulcsar Real Estate Trust, Doylestown, OH

Alison Myers, Doylestown, OH

Amanda J. Goff, Doylestown, OH

Anna L. Kaim, Doylestown, OH

Barbara L. North, Doylestown, OH

Beverly Lindner, Doylestown, OH

Bruce E. & Cheryl D. McCoy, Doylestown, OH

C. Ralph Gilbertson, Doylestown, OH

Carol J. Snyder, Doylestown, OH

Charolette L. Fraley, Doylestown, OH

Core M. Momchilov, Doylestown, OH

Daniel J. Keller, Doylestown, OH

Dave Busson, Chippewa Township, Wayne Co. Board of Trustees, Doylestown, OH

David D. & Christine J. Fazekas, Doylestown, OH

David E. Holmes, Doylestown, OH

David L. & Brenda Lee Busson, Doylestown, OH

David R. & Marilyn S. Hill, Hill Family Trust, Doylestown, OH

Dawn C. Huebner, Doylestown, OH

Deborah A. (Fka Deborah Williams) & Dennis Bergeron, Doylestown, OH

Edwin D. Ross, Doylestown, OH

Eric S. Rubright, Doylestown, OH

Eugene T. Hafler, Doylestown, OH

Frank M. & Ann Denise Vargo, Doylestown, OH

Glenn L. & Linda I. Butcher, Doylestown, OH

Gregory & Melinda Renee Richardson, Doylestown, OH

Harvey S. & Constance R. Bechtel, Doylestown, OH

James & Teresa A. Perry, Doylestown, OH

James C. & Nicole K. Cushing, Doylestown, OH

James W. & Sandra L. Lusk, Doylestown, OH

Jason F. & Stacy M. Dutt, Doylestown, OH

Jerald A. & Clare G. Delventhal, Doylestown, OH

Joan Goch, Doylestown, OH

John & Sherry Karabatsos, Doylestown, OH

John C. & Rita L. Loggins, Doylestown, OH

Joshua B. Brown, Doylestown, OH

Karen S. Cutshall, Doylestown, OH

Keith M. & Paula D. Miller, Doylestown, OH

Kenneth F. & Constance R. Clausen, Trustees, The Clausen Family Revocable Trust, Doylestown, OH

Lisa S. Somers, Doylestown, OH

Lucille A. Dietry, Doylestown, OH

Marlene J. Lindeman, Trustee, Doylestown, OH

Matthew L. Gentner, Doylestown, OH

Miles P. Coughenour, Doylestown, OH

Pamela Busson, Doylestown, OH

Pamela J. Myers, Doylestown, OH

Patricia A. Doyle, Doylestown, OH

Phyllis Ledford, Phyllis Ledford, Doylestown, OH

Raymond A. Lewis, Doylestown, OH

Richard Galehouse, Doylestown, OH

Richard J. & Cheryl M. Dombroski, Doylestown, OH

Richard W. Talbott, Doylestown, OH

Rita Roberts, Doylestown, OH

Robert C. & Patricia Harrison, Doylestown, OH

Robert L. & Linda S. Knickerbocker, Doylestown, OH

Ronald E. & Judith Lindeman, Doylestown, OH

Ross W. & Rebecca J. Mollohan, Doylestown, OH

Scott A. & Charlene Moyer, Doylestown, OH

Shirley A. Walsh, Doylestown, OH

Stephen J. & Teressa E. Jung, Doylestown, OH

Stevan & Melita Stelkic, Doylestown, OH

Thomas B. & Ina F. Gainer, Doylestown, OH

Thomas D. & Cathy L. Van Nostran, Crown Point Farms, Inc., Doylestown, OH

Tony Lindeman, Doylestown, OH

Troy G. & Jennie McFarland, Doylestown, OH

William J. Lepley, Jr., Doylestown, OH

Dutt Family Properties, Inc., Doylestown, OH

Geraldine L. Butcher Family Trust, Doylestown, OH

JAS, LLC, Doylestown, OH

KDD Miller Farms Partners, Doylestown, OH

Mary E. Boughman Revocable Trust, Doylestown, OH

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Draft EIS Distribution List

Walsh Farms A General Partnership, Doylestown, OH

Greg Belew, AT&T, Dublin, OH

Ohio Gas Association, Dublin, OH

Urban Renewables II, LLC, Dublin, OH

Robert & Amanda Weaver, Dundee, OH

Marjorie J. Ellyson Living Trust, E Rochester, OH

Jack Smalley, E. Rochester, OH

Thomas & Dorothy Lynch, East, OH

Lozier Family LLC, East, OH

Tri-County Contractors, East, OH

Alan Fuller, East Canton, OH

Daniel & Malinda Adams, East Canton, OH

Dwain & Kathy Foltz, Trustees, Dwain R Foltz Trust, East Canton, OH

Earl Grove, East Canton, OH

Gladys Bellamy, East Canton, OH

Kris & Rebecca Vincent, East Canton, OH

Kris G & Rebecca Vincent, East Canton, OH

Lyndal Sr & Betty Tabler, East Canton, OH

Robert Foltz, East Canton, OH

Steven Godfrey, East Canton, OH

Tommy A & Minnie Metz, East Canton, OH

Vicki Lloyd-Bellamy, East Canton, OH

Darije Family Limited Partnership, East Canton, OH

Foltz & Foltz Ltd Partnership, East Canton, OH

The Cheryl A. Hrovatic Trust, East Rochester, OH

Bruce L. & Jennine E. Woolf, East Rochester, OH

Charles M. & Marjorie J. Ellyson, East Rochester, OH

Charlotte Jo Boord, East Rochester, OH

Cheryl Ann Giey, East Rochester, OH

David M. & Jo D. Unkefer, East Rochester, OH

Don Bush, East Rochester, OH

Donald J. Wutrick, East Rochester, OH

Donald L. & Lorie K. Bush, East Rochester, OH

Jack Vincent, Jr., East Rochester, OH

James W. & Nancey E. Irwin, East Rochester, OH

Jeanne Lovejoy, East Rochester, OH

Jim Irwin, East Rochester, OH

Keith R. & Amanda B. Sanor, East Rochester, OH

Kenneth Unkefer, East Rochester, OH

Kevin L. Kleinbeck, East Rochester, OH

Leo & Mary Alice Davis, East Rochester, OH

Lorie A. Smalley, East Rochester, OH

Lorie K. Pollock, East Rochester, OH

Lucille M. Ellyson, East Rochester, OH

Patricia L. Wutrick, East Rochester, OH

Patricia Zachman, East Rochester, OH

R Mark & Judy Kohler, East Rochester, OH

Samuel L. Figley, East Rochester, OH

Shawn McConville, East Rochester, OH

Susan Hilverding, East Rochester, OH

Thomas R. Irwin, East Rochester, OH

Timothy & Tamara Wilson, East Rochester, OH

Ayrview Acres LLC, East Rochester, OH

Benner Revocable Living Trust, East Rochester, OH

Big Arbs Enterprises LLC, East Rochester, OH

Alison Hoffa, East Sparta, OH

David A & Theresa Collinsworth, East Sparta, OH

Edward C & Betty Alborn, East Sparta, OH

Ellen Vanpelt, East Sparta, OH

Gabe & Robyn Hoffa, East Sparta, OH

Gary & Betty Sayre, East Sparta, OH

Gary & Rhonda Fleischman, East Sparta, OH

Gary Kovach, East Sparta, OH

Jeffery Beshore, East Sparta, OH

Kay Klever, East Sparta, OH

Linda Zaleski, East Sparta, OH

Mark Cook, East Sparta, OH

Mark Cook, East Sparta, OH

Martha Gordon, East Sparta, OH

Marvin & Martha Cook, Trustees, East Sparta, OH

Marvin L & Martha J Cook, Trustees, East Sparta, OH

Mary Hill, East Sparta, OH

Michael Wiles, Jr, East Sparta, OH

Richard Zaleski & Patricia Barnett, East Sparta, OH

Rita Klever, East Sparta, OH

Robert & Candy Carroll, East Sparta, OH

Robert L Kirkpatrick, Etal, East Sparta, OH

Steven Swank, East Sparta, OH

Terri Cook, East Sparta, OH

Terri Cook, East Sparta, OH

Terri Thornhill, East Sparta, OH

William R & Linda Lasure, East Sparta, OH

I & L Ltd, East Sparta, OH

Pike Twp Board Of Trustees, East Sparta, OH

Senlen Corporation, East Sparta, OH

Springwood Lake Ccpo Assn, East Sparta, OH

Charlotte Wobser, Life Estate, Eastlake, OH

Karen J. Tabar, Eastlake, OH

Charles Botzko, Elmore, OH

Daryl J. & Betty Jo Sherman, Elmore, OH

Deborah L. Johlin-Bach, Deborah L. Johlin-Bach Living Trust, Elmore, OH

Gary W. Bach, Gary W. Bach Living Trust, Elmore, OH

Trent Rutherford, Rothert Farm Inc., an Ohio Corporation, Elmore, OH

Karen M. Haar Revocable Inter Vivos Trust Established April 4, 1997, Elmore, OH

Hollie Hallman, Elryia, OH

Christine Bruce, Elyria, OH

Daniel T. & Cathern L. Fink, Elyria, OH

Don Bohannon, Lorain County Engineer, Elyria, OH

Ernie Nevelos, Lake Shore Railway Association Inc, Elyria, OH

Appendix A
Draft EIS Distribution List

Glenn L & Pamela M Miskov, Elyria, OH

Richard Szantay, Elyria, OH

Rob Shulman, Elyria, OH

Wayne Wade, Elyria, OH

Lake Shore Railway Association Inc, Elyria, OH

Gary W. & Kathryn I. Kothe, Elyria, OH

Mary Ann McGuckin, Fairlawn, OH

William Hlavin, Bass Energy, Inc., Fairlawn, OH

Richard A. Smith, Kenneth S. Smith Trust Agreement, Findlay, OH

Hardin Street Transportation, LLC, Findlay, OH

State Of OHIO, Findlay, OH

Stoneco, Inc., Findlay, OH

Aden Yoder, Fredericksburg, OH

Andrew Troyer, Fredericksburg, OH

Crist Miller, Fredericksburg, OH

Dennis Wengerd, Fredericksburg, OH

Donald Rhamy, Fredericksburg, OH

Levi Miller, Jr, Fredericksburg, OH

Lynne & Kenneth Orr, Fredericksburg, OH

Owen & Laura Mast, Fredericksburg, OH

Robert Kein, Fredericksburg, OH

Steven & Martha Yoder, Fredericksburg, OH

Vernon Yoder, Fredericksburg, OH

Lisa Tharp, Ohio State Grange, Frederickstown, OH

Angela L Morelock, Chamber of Commerce of Sandusky County, Freemont, OH

James E Ardner, Freemont, OH

Kenneth D. & Deborah S. Ruttig, Freeport, OH

L&M Farms Inc., Fremont, OH

The Board of Commissioners of the Sandusky County Park District, Fremont, OH

The Freemont Chapter, Fremont, OH

Anthony Polter, Polter Brothers Farms LLC, an Ohio limited liability company, Fremont, OH

Arley M. Stewart, Fremont, OH

Barbara J Shively, Fremont, OH

Benjamin Shively, Life Estate, Fremont, OH

Bernard R. Overmyer, Fremont, OH

Brad J. Edmonds & Andrew J. Edmonds & Candace D. Edmonds, Fremont, OH

Brad L. & Barbara E. Bristley, Fremont, OH

Brandon T. Jones & April N. Ratliff, Fremont, OH

Brenda Black, Fremont, OH

Bruce Shank, Sandusky Township, Fremont, OH

Carol S. Crump, Fremont, OH

Charles A. Weickert, Weickert Farms LLC, Fremont, OH

Charles F. Hetrick, Life Estate, Fremont, OH

Chris E. Schwochow, Fremont, OH

Christie L. O'Brien, Fremont, OH

Christie Schneider, Fremont, OH

Clarence L. & Sandra S. Weickert, Jr., Fremont, OH

Constance I. Longanbach, Fremont, OH

David W. & Lisa J. Sachs, Fremont, OH

Deborah S. Beard, Fremont, OH

Diane Fails, Fremont, OH

Don Atkinson, RICE TWP of Sandusky County, Fremont, OH

Donald J. & Rosemary L. Wensinger, II, Fremont, OH

Duane E. & Robin S. Reese, Fremont, OH

Elizabeth Herman, Life Estate, Fremont, OH

Eric J. & Joan A. Magnuson, Fremont, OH

Gary H. & Lynn M. Emery, Fremont, OH

George J. Rathfelder, George J. Rathfelder Declaration of Trust, Fremont, OH

Gilbert C. & Catherine A. Overmyer, Fremont, OH

Howard N. Schlegel, Fremont, OH

James E. & Linda K. Ardner, Fremont, OH

James J. Sheenan, Fremont, OH

Jeffrey A. Biehler, Fremont, OH

Jerri Miller, Auditor, Fremont, OH

Jerry R. & Brenda K. Stults, Fremont, OH

Joel A. Lagrou, Fremont, OH

John E. Payne, John E. Payne LLC, Fremont, OH

John P Mollinger, Fremont, OH

John P. & Jean M. Anderson, Fremont, OH

John W. Antesberger, Fremont, OH

Joseph A. & Patricia L. & James L. & Judith K. Halbeisen, Halbeisen Living Trust, Fremont, OH

Kay Lynn Koch, Fremont, OH

Kimberly Elfring, Fremont, OH

Larry Willey, Fremont, OH

Lawrene C. Bruggeman, Fremont, OH

Lori Kepus, Woodville Township, Fremont, OH

Mary Jane Hasselbach, Fremont, OH

Michael A. Hrupcho, Fremont, OH

Michael B. Schlegel, Fremont, OH

Michael B. Schlegel, Fremont, OH

Michael C. Gruss, Fremont, OH

Michael Longanbach, Fremont, OH

Norma L. Pence, Fremont, OH

Patricia Kiser, Fremont, OH

Paul Parkhurst, Fremont, OH

Peter A. & Marcella Naderer, Fremont, OH

Philip Brooks, Fremont, OH

Rich Randolph, Sandusky County Engineer, Fremont, OH

Richard D. Beard, Fremont, OH

Robert & Robin Roth, Robert & Robin Roth Revocable Living Trust, Fremont, OH

Ronald A. & Shari Snyder, Fremont, OH

Ronald L. & Debra B. Conner, Fremont, OH

Ronald L. Root, Fremont, OH

Scott A Logan, Fremont, OH

Scott L. Rathfelder, Sr., Ralph L. Rathfelder Revocable Living Trust, Fremont, OH

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Draft EIS Distribution List

Stephen J. & Cynthia A. Frontz, Fremont, OH

Teresa Sattler, Fremont, OH

Thomas J. & Margaret E. Wagner and Walter & Marjorie Bumb, Fremont, OH

Thomas J. Wagner & Margaret E. Wagner, Fremont, OH

Thomas K. & Laura M. Krynock, Fremont, OH

Thomas Kistler, Fremont, OH

Thomas L. Antesberger, Fremont, OH

Todd Edward & Dawn Marie Williams, Fremont, OH

Troy Amor, Armor Farms LLC II, Fremont, OH

Vincent P. & Mary K. Reiter, Fremont, OH

William A. Bordner, Fremont, OH

Chaberlain Family Revocable Living Trust, Fremont, OH

Howard N. Schlegel, Life Estate, Fremont, OH

Keith A. King and Beverly J. King Joint Trust, Fremont, OH

Ohms Acres, LLC, Fremont, OH

James O. & Candace L. Rosenberger, Fremont, OH

Donald J. & Rosemary L. Wensinger, Fremont, OH

Kenneth A. & Barbara J. Ackerman, Fremont, OH

Rick A. & Kathryn A. Talbert, Fremont, OH

Tomas M. & Jacqueline A. Mendoza, Fremont, OH

John Harrison, American Electric Power (AEP), Gahanna, OH

Nola Mohrman, Trustee Etal, Galena, OH

Carol K. Deal, Genoa, OH

Marlene Stelnicki, Genoa, OH

Carol L. Miller, Gibonburgh, OH

Carol E. Lindsay, Remainderman, Gibsonburg, OH

Charles J. Rupke, Gibsonburg, OH

David C. & Debra L. Beeker, Gibsonburg, OH

Douglas R. & Gail L. Edwards, Gibsonburg, OH

Douglas R. Edwards, Remainderman, Gibsonburg, OH

Evan A. Miller, Gibsonburg, OH

Girea J. Haskill & Richard G. Arndt, Gibsonburg, OH

Jerry P. Schuett, Gibsonburg, OH

John C. Schuett, Gibsonburg, OH

Joseph T & Brenda J Wagner, Gibsonburg, OH

Joyce E. Harruff, Gibsonburg, OH

Joyce Labine, Gibsonburg, OH

Karl Raymond Bury, Gibsonburg, OH

Keith A. Edwards, Remainderman, Gibsonburg, OH

Lisa Ann Bury, Gibsonburg, OH

Lorenna J. Rothert, Remainderman, Gibsonburg, OH

Lyman Eugene Crawfoot, Jr., Gibsonburg, OH

Margaret B. Edwards, Life Estate, Gibsonburg, OH

Mark L. & Diane M. Buck, Gibsonburg, OH

Mark L. Buck, Gibsonburg, OH

Mary Schraeder, Gibsonburg, OH

Michael L. and Tina M. Watkins, Vendees, Gibsonburg, OH

Randall Martin Bury, Gibsonburg, OH

Richard G. Arndt, Gibsonburg, OH

Robert A. & Mary J. Schroeder, Gibsonburg, OH

Robert F Miller, Gibsonburg, OH

Robert L. Gerwin, Gibsonburg, OH

Ronald C. & Ruth A. Humburg, Gibsonburg, OH

Sarah Shively, Next Level Auto Sales, Gibsonburg, OH

Scot E. Haar, Gibsonburg, OH

Sharon H. Bury aka Sharon L. Bury, Life Estate, Gibsonburg, OH

Shon A. & Amy L. Lawless, Gibsonburg, OH

Steve M. Conrad, Gibsonburg, OH

Ustolia Escobedo, Gibsonburg, OH

Yvonne A. Long, Gibsonburg, OH

The Robert and Mary Blausey Trust, Gibsonburg, OH

Albert L. & Lynn R. Weigel, Grafton, OH

Albert L. Weigel, Grafton, OH

Andrew Pennell, Grafton, OH

Anna Marie Gibbons, Grafton, OH

Bobbie Burey, Grafton, OH

Bonnie L. Facemire, Grafton, OH

Brian Cole, Grafton, OH

Brian Mohoney, Grafton, OH

Charlene F. Adkins, Grafton, OH

David Espansandin, Grafton, OH

Dawn M. McKimmie, Grafton, OH

Dennis & Deborah Uehlein, Grafton, OH

Dennis J. & Jayne E. Walter, Grafton, OH

Donald Miller, Grafton, OH

Faith Costilow, Grafton, OH

Gilbert E. & Joyce M. Haury, Grafton, OH

Gina Cole, Grafton, OH

Helen Louise Rader, Grafton, OH

Jack L. & Shirley A. Clifford, Grafton, OH

James L. Weigel, Grafton, OH

Jay L. & Michele A. Squire, Grafton, OH

Jean Haight, Grafton, OH

Jean M. Porter, Grafton, OH

Jerry R. Weigel, Grafton, OH

Jerry W. Kelley, Grafton, OH

Jimmy L. & Rose M. Cornell, Grafton, OH

John A. Setlock, Grafton, OH

John J. & Cynthia L. McFadian, Grafton, OH

John M. & Elizabeth A. Patton, Grafton, OH

John R. & Lizabeth L. Muellauer, Grafton, OH

Jose M. & Dolores M. Cruz, Grafton, OH

Joyce Harvey, Grafton, OH

Keith A. & Kimberly A. Wagner, Grafton, OH

Keith R. Falkowski, Grafton, OH

Kenny L. Hodges, Grafton, OH

Laura J. Konas, Grafton, OH

Laurie Weigelt, Grafton, OH

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Draft EIS Distribution List

Lawrance Plas, Grafton, OH

Linda O'Donnell & Marilyn Filimon, Grafton, OH

Lori A. Swain, Grafton, OH

Louis E. & Shelby A. Charlton, Grafton, OH

Luci Thomas, Grafton, OH

Marian M. Weigel, Grafton, OH

Marilyn R. Griffin, Grafton, OH

Mark R. & Judith L. Wakefield, Grafton, OH

Metro Parks Lorain County, Grafton, OH

Michael & Jeanne Debs, Grafton, OH

Michael P. Buckey, Grafton, OH

Minta A. Monchein, Trustee and Settlor, Grafton, OH

Patrick Fraley, Grafton, OH

Peter P Favorito, Grafton, OH

Rae Buckey, Grafton, OH

Ralph N. & Desirae A. Shie, III, Grafton, OH

Rebecca L. & Kyle N. Atwood, Grafton, OH

Rhonda S. Bruchac, Grafton, OH

Robert F. Monchein, Grafton, OH

Roger D. & Rebecca A. Canterbury, Grafton, OH

Sharon Pall, Grafton, OH

Sheryl Billman, Grafton, OH

Steve & Denise Shanno, Grafton, OH

Susan K. Sandstrom, Grafton, OH

Ted J. Shriver, TJS Trust, UWA, Grafton, OH

Thomas Herron, Grafton, OH

Thomas L. & Patricia M. Marquard, Grafton, OH

Thomas M. & Linda Smolilo, Grafton, OH

Thomas R. & Rachele A. Podulka, Grafton, OH

Thomas R. Podulka, Grafton, OH

Timothy & Bernadette A. Zielinski, Grafton, OH

Timothy R. Dostall, Grafton, OH

Virginia O. Moore, Grafton, OH

Wayne W. Wise, Grafton, OH

Wendy Mohoney Montoney, Grafton, OH

William G. Johnson, Grafton, OH

42 Raceway LLC, Grafton, OH

Hrusch Family Revocable Living Trust, Grafton, OH

Pullen Family Revocable Living Trust, Grafton, OH

Ross Consolidated Corp, Grafton, OH

Weigel Farms Inc, Grafton, OH

Dale R & Roberta J Kitchen, Grand Rapids, OH

Frank Goods, Grand Rapids, OH

John Strayer, Grand Rapids, OH

Larry & Suzanne Mary Hancock, Grand Rapids, OH

Leatra Harper, Freshwater Accountability Project, Grand Rapids, OH

Leatra Harper, Grand Rapids, OH

Luke Hutchinson, Grand Rapids, OH

Marjorie Hertzfeld, Grand Rapids, OH

Rhonda Mokri, Grand Rapids, OH

Richard D & Shirley Hester, Grand Rapids, OH

William H & Margaret M Johnson, Grand Rapids, OH

Donna M. Box Trust, Grand Rapids, OH

H.H.H. Enterprises, Grand Rapids, OH

Hertzfeld Poultry Farms, Grand Rapids, OH

Hertzfeld Poultry Farms Inc., Grand Rapids, OH

James D Hertzfeld Family Limited Partnership, Grand Rapids, OH

James D. & Mary Lou Hertzfeld Trust, Grand Rapids, OH

Richard G. and Marjorie R. Hertzfeld Family, Grand Rapids, OH

The Judith E. Kovach Living Trust, Grand Rapids, OH

Green Bulldog Youth Football, Green, OH

Green Lacrosse Club, Green, OH

John Walch, City of Green , Green, OH

Tammy Daly, Green Soccer Association, Green, OH

Wayne L. Wiethe, AICP, City of Green, Green, OH

City of Green, Green, OH

Danny J. & Elizabeth B. Anstead, Green Springs, OH

Michael J. & Carrie A. McDonald, Green Springs, OH

Diana H. Neff, Greentown, OH

Ryan S. Thompson, Greentown, OH

Sherry L. Thompson, Greentown, OH

Ted D. & Carole L. Rohrer, Greentown, OH

Melissa Dyer, Green Schools Foundation, Greenwich, OH

Michael Dangelo, Greenwich, OH

Shirley Oney, Greenwich, OH

Gregory A. & Brenda S. Goble, Greenwich, OH

Anthony Arnoto, Jr., Hanoverton, OH

Becky L. Crawford, Hanoverton, OH

Becky Lynn Crawford, Hanoverton, OH

Bonita Trumble, Hanoverton, OH

Burdette & Shirley Solomon, Hanoverton, OH

Carol Ossler, Hanoverton, OH

Charles & Terry Ankeny, Jr., Hanoverton, OH

Charles M. & V. Susan Pritchard, Hanoverton, OH

Cheryl Watson, Hanoverton, OH

Cynthia D. Stoughton, Hanoverton, OH

Dean & Betty Kibler, Hanoverton, OH

Dean & Betty Kibler, Hanoverton, OH

Dean A. & Betty J. Kibler, Hanoverton, OH

Dorothy L Ward, Hanoverton, OH

Edwin Brenner, Hanoverton, OH

George Kimble & Sandra Gaye Wilson, Hanoverton, OH

Gerald & Wanda Kidder, Hanoverton, OH

Grant M. Wilson, Hanoverton, OH

J. Mark & Mary Prosko, Hanoverton, OH

Jack Mcintosh, Hanoverton, OH

James Kibler, Hanoverton, OH

James Solomon, Hanoverton, OH

Janice K. Gruszecki, Janice K. Gruszecki Revocable Living Trust, Hanoverton, OH

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Draft EIS Distribution List

John Leach, Hanoverton, OH

John & Lori Tucker, Hanoverton, OH

John Thomas, Hanoverton, OH

Joseph D. Ray, Hanoverton, OH

Joseph Ray, Hanoverton, OH

Joshua J. & Beth D. Swogger, Hanoverton, OH

Keith Sell, Hanoverton, OH

Kevin & Barbara Hitchcock, Hanoverton, OH

Kiko Russell T Jr Russell T Kiko Jr (Te), Hanoverton, OH

Larry Brogan, Hanoverton, OH

Leroy Ridgeway, Hanover Township, Columbiana Co. Board of Trustees, Hanoverton, OH

Mancil & Agnes Ridgeway, Hanoverton, OH

Margie K. Berresford, Hanoverton, OH

Michael & Jan Blazer, Hanoverton, OH

Michael & Karen Gruszecki, Hanoverton, OH

Michael E. & Karen S. Gruszecki, Hanoverton, OH

Michael Gruszecki, Jr, Hanoverton, OH

Michael J. & Rebekah R. Chestnut, Hanoverton, OH

Nancy Clapsadle, Hanoverton, OH

Nancy L. Clapsadle, Hanoverton, OH

Nathan A. Wilson, Hanoverton, OH

Patrick R. Hallock, Hanoverton, OH

Peggy Ann Mix, Hanoverton, OH

Phillip T. & Mary M. Wolfgang, Hanoverton, OH

Rudolph Sobotka, Hanoverton, OH

Russell & Rebecca Miller, Hanoverton, OH

Russell & Rebecca Miller, Sr, Hanoverton, OH

Sandra Kay Tedeschi, Hanoverton, OH

Scott Kibler, Hanoverton, OH

Sidney A. Isenschmid, Hanoverton, OH

Steven Jenkins, Hanoverton, OH

Susan Lee Drotleff, Hanoverton, OH

Vinson Allen Ward, Hanoverton, OH

Bangor LLC, Hanoverton, OH

Columbia Gas Transmission Corp, Hanoverton, OH

Jay Lugibihl Properties LLC, Hanoverton, OH

Kensington Enterprises, LLC, Hanoverton, OH

Wilsons Sandy Creek Land LLC, Hanoverton, OH

Tri County Water Authority Of Harrisville, Harrisville, OH

Charles M. & Cheryl A. Shoulders, Hartville, OH

Darrin J. & Donna J. Noble, Hartville, OH

Eugene R. & Rebecca S. Martz, Hartville, OH

James M. & Bethia J. Herbruck, Hartville, OH

Jeffery A. Bynum, Hartville, OH

Katherine E. Shoulders, Hartville, OH

Leroy J. & Martha M. Yoder, Hartville, OH

Levon Hill, Lake Township, Stark Co. Board of Trustees, Hartville, OH

Louetta Mills, Hartville, OH

Rick Pergert, Marlboro Township, Stark Co. Board of Trustees, Hartville, OH

Steven L. Grose, Hartville, OH

Thomas A. & Elizabeth A. Burick, Hartville, OH

Troy Valasek, Enervest Energy Partners, LLC, Hartville, OH

Cra Properties I Ltd, Hartville, OH

Glenwood Holdings, LLC, Hartville, OH

Pavlak Enterprises Inc., Hartville, OH

The Jacovetty Revocable Living Trust, Hartville, OH

The Linda P. Lahr Revocable Trust, Hartville, OH

The Woodrow L. Lahr Revocable Trust, Hartville, OH

Dean James LLC, Haskins, OH

Jeff Ford, Middleton Township (Wood County), Haskins, OH

Luke Shipp, Haskins, OH

E Louise Perkins, Hinckley, OH

Daniel W. Keivens, Holland, OH

Janet Traub, Oak Openings Region Conservancy, Holland, OH

Janice L. Burchfield, Janice L. Burchfield Trust Agreement, Holland, OH

Josh Hazard, Lucas County, Holland, OH

Norman Malkin, Holland, OH

Susan Bones, Holland, OH

Thomas J. & Sharon Puhl, Holland, OH

John C. Burchfield, Trustee, Holland, OH

The Revocable Trust Agreement of John C. Burchfield, Holland, OH

Rosella Bezio, Hollard, OH

Anna R Clark, Homerville, OH

Claude W & Gloria J Doering, Homerville, OH

Dan C & Katie E Zook, Homerville, OH

Dan D & Mary Yoder, Homerville, OH

Daniel C & Sheila K Metzger, Homerville, OH

David E Bowen, Homerville, OH

Don E & Laura J Scarbrough, Homerville, OH

Edward W & Joyce M Frank, Homerville, OH

Eulynn K & Daniel E Crissey, Homerville, OH

George J & Ann L Miller, Homerville, OH

Isaac L & Sarah Keim, Homerville, OH

James J & Alice Emmert, Homerville, OH

Janet L Jenkins, Homerville, OH

Jo I & Amanda J Keim, Homerville, OH

John A & Susie Keim & Alvin L & Annie Keim, Homerville, OH

John J & Sandra Lee Hojnacki, Homerville, OH

Michael Steele, Homerville, OH

Peter J & Saloma P Hershberger, Homerville, OH

Sam A & Lizzie J Weaver, Homerville, OH

Scott E Joss, Homerville, OH

Timothy D & Tracey L Naftzger, Homerville, OH

Todd M & Angela Dudziak, Homerville, OH

Bailey Building & Loan LLC, Homerville, OH

Appendix A
Draft EIS Distribution List

Homer Grange Limited, Homerville, OH

Amanda L. Kinsey, Homeworth, OH

Amy K. Wardeska, Homeworth, OH

Angela Ann Eglie, Homeworth, OH

Bradley E. & Nerissa L. Maris, Homeworth, OH

Daniel & Kathleen Chapanar, Homeworth, OH

Daniel A. & Susanne E. Dickerhoof, Homeworth, OH

Darick E. & Crystal L. Miller, Homeworth, OH

David L. & Susan J. Farnsworth, Homeworth, OH

Douglas E. & Linda K. Arbogast, Homeworth, OH

Eldis R. & Blanche E. Zeller, Homeworth, OH

Ernest S. & Sharon J. West, Homeworth, OH

Eugene W. Hawthorne, Homeworth, OH

Gerald L. & Sandra K. Johanning, Homeworth, OH

Glenda Mellott, Homeworth, OH

Gregory Carver, Knox Township, Columbiana Co. Board of Trustees, Homeworth, OH

Jennifer L. Brahler, Homeworth, OH

Jerry A. Shafer, Homeworth, OH

John M. & Laurene M. Koziatek Kiel, Homeworth, OH

John P. Rose, Sr., The John P. Rose, Sr. Revocable Living Trust, Homeworth, OH

Josh J. & Lisa K. Moore, Homeworth, OH

Larry H. Riddle, Homeworth, OH

Lona Jane Campbell, Homeworth, OH

Mark A. & Mary M. Franks, Homeworth, OH

Mark A. Hawthorne, Homeworth, OH

Maurice C. & Ada Sue Dehoff, Homeworth, OH

Michael E. & Terri A. Barborak, Homeworth, OH

Patricia & Timothy J. Lanzer, The Patricia L. Lanzer Revocable Trust, Homeworth, OH

Patricia & Timothy J. Lanzer, The Timothy J. Lanzer Revocable Trust, Homeworth, OH

Paul W. & Jennifer L. Wallace, Homeworth, OH

Randall A. & Barbara Burtnett, Homeworth, OH

Randy A. & Donna M. Taraszewski Manning, Homeworth, OH

Ryan N. & Rachelle A. Betz, Homeworth, OH

Sandra L. Blackmon, Homeworth, OH

Seth L. Dehoff, Homeworth, OH

Thomas C. & Brenda J. Samblanet, Homeworth, OH

Timothy J. & Theresa A. Stryffeler, Homeworth, OH

William C. Waltenberger, Homeworth, OH

Campbell Family Land, LLC, Homeworth, OH

George & Knox, LTD., Homeworth, OH

Sanor Irrevocable Trust, Homeworth, OH

Mark Hall, Hubbard, OH

Larry A. Schmidt, Estate of Donald W. Schmidt, Hudson, OH

Melissa Mulvihill, Hudson, OH

Charles D. & Mary A. Swineford, The Swineford Living Trust, Huron, OH

Cynthia Fialk, Huron, OH

Dan Benson, Huron, OH

James A. & Kelly A. Spehar, Huron, OH

James W. III and Jennifer C. Steigner, Huron, OH

Jodi Ruth Taylor Harris, Huron, OH

John E. Pais, Huron, OH

Lawrence E. & Laura J. Cornett, Huron, OH

Lily Evans, Huron, OH

Robert Boehk, Erie Materials Inc., Huron, OH

Robert L. Taylor, Et al, Huron, OH

Robert S. Taylor, Huron, OH

Robert W. Wilcox, Huron, OH

Stuart L. & Ginger G. Taylor, Huron, OH

Todd V. Taylor, Huron, OH

Todd W. & Mary Jane Anderson, Huron, OH

David N. & Patricia Wilcox, Huron, OH

La Claire Evans, Huron, OH

Rita M. Boetticher, Boetticher Living Trust, Huron, OH

Robert L. Taylor (Life Estate), Huron, OH

Robert W. & Lynda M. Wilcox, Huron, OH

Ronald L. & Sandra Johnson, Ronald Johnson Trust, Huron, OH

Scott Matheny, Huron, OH

Mathew Rousseau, Independence, OH

Sophocles Sophocleous, JSTG Mentor Properties LLC, Independence, OH

Greg A. & Nancy J. Baumberger, Jacobsburg, OH

Utica East Ohio Midstream LLC, Kensington, OH

Aaron K. & Lindsay D. Short, Kensington, OH

Al D. Holenchick, Kensington, OH

Alan Seth Greenwald, Kensington, OH

Alyssa R. Miller, Kensington, OH

Austin Berresford, Kensington, OH

Barbara Norton, Kensington, OH

Bennie & Wilma Hillyer, Kensington, OH

Betty Barnes, Kensington, OH

Betty Mckarns, Kensington, OH

Beula Stackhouse, Kensington, OH

Burton & Donna Manfull, Kensington, OH

Byron Melville, Kensington, OH

Catherine Phillips, Kensington, OH

Charles & Patricia Clark, Kensington, OH

Dannie & Kathy Fillman, Kensington, OH

David & Linda Huffman, Kensington, OH

David Gromley, Kensington, OH

Deborah Niswonger, Kensington, OH

Edwin L. Brenner, Kensington, OH

Effie Huffine, Kensington, OH

Evelyn Greenwald, Kensington, OH

Floyd & Geraldine Minard, Kensington, OH

Francis & Holly Abel, Kensington, OH

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Draft EIS Distribution List

Frank & Brandy Burchik, Kensington, OH

Frank Coniglio, Jr., Kensington, OH

Gary Herold, Kensington, OH

Gary & Lois Noling, Kensington, OH

George Oyer, Kensington, OH

George Smith, Kensington, OH

Gloria Ridgeway, Kensington, OH

Hobart & Dianna Erb, Kensington, OH

Jack H. & Jackie R. Wilson, Kensington, OH

James & Hazel Close, Kensington, OH

James & Rebecca Denman, Kensington, OH

James & Stefanie Higgins, Kensington, OH

Jason & Trudy Minard, Kensington, OH

Jason Jackson, Kensington, OH

Jeffrey Yeager, Kensington, OH

Jeremy Kohler, Kensington, OH

John & April Berresford, Kensington, OH

John D. & Kendra A. Alexander, Kensington, OH

Joseph & Sharon Toalston, Kensington, OH

Joseph Coniglio, Kensington, OH

Joseph M. & Leatta M. Davis, Kensington, OH

Karen S. Guappone, Kensington, OH

Kenneth & Naomi Sell, Kensington, OH

Kimerly S. Cowgill, Kensington, OH

Linda Beadnell, Kensington, OH

Lizette Brogan, Kensington, OH

Mary Cotton, Kensington, OH

Matthew & Laura Grubb, Kensington, OH

Micah & Rosanne Klippenstein, Kensington, OH

Mitchell Mcguire, Kensington, OH

Paula Moore, Kensington, OH

Peggy Bhe, Kensington, OH

R S & Rebecca Kress, Jr., Kensington, OH

Ralph Edward Kreps, Kensington, OH

Ralph Kreps, Kensington, OH

Ralph R. Guappone, Kensington, OH

Randall & Melinda Speirs, Kensington, OH

Randy & Patrick Oconnor, Kensington, OH

Raymond & Genia Gromley, Kensington, OH

Rebecca Hofmeister, Kensington, OH

Richard & Nicole Kiko, Kensington, OH

Rick Smalley, Kensington, OH

Rita M. Ankeny, Kensington, OH

Robert & Angela Manfull, Hanover Township, Kensington, OH

Robert & Marcia Wood, Kensington, OH

Robert G. Harvey, The Robert G. Harvey Trust, Kensington, OH

Ronald & Susan Little, Kensington, OH

Ronald S. & Rebecca Kress, Jr., Kensington, OH

Russell Brown, Kensington, OH

Rusty & Lisa Grubbs, Trustees, Kensington, OH

Shawn & Alissa Ganslein, Kensington, OH

Sherry Berresford, Kensington, OH

Stephen & Susan Smith, Kensington, OH

Steven J. Paul, Kensington, OH

Susan Hines, Kensington, OH

Todd & Tiffany Stout, Kensington, OH

Tracey Lindsay, Kensington, OH

Vinson & Leslie Ward, Kensington, OH

Virgil E. & Patricia A. Curfman, Kensington, OH

Virginia Bender, Kensington, OH

First Christian Church of Kensington, Kensington, OH

Manfulls Service, LLC, Kensington, OH

Rosebud Mining Company, Kensington, OH

Chuck Price, Carter Lumber Development Co., Kent, OH

James R. & Alexis N. Weirick, Kent, OH

Erwin Fieni, Kidron, OH

Drew D. Phillips, Kipton, OH

George J. & Sandra L. Springer, Kipton, OH

Kipton Sportmens Club Inc, Kipton, OH

The Board of Commissioners, Lorain County Metropolitan Park District, La Grange, OH

Charles E. & Nan L. Brown, La Grange, OH

Darel L. & Bonnie S. Underwood, La Grange, OH

Gerald K. & Carol Ann Squire, Squire Family Revocable Living Trust, La Grange, OH

James A. Plas, The James A. Plas Revocable Trust, La Grange, OH

Joseph J. & Mary J. Zalka, Jr., La Grange, OH

Larry N. Grimes, La Grange, OH

Ronald J. Pickworth, La Grange, OH

Albert L. & Anna Mae Koch, LaGrange, OH

Chad & Sarah Senghas, LaGrange, OH

Dave French, Road Superintendent, LaGrange Township, Lagrange, OH

David N. & Susan M. Detardo, LaGrange, OH

Deborah Mullins, LaGrange, OH

Donald A Piwinski II, LaGrange, OH

Dorothy M. Wash, LaGrange, OH

Gregory D. Bradford, LaGrange, OH

Guy K. & Belinda J. J Borders, LaGrange, OH

James E. McHugh & Kimberly A. Callihan, LaGrange, OH

Joseph E. Cogar, Sr, Lagrange, OH

Kathleen Zalka, LaGrange, OH

Kevin Friend, Lagrange, OH

Kevin V. Riley, LaGrange, OH

Mark & Karen Sue Smith, LaGrange, OH

Martha Zalka, LaGrange, OH

Michael J. & Barbara L. Rodak, Mr. & Mrs. Michael J. & Barbara L. Rodak LLC, Lagrange, OH

Michael J. & Suzanne A. Piscione, Lagrange, OH

Mike Mullen, Lagrange, OH

Mildred Karpinski, Lagrange, OH

Nancy Jean Clark, LaGrange, OH

Nicholas Anikienko, Lagrange, OH

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Draft EIS Distribution List

Paul L. & Eva J. Setliff, Lagrange, OH

Rodney A. Peters, LaGrange, OH

Seth J. & Melissa L. Linebrink, Lagrange, OH

Thomas J. Nolan, LaGrange, OH

Tracy L & Michael E Payne, LaGrange, OH

Wiley Setliff, Lagrange, OH

Willie & Patricia Layne, LaGrange, OH

Willie C. & Gail L. Howard, Lagrange, OH

Metro Parks Lorain County, Lagrange, OH

Jim Truesdell, Rural Lorain County Water Authority, Lagrange, OH

Saleem S. & Noorjehan B. Syed, Lakewood, OH

Lori Krumler, Lawrence, OH

Doris Mango, Leetonia, OH

Brian R. & Teresa Dotts, Liberty Center, OH

Charles F. II & Rhonda L. Fehrenbach, Liberty Center, OH

Darwin & Mary Box, Liberty Center, OH

James Christopher Ford, Liberty Center, OH

JoAnn Dawe, JoAnn Dawe Trust, Liberty Center, OH

Joe Sminsky, Liberty Center, OH

John M. Dawe, Liberty Center, OH

Matthew G Thomas, Liberty Center, OH

Nancy Smitley, Liberty Center, OH

Ralph D. & Dolly I. Lybarger, The Ralph D. Lybarger & Dolly I. Lybarger Revocable Living Trust, Liberty Center, OH

Ryan M & Lindsay R Strayer, Liberty Center, OH

Thomas M. Dawe, Thomas M. Dawe Trust Agreement, Liberty Center, OH

Timothy J & Karen K Kistner, Liberty Center, OH

Benson Family Trust, Liberty Center, OH

Janello Farms, Ltd.., Liberty Township, OH

Clyde E. Michael, Lindsey, OH

Deborah Wingert, Lindsey, OH

James F. & Margaret E. Schwartz, Lindsey, OH

Judy Mauch, Washusky Farms Ltd., Lindsey, OH

Kenneth D. & Gloria J. Root, Lindsey, OH

Lauralee S. Wyss, Lindsey, OH

Paula Fahle, Washington Township (Sandusky County), Lindsey, OH

Robert & Sandi Reed, Lindsey, OH

Ronald C. Mauch, Lindsey, OH

Ronald Mauch, CBR Farms, LTD, Lindsey, OH

Scott D. & Kelly A. Weickert, Lindsey, OH

Scott L. Smith, Lindsey, OH

Vernon P. & Marjorie A. Roepke, Lindsey, OH

John G. & Judith A. Neill Joint Trust, Lindsey, OH

David P. Price, Lindsey, OH

Frank N Laughlin, Lindsey, OH

Jim Hoppel, Lisbon, OH

Michael S. & Tina M. Strong, Lisbon, OH

Michael Strong, Strong Family Investments, Lisbon, OH

Paula S. McDonald, Lisbon, OH

Robert Durbin, Columbiana County Engineer, Lisbon, OH

Rosemary Betz, Lisbon, OH

Roy Larkins, Lisbon, OH

Sean Logan, Lisbon, OH

Andrea Stewart, Litchfield, OH

David Berry, Litchfield, OH

Dennis & Jessica Ryncarz, Litchfield, OH

Dennis Jocke, Litchfield, OH

Estate of Charles Demuth, Litchfield, OH

Hugh Turner, Jr, Litchfield, OH

Jeffery & Teresa Cotman, Litchfield, OH

Karen Swinger, Litchfield, OH

Resident, Litchfield, OH

William & Carol Kujat, Litchfield, OH

Karl Beuck, Lodi, OH

Michael Poindexter, Logan, OH

Steven Poindexter, Logan, OH

First Federal Savings & Loan Association of Lorain, Ohio, Lorain, OH

West Park Limited Inc, Lorain, OH

Guy Eddy, Lorain, OH

Kathleen Markus-Walczak, Lorain, OH

Olga Martinez, Lorain, OH

Peter Goldauskas, Lorain, OH

Rebecca Lewis, Lorain, OH

Renell Taylor, Lorain, OH

Rudolph G. & Judy G. Kubasak, R&J Kubasak Revocable Trust, Lorain, OH

Victoria Young, Lorian, OH

Alice V. Butler, Trustee, Louisville, OH

Alton Edgar & Carol Lee Smith, Louisville, OH

Ann Hans, Louisville, OH

Anthony M. Milini, Louisville, OH

Carl & Beth A. Strouble, Louisville, OH

Darrin T. & Cheryl E. Metzger, Louisville, OH

David L. & Bonnie L. Miller, Louisville, OH

Donald E. Linhart, The Donald E. Linhart Revocable Trust, Louisville, OH

Donald J. & Patricia L. Haubert, Louisville, OH

Dorothy & Barnes Harold, Louisville, OH

Doug Linhart, Linhart Farm, Louisville, OH

Doug Linhart, Louisville, OH

Dwight S. Raber, Louisville, OH

Earl A. & Lois M. Ringer, Louisville, OH

Edward E. & Cecilia A. Waggoner, Louisville, OH

Gary L. Smith, Louisville, OH

James R. & Carol L. Wolfe, Louisville, OH

Janice K. Raber, The Bruce R. Raber Revocable Trust, Louisville, OH

Jeanette M. Green, Louisville, OH

Jeff G. Vernier, Louisville, OH

Appendix A
Draft EIS Distribution List

Jonathan D. & Rachel R. Krabill, Louisville, OH

Karen M. Caywood, Louisville, OH

Keith A. & Yvette Sweger, Louisville, OH

Kim R. Perez, Louisville, OH

Lyle D. & Margaret L. Krabill, Louisville, OH

Marcia L. Beck, Louisville, OH

Matthew J. & Toni M. Baker, Louisville, OH

Michael L. & Charlene R. Eisert, Louisville, OH

Pat Miller, Louisville, OH

Phillip A. & Pamela L. King, Louisville, OH

Randy R. & Terri A. Kiko, Louisville, OH

Shirley F. Linhart, The Shirley F. Linhart Revocable Trust, Louisville, OH

Shirley M Ebner, Trustee, Louisville, OH

Steven M. Thompson, Louisville, OH

Steven R. & Jodi L. Kish, Louisville, OH

Susan M. Green, Louisville, OH

Theodore E. Tuttle, Louisville, OH

Todd D. & Amy L. Bosley, Louisville, OH

Victoria Blackwell, Louisville, OH

William L. & Milinda A. Frank, Louisville, OH

William T. & Marybeth M. Tolbert, Louisville, OH

Carmel Properties LLC, Louisville, OH

Dwight S. Raber Revocable Trust, Louisville, OH

J & D Partnership, Louisville, OH

Paradise Valley Farms II, Ltd., Louisville, OH

Pastore Foundation, Louisville, OH

Royer Farms, Inc., Louisville, OH

The A & J Real Estate LLC, Louisville, OH

The Hoover Family Living Trust, Louisville, OH

The John A. Bauman and Nancy K. Bauman Revocable Trust, Louisville, OH

The Julia A. Raber Revocable Trust, Louisville, OH

The Larry W. Strouble Revocable Trust, Louisville, OH

The Raymond G. Burger Revocable Trust, Louisville, OH

Northwood Realty Co, Luckey, OH

Andrew M. & Stephanie E. Lang, Luckey, OH

Andrew Spencer, Luckey, OH

Anthony F. Prochaska, Luckey, OH

Bradley K. & Kimberly T. Hart, Luckey, OH

Brent A. Weaver, Luckey, OH

Clayton D. & Martha J. Carn, Luckey, OH

Dan Miller, Luckey, OH

Daniel W. & Catherine S. Miller, Luckey, OH

Donald W. Young, Luckey, OH

Doris Rothenbuhler, Luckey, OH

Dustin & Nicole Monhollen, Luckey, OH

Edgar F. & Judith C. Holliday, Luckey, OH

Edmund & Jeanette Miller, Luckey, OH

Edmund J. & Jeannette B. Miller, Luckey, OH

Eric & Rebecca S. VanDenk, Luckey, OH

James H. & Sharon K. Couch, Jr., Luckey, OH

Jay E. & Jennifer L. Griffith, Luckey, OH

John C. & Carol A. Anderson, Luckey, OH

John C. Briggs, Luckey, OH

John S. & Nancy A. Jacobs, Luckey, OH

Jonathon B. & Nicole A. Mcintyre, Luckey, OH

Kenneth E. & Susan J. Greulich, Luckey, OH

Mark E. & Melissa J. Briggs, Luckey, OH

Mark F. Greifelt, Luckey, OH

Michael W. & Pamela L. Metzger, Luckey, OH

Richard A. & Sandra R. Carter, Luckey, OH

Rolland I. & Susan Kay Huss, Luckey, OH

Russell K. & E. Jane Nowlin, Luckey, OH

Thomas E. & Colleen E. Perry, Luckey, OH

Thomas J & Dianne M Woodruff, Luckey, OH

Timothy J. & Susan M. Tressel, Luckey, OH

Todd Gottschalk, Zoning Inspector, Troy Township, Luckey, OH

Dale J. Avers Living Trust Agreement, Luckey, OH

Lizabeth Jo Hirzel Trust, Luckey, OH

James Kananen, Girl Scouts North East Ohio, Macedonia, OH

Dale Slagle, Magnolia, OH

Danny & Virginia Long, Trustees, Danny L Long Living Trust, Magnolia, OH

Danny Borne, Magnolia, OH

Frederick & Maureen Bausher, Magnolia, OH

George & Mary Bowling, Magnolia, OH

James Fletcher, Magnolia, OH

Matthew Kirkpatrick, Magnolia, OH

Ronald & Frances Adkins, Magnolia, OH

Dp Howie LLC, Magnolia, OH

David Arnold, Malvern, OH

Dennis L & Barbara Garrott, Malvern, OH

Mark W. & Debbie M. Smith, Malvern, OH

Marvin L. Janssen, The Marvin L. Janssen Revocable Trust, Malvern, OH

Richard & Jacqueline Foster, Malvern, OH

Church of God Saints In Christ, Malvern, OH

Rebecca J. Michaluk, Manchester, OH

James Irwin, Marblehead, OH

Patrick D. & Mary K Keegan, Marblehead, OH

James Greetham, Jr, The James S. Greetham, Jr. & Barbara J. Greetham Family Trust, Marion, OH

Daniel P. Harrington, Marshallville, OH

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Draft EIS Distribution List

Joseph D. Stoller, Marshallville, OH

Marian S. Stoller, Marshallville, OH

Claude N. & Darlene M. Vanness, Martin, OH

Charles A. & Shirley J. Lemmon, Martins Ferry, OH

Charles J., Jr. & Artina Denunzio, Martins Ferry, OH

Elizabeth R. Ruble, Martins Ferry, OH

Heyward T. & Teena M. Bazar, Martins Ferry, OH

James W. & Delores M. Bain, Martins Ferry, OH

John Stanley Stock, Etal, Martins Ferry, OH

Michael J., Jr. Lemmon, Martins Ferry, OH

Shereza K. O'Hara, Martins Ferry, OH

Thomas H. Haapapuro, Martins Ferry, OH

Willa Jean Foschia, Martins Ferry, OH

Kyle Homan, Mason, OH

Fred Tuttle, Warner Properties LTD, Massillon, OH

Greg Leimeister, Massillon, OH

James Huebner, Massillon, OH

Jared & Jodi Gruca, Massillon, OH

Jim Amenhauser, Massillon, OH

Kendel & Kenneth Croston, Massillon, OH

Margaret Tomko, Massillon, OH

Perlee & Leslie Grove, Massillon, OH

Renee Bogue, Massillon, OH

Richard G. Bogus, Massillon, OH

Vincent Strasavich, Massillon, OH

Dover Attwood Corp., Massillon, OH

Debra Dunaway, Massilon, OH

Brett Ruhm, Maumee, OH

Diana Schwind, Maumee, OH

Frederick L. Ruhm, The Ruhm Trust, Maumee, OH

Kyle & Nicole Hubbard, Maumee, OH

Lou Komza, Northwood Realty Co, Maumee, OH

Marlene Barrett, Maumee, OH

Michael L. & Teresa D. Miller, Maumee, OH

Rebecca Bishop & Fred Ruhm, Brett Ruhm, Maumee, OH

Roger W. & Kathleen Sund, Maumee, OH

Scott R. Carter, Maumee, OH

Susan Muller, Maumee, OH

Robert T. Grams Trust, Maumee, OH

Florence A. Ryder, Life Estate, Maumee, OH

Mark and Karen Burkett, Simplicity Farm LLC, an ohio limited liability company, Maumee, OH

Robert Ryder, Remainderman, Maumee, OH

Edward & Mary Crum, Maximo, OH

Rosemunde M. Wrann, Maximo, OH

Terry E. Toussant, Maximo, OH

Bishop of Diocese of Youngstown, Maximo, OH

The Trust of Glen L. & Ardis J. Rastetter, Maximo, OH

Jason D. & April L. Born, McClure, OH

James P. Pidgeon, Mechanicstown, OH

VGL Properties, LLC, Medina, OH

Abigal Boyce, Medina, OH

Adele M. & Donald E. Borling, Medina, OH

Alice Dolney, Medina, OH

Andrea M. Demczyk, Medina, OH

Belinda K. Cool, Medina, OH

Bobby R. & Catherine A. Wills, Medina, OH

Carol Ann Hannah, Medina, OH

Charles & Carol Bailey, Medina, OH

Charles W. & Grace E. Morrison, Jr., Medina, OH

Christine McClanahan, Medina, OH

Christopher & Leah Hall, Medina, OH

Christopher E. & Kelly M. Bohl, Medina, OH

Christopher Hawkins, Medina, OH

Craig A. & Colleen J. Schneider, Medina, OH

Curtis E. Slabaugh, Medina, OH

Dan Cunningham, Patricia L. Cunningham Trust, Medina, OH

Daniel & Kathy Ann Sicz, Medina, OH

Daniel A. Miller, Medina, OH

David Crocker, DC Landscape / Excavation, LLC, Medina, OH

David G. Hollish, Medina, OH

David J. Jenkins, Medina, OH

David Morris, Medina, OH

Debra L. (fka Vorhies) Dangelo, Medina, OH

Dennis Grella, Medina, OH

Don Houston, Medina, OH

Donald E. & Adele H. Borling, Medina, OH

Donald H. Mohler, Medina, OH

Donald R. Houston, Medina, OH

Dorothy J. Lichty, Medina, OH

E. Rodney & Patricia R. Taylor, Medina, OH

Edward & Rhonda D. (formerly Poultney) Burba, Medina, OH

Edward J. & Amy L. Neumeyer, Medina, OH

Edwin L. & Robin R Hess, Medina, OH

Elizabeth Gross, Medina, OH

Elizabeth Kimble, Medina, OH

Elizabeth M. Wilson, Medina, OH

Erik Rusmanis, Medina, OH

Eugene S. & Kay L. Pabin, Medina, OH

Evelyn M. Mann, Medina, OH

Franklin C. & Marilyn F. Ehrman, Medina, OH

Gary Elton & Martha K. Vaughn, Medina, OH

George H. Miller, Medina, OH

George R. & Rose M. Birth, Medina, OH

Georgia F. Kimble, Georgia F. Kimble Declaration of Trust, Under Agreement, Medina, OH

Gregory & Sandra K. Demczyk, Medina, OH

Gregory C. Cravatas, Medina, OH

Harley H. & Patricia A. Hall, Medina, OH

Helen J. Riehm, Medina, OH

James E. & Patricia A. Braatz, Trustees, Braatz Revocable Living Trust, Medina, OH

Appendix A
Draft EIS Distribution List

James T. & Diane C. Adam, Medina, OH

Jason T. and Shannon M. Thome, TNT Dairy Farms, LLC, Medina, OH

Jeffrey F. Derhammer, Medina, OH

Jeffrey L. & Denise L. Aungst, Medina, OH

Jeremy & Mary Smith, Medina, OH

Jeremy and Mary M. Smith, Medina, OH

Jeremy Smith, Medina, OH

Jerry M. & Sandra Mooney, Medina, OH

John & Teresa Minarchick, Medina, OH

John Eureka, Medina, OH

John M. Rossodivito, Medina, OH

Joseph F. Martin, Medina, OH

Joseph G Hyclak, Medina, OH

Joseph O. Perkins, Medina, OH

Joyce E. Young, Medina, OH

Judith L. Parish, Medina, OH

Karen Barton, Medina, OH

Karen Hurst, Medina, OH

Karen Wheeler, Medina, OH

Kenneth Petz, Medina, OH

Kenneth T. Barrett, Medina, OH

Kevin & Mary Anne Quigley, Medina, OH

Kevin Kimble, Medina, OH

Krestta & Charles Lotz, Medina, OH

Laura A. Calala, Medina, OH

Leonard J. & Linda L. McManus, Jr., Medina, OH

Louis J. & Shirley A. Javorsky, Medina, OH

Lynda Bowers, Lafayette Township, Board of Trustees, Medina, OH

Lynn Kemp, Medina, OH

Mark Albrecht, Medina, OH

Marvin & Sharon L. Nicholson, Jr., Medina, OH

Mary Beth Jenkins, Medina, OH

Mary E. Albrecht, Mary E. Albrecht, Trustee, Medina, OH

Mary Palker, Medina, OH

Matthew Lichty, Medina, OH

Medina Kennel Club, Inc., Medina, OH

Michael Fecca, Medina, OH

Michael Laribee, Laribee & Hertick, LLP, Medina, OH

Michael Wagner, Medina, OH

Mickey & Virginia M. Kanzeg, Medina, OH

Mike Kenski, Medina, OH

Molly M. O'Connor, Medina, OH

Nancy S. Kanzeg, The Kanzeg Family Trust, Medina, OH

Noreen J. Woodhall, Medina, OH

Paul & Sharyn Dey, Medina, OH

Paul A. Decker, Medina, OH

Paula J. Wodzisz, Medina, OH

Raymond Bessmer, Executor, Raymond Bessmer, Executor, Medina, OH

Richard E. & Lee Kay Farnsworth, Medina, OH

Richard S. & Diane D. Palker, Medina, OH

Robert & Evelyn Garver, Medina, OH

Robert E. Bazik & Eleanore T. Koptis, Medina, OH

Robert W. & A. Louise McAfee, Medina, OH

Ronald S. Walker, Medina, OH

Rosemarie Farnsworth, Medina, OH

Roy L. & Nancy F. Zirkle, Medina, OH

Russ Johnson, Columbia Gas Transmission Company, Medina, OH

Russ Johnson, NiSource, Inc., Medina, OH

Sandra Bilek, Medina, OH

Sandra L. Sailer, Medina, OH

Sharon & Hugh Gregory McFadden, Medina, OH

Sheri A. Acierto, Medina, OH

Sophie A. Stafinski, Medina, OH

Stacy & Jacqueline McGlocklin, Medina, OH

Steven M Wolnik, Medina, OH

Steven R. & Sarah Vachon, Medina, OH

Susan Schmidt, Medina, OH

Sydney Benson, Medina, OH

Thomas J. & Georganne E. Rinehart, Medina, OH

Thomas J. Judson, Medina, OH

Thomas K. James, Medina County Park District, Medina, OH

Timothy J. & Melissa A. Dundr, Medina, OH

Vaughn Lekan, VGL Properties LLC, Medina, OH

Walter H. Nagel, Jr., Medina, OH

Wesley M. & Michelle M. Mikulski, Medina, OH

William & Gail Tompkins, Medina, OH

William G. & Betty M. West, Medina, OH

William P. Saganes, Medina, OH

William R. & Gayle A. Foster, Medina, OH

William T. & Terri A. Gaertner, Medina, OH

Zachary J. & Stacey M. Jaworske, Medina, OH

Board Of County Commissioners Of The County Of Medina*, Medina, OH

Chippewa Lake Baptist Church, Medina, OH

Estate of John W. Zimmerly, Medina, OH

Mann Family Trust, Medina, OH

NiSource Midstream, Medina, OH

Patricia A. Workman, Trustee, Medina, OH

Paxton Real Estate Holding Company, LTD., Medina, OH

Summer Ridge LLC, Medina, OH

Wood Family Revocable Trust, Medina, OH

Trustees of Lafayette Township, Trustees of Lafayette Township, Medina, OH

Albert J. & Barbara Ann Baker, Metamora, OH

Arlan J. Reimschusel, Metamora, OH

Charles Saunders, Metamora, OH

Donald A. & Gladys M. Dickerson, Metamora, OH

Donald A. Dickerson, The Donald A. Dickerson Trust, Metamora, OH

Appendix A
Draft EIS Distribution List

Edward L. & Lauren M. Farnsel, Metamora, OH

Gladys M. Dickerson, The Gladys M. Dickerson Trust, Metamora, OH

Harvey S. Wells & Arleen Kaminski, Metamora, OH

Jeffrey L. Truckor, Metamora, OH

John Pflum, Metamora, OH

Keith R. & Kimberly K. Truckor, Metamora, OH

Randy K. Koepler, Metamora, OH

The Gladys M. & Donald A. Dickerson Trusts, Metamora, OH

Carol Y. Kiminecz, Middlefield, OH

Ernest Kiminecz, Middlefield, OH

John Casper Kiminecz, Middlefield, OH

Jevon R. Rockwell, Milan, OH

John C. Draeger, Harold W. Draeger Trust, Milan, OH

John R. Rockwell, Jr., Milan, OH

King Diver, Divers Farm, LLC, Milan, OH

Linda Wheeler, Milan, OH

Loren W. Heckelman, Loren W. Heckelman Living Trusts, Milan, OH

Robert Wheeler, Milan, OH

Timothy D. & Lisa A. Mayles, Milan, OH

Agnes B. Heckelman Life Estate, Milan, OH

Agnes Heckelman, Heckelman Family Limited Partnership, Milan, OH

Brian F. & Julia A. Deering, The Deering Family Trust, Milan, OH

E. Randall & Jari Ann Schaeffer, Milan, OH

Janet Gottwald, Milan, OH

Jayson R. Rockwell, Milan, OH

Richard H. & Mary R. Fabik, Milan, OH

Steven Wayne Russell, Steven Wayne Russell, Trustee under Declaration of Trust, Milan, OH

Loren W. Heckelman Living Trust Agreement, Milan, OH

St John's United Church of Christ Milan Ohio Inc, Milan, OH

Wikel Farms LTD, Milan, OH

Dale M. Pertner, Millbury, OH

Ronald P. Zakrzewski, Millbury, OH

Geraldine J. Hahn, Geraldine J. Hahn Declaration of Trust, Millersburg, OH

Forest Lanes Restaurant & Lounge, LLC, Minerva, OH

Andreas Tompulis, Minerva, OH

Anna M. Buckman, Minerva, OH

Barbara S. Cunningham, Barbara S. Cunningham Trust, Minerva, OH

Barnes Howard Allen & Melody Anne Barnes Fam (Te), Minerva, OH

Bernard & Sharon Jakubowski, Minerva, OH

Beverly Walker, Minerva, OH

Brian L. & Anne M. McKarns, Minerva, OH

Bruce D. Biggs, Minerva, OH

Chris Norton, The Annick M. Norton Revocable Trust, Minerva, OH

Corita Prendergast, Minerva, OH

Dale L. & Lana L. Lowmiller, Minerva, OH

David & Marjorie Polen, Minerva, OH

David W. & Judy Ann Miller, Minerva, OH

Denver L & Norma Belknap, Minerva, OH

Donald & Sharon Cruse, Minerva, OH

Elmer Marteney, Minerva, OH

Eugene L. Prendergast, Minerva, OH

F. Gerald & Ruth Borsh, Minerva, OH

Frances King, Minerva, OH

Frank & Constance Hein, Minerva, OH

Gabe Taylor, Minerva, OH

Gary & Elaine Chaddock, Minerva, OH

Gary Blevins, Minerva, OH

Gerald Knepper, Minerva, OH

Glen M. Starcher, Minerva, OH

Gregory & Linda Unkefer, Minerva, OH

Harvey & Judith A Farnsworth, Minerva, OH

Heath Halter, Minerva, OH

James & Betty J Speakman, Trustees, Minerva, OH

James Blevins, Minerva, OH

James L. & Susan Sanor, Minerva, OH

Jamie S. Wright, Forest Lanes Restaurant and Lounge, LLC, Minerva, OH

Jay & Deborah Harsh, Trustees, Harsh Family Living Trust, Minerva, OH

John & Patricia Richardson, Minerva, OH

John & Renae Griffith, Minerva, OH

Joseph Ledbetter, Minerva, OH

Kenneth & Ila Oyster, Minerva, OH

Kenneth Blevins, Minerva, OH

Kenneth L. & Vicki L. Smith, Minerva, OH

Kevin A. & Renee L. Barley, Minerva, OH

Larry Eldon & Patricia Mae Rosenberger, Minerva, OH

Linda & William Becknell, Minerva, OH

Nancy Nightingale, Minerva, OH

Neil Lippincott, Minerva, OH

Patricia Beadnell, Minerva, OH

Paul & Ketura Sommers, Minerva, OH

Paula Ludt, Minerva, OH

Richard Curfman, Minerva, OH

Robert & Kathryn Gingerich, Minerva, OH

Roger W & Mary Jones, Minerva, OH

Ronald J. & Suzanne M. Berstler, Minerva, OH

Roy Landsberger, Minerva, OH

Russell S. & Jeanelle E. Thorn, Minerva, OH

Sabrina Tompulis, Minerva, OH

Samuel & Susan Iden, Minerva, OH

Shirley A Bonar, Trustee, Minerva, OH

Sylvan & Christine Weaver, Minerva, OH

Terry & Bonnie Parrish, Minerva, OH

Thomas & Debra Slack, Minerva, OH

Thomas F & Debra Slack, Minerva, OH

Thomas W. Hagan, Minerva, OH

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Titus Miller, Orchard View Leasing LLC, Minerva, OH

Wesley H Blevins, Minerva, OH

William & Ruth Neal, Minerva, OH

Andrew Whiteleather LLC, Minerva, OH

Kal-Kar ins LLC, Minerva, OH

Lippincott Land LLC, Minerva, OH

Lippincott Land LLC, Minerva, OH

Lippincott Land LLC, Minerva, OH

Minerva Ohio Congregation of Jehovas Witnessess, Minerva, OH

Rdr Lippincott Land LLC, Minerva, OH

The Marjorie J. Whiteleather Trust, Minerva, OH

Whiteleather Properties LLC, Minerva, OH

William B. Cleveland, III, Minster, OH

Selinda Schultz, Monclova, OH

Vicky L. Ryan Trust, Monclova, OH

William J. Ryan Trust, Monclova, OH

Ducks Unlimited, Monroe Chapter, Monroe, OH

Christopher N. Wensink, Trust of Christopher N. Wensink, Monroeville, OH

Gerald A. Wensink, Monroeville, OH

Gerard A. & Denise L. Wensink, Monroeville, OH

Gerard A. Wensink, Monroeville, OH

James H. Love, Monroeville, OH

James M. & Madeleine Wensink, Monroeville, OH

James M. Wensink, Maurice W. Wensink Trust Agreement, Monroeville, OH

Richard J. & Kay L. Wensink, Monroeville, OH

Richard J. Wensink, Monroeville, OH

Robert B. Wensink, Monroeville, OH

Robert O. & Ursula E. Scott, Monroeville, OH

Ruth B. Wensink, Norbet B. Wensink Trust Agreement, Monroeville, OH

Thomas A. Wensink, Monroeville, OH

Thomas M. Wensink, Monroeville, OH

Clear Creek Acres, Monroeville, OH

Arlene H. Kaiser, Monroeville, OH

Brian Deering, Deering Farms, Inc., Monroeville, OH

Fred E. Dahs, Monroeville, OH

James W. Stewart, Monroeville, OH

John F. Dahs, Monroeville, OH

Kenneth J. & Cheryl Lin Chill, Monroeville, OH

Max M. & Shelley A. Jarrett, Monroeville, OH

Michael E. Erney, Sr., Monroeville, OH

Ray & Carolyn Osburn, Monroeville, OH

Robert B. & Ellen T. Wensink, Monroeville, OH

Scott & Jennifer Galloway, Monroeville, OH

Theodore C. Wensink, Monroeville, OH

Thomas C. & Helen S. Love, Monroeville, OH

Todd Mathias, Monroeville, OH

William Schaefer, Schaefer Family Trust, Monroeville, OH

Wensink Seed Farms, Inc., Monroeville, OH

Western Reserve Land Conservancy, Moreland Hills, OH

Mt Eaton Reclamation Inc, Mount Eaton, OH

Charles T. & Wanda Cleaver, Mt Pleasant, OH

Anne Halpin, Munroe Falls, OH

Dennis M. & Michelle L. Volpe, N Hartville, OH

Eric H. Sauter, N Olmsted, OH

Gerald A. Sauter, N Olmsted, OH

Christopher & Jeanette P. Pilan, N Ridgeville, OH

Internationals Soccer, Inc., N Royalton, OH

Aden & Ada Yoder, Navarre, OH

Allen Rohr, Navarre, OH

Barbara Silvestri, Navarre, OH

Carol Christine Simmons (Or Any Successor Trustee), The Carol Christine Simmons Revocable Trust, Navarre, OH

Carol Stroh, Trustee, The Carol A Stroh Trust, Navarre, OH

Charles & Carolyn Unruh, Navarre, OH

Dale Pursley, Trustee, Navarre, OH

Daniel & Iva Hershberger, Navarre, OH

Daniel A & Carol Sukosd, Navarre, OH

Dennis & Jennifer Smith, Navarre, OH

Dexter & Adrienne Ehmer, Navarre, OH

Donald A & Ann Shetler, Trustees, Navarre, OH

Earl Rohn, Navarre, OH

Edna Raber, Navarre, OH

Eli & Ellen Miller, Navarre, OH

Elizbeth Bowers, Navarre, OH

Franklin Jr & Victoria Kilgore, Navarre, OH

Glenn Hiner, Navarre, OH

Gregory Shetler, Navarre, OH

Jack Baylor, Navarre, OH

Jacob & Susie Miller, Navarre, OH

Jean Taylor, Navarre, OH

Jimsey J Forrest, Etal, Navarre, OH

Kathleen K Ludwig, Trustee, Navarre, OH

Keith & Lois Speicher, Navarre, OH

Keith Elkins, Navarre, OH

Larry J & Cindy Oney, Navarre, OH

Mary Blaska, Navarre, OH

Maynard & Karen Arney, Navarre, OH

Maynard L & Karen Arney, Navarre, OH

Merlin & Leanna Weaver, Navarre, OH

Michael & Jennifer Ritterbeck, Navarre, OH

Michael & Martha Schmuki, Navarre, OH

Michael E & Elizabeth Bucher, Navarre, OH

Milan & Clara Weaver, Navarre, OH

Otto & Frieda Schmuki, Navarre, OH

Patrick Bucher, Navarre, OH

Patrick J & Rita Nealis, Navarre, OH

Paula Kinsey, Navarre, OH

Peter & Dina Vliet, Navarre, OH

Phillip & Sandra Lloyd, Trustees, Lloyd Rev Living Trust, Navarre, OH

Ralph S Regula, Trustee, Navarre, OH

Rebecca Burcaw, Navarre, OH

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Draft EIS Distribution List

Richard A & Faydra Young, Navarre, OH

Richard Black & Tana Olmstead, Navarre, OH

Richard E Mcdonald, Trustee, Navarre, OH

Robert & Barbara Stokes, Navarre, OH

Robert D & Dorothy Hostetler, Navarre, OH

Russell Mathie, Navarre, OH

Scott & Cara Silvestri, Navarre, OH

Steven Merry, Navarre, OH

Steven Yoder, Navarre, OH

Terence & Patricia Bauldry, Navarre, OH

Thomas & Irene Kimmins, Navarre, OH

Thomas & Vickie Tschantz, Navarre, OH

Thomas & Wilma Prunty, Navarre, OH

Troy Lanier, Navarre, OH

Walter L & Michal Forney, Navarre, OH

William & Mary Pittman, Navarre, OH

Bethlehem Twp Trustees, Navarre, OH

Corelogic, Navarre, OH

Navarre Village, Navarre, OH

Jill Brothers, Negley, OH

Ed Looman, Appalachian Partnership for Economic Growth, Nelsonville, OH

Andrea Wagner, New Franklin, OH

Bill & Janice McCormick, New Franklin, OH

Bruce Bycura, New Franklin, OH

Bruce Lombardi, The Lombardi Revocable Living Trust Agreement, New Franklin, OH

C. Baker, New Franklin, OH

Carla Barner, New Franklin, OH

Curtis L. & Kyle Elaine Doles, New Franklin, OH

Daniel & Caitlin Knop, New Franklin, OH

David T. & Geraldine W. Sexton, New Franklin, OH

Dawn Spaporito, New Franklin, OH

Debbie Lindsay, New Franklin, OH

Dennis & Josie Winchell, New Franklin, OH

Dennis Jordan, New Franklin, OH

Donald C. Galloway, New Franklin, OH

Donald E. & Diane M. Boggs, New Franklin, OH

Dorothy Martin, New Franklin, OH

Edward A. & Deborah L. Doerr, New Franklin, OH

Elaine Bigham, New Franklin, OH

Eric McDonald, New Franklin, OH

Frank Smith, New Franklin, OH

Harold L. & Kimberley R. Kunkle, New Franklin, OH

Jack A . Toomey, Sr., New Franklin, OH

Jack S. Davenport, Sr., New Franklin, OH

James A. & Grace Evans, New Franklin, OH

Janice & John Adams, New Franklin, OH

Jeff Yingling, New Franklin, OH

John E. Grace, Jr., New Franklin, OH

John Gates, New Franklin, OH

John W. & Victoria H. Kee, New Franklin, OH

Joseph S. Barranco, New Franklin, OH

Karen Jane Evans, New Franklin, OH

Kenneth W. & Crystal Huffman, New Franklin, OH

Krista L. Markley, New Franklin, OH

Lori Pfahler, New Franklin, OH

Margaret A. Moirano, New Franklin, OH

Matthew R. & Karen S. Craddock, New Franklin, OH

Michael G. & Jada L. Cline, New Franklin, OH

Michael J. & Kirsten L. Davis, New Franklin, OH

Michele D. Otey, New Franklin, OH

Paul & Margaret Biro, Jr., New Franklin, OH

Paul W. Haberny, Jr., New Franklin, OH

Perry & Donna Stone, New Franklin, OH

Resident, New Franklin, OH

Resident, New Franklin, OH

Richard G. & Beth E. Starling, New Franklin, OH

Robert & Kathleen Harris, New Franklin, OH

Robert & Roxanne Knotts, New Franklin, OH

Robert Carl & Brenda Lee Jarvis, New Franklin, OH

Robert W. & Diane K. Straley, Jr., New Franklin, OH

Roger & Priscilla Patterson, New Franklin, OH

Ronald Christopher, New Franklin, OH

Scott P. & Kimberly L. Collins, New Franklin, OH

Tom Buechler, New Franklin, OH

Tom Dungey, New Franklin, OH

Toni B. Sholley, New Franklin, OH

Toni Sholley, New Franklin, OH

Tony L. & Gail S. Newman, New Franklin, OH

The Marie Easterling Trust, New Franklin, OH

The Parks Family Trust, New Franklin, OH

The Robinson Income Access Trust, New Franklin, OH

Roger D. Vaughan, Jr., New Franklin, OH

Michael Kell, New London, OH

Jeffery Diosi, Ohio Department of Transportation, District #11, New Philadelphia, OH

Muskingum Watershed Conservancy District, New Philadelphia, OH

Loran C & Peggy Dalton, New Waterford, OH

Jane Buehler, Newcomerstown, OH

Mitch Lynd, Midwest Apple Improvement Association, Newcomerstown, OH

Hagan Family Revocable Trust, North Canton, OH

Alan L. & Jean S. Clites, North Canton, OH

Alan R. Hess, North Canton, OH

Alfred H. & Anastania G. Grzeschik, North Canton, OH

Amanda Joyce Abbott, North Canton, OH

Beth Burns, North Canton, OH

Betty Newman, North Canton, OH

Appendix A
Draft EIS Distribution List

Bobby E. Geer, North Canton, OH

Camille M. Malfeo, North Canton, OH

Carol L. Grzeschik, North Canton, OH

Charlene E. Stevanov, North Canton, OH

Claudine M. Rabl, North Canton, OH

Daryl Miller, North Canton, OH

Don Richeson, North Canton, OH

Donald L. & Patricia A. Day, North Canton, OH

Douglas E. & Patricia A. Julian, North Canton, OH

Douglas R. & Robin J. Ricks, North Canton, OH

Edward P. Thompson, North Canton, OH

Erik M. & Charlotte M. Francis, North Canton, OH

Frank Rabl, North Canton, OH

George L. Long, Sr., North Canton, OH

Gretchen Ferncez, North Canton, OH

Harlan G. & Leocadia V. Storey, North Canton, OH

Harry Darryl Lukkes, North Canton, OH

Herbert E. & Yvonne R. Ward, North Canton, OH

Jacqueline Day, North Canton, OH

James P. Kling, North Canton, OH

James W. Doan, North Canton, OH

Jayson Rothacker, North Canton, OH

Jeff Masin & LeeAnne Matthews, North Canton, OH

Jeffrey Burns, North Canton, OH

Jennifer M. Seloover, North Canton, OH

Jimmy Lee & Talma L. Rutherford, North Canton, OH

John & Toni Carver, North Canton, OH

John A. Stevanov, North Canton, OH

John D. & Laura M. Barrickman, North Canton, OH

John Helms, North Canton, OH

Joseph & Diane Petrella, North Canton, OH

Joseph Langenfeld, North Canton, OH

Joyce A. Scott, North Canton, OH

Kay Sanders, NCT Development Corp., North Canton, OH

Kellie Johnson, North Canton, OH

Krista Marie Roversi-Devlin, North Canton, OH

Laura A. Seloover, North Canton, OH

Linda Bernat, North Canton, OH

Linda M. Cardarelli, North Canton, OH

Linda M. Edwards, North Canton, OH

Linda M. Roversi, North Canton, OH

Linda S. Johnson, North Canton, OH

Lisa J. Kelleman, North Canton, OH

Lori Davis, Dehoff Agency Inc., North Canton, OH

Macel L. Croston, North Canton, OH

Margaret A. Amonett, North Canton, OH

Mark A. & Michelle L. Loveland, North Canton, OH

Mark L. Herdlick, North Canton, OH

Mary E. Sockwell, North Canton, OH

Mary L Robson, Trustee, North Canton, OH

Michael D. Fluty, North Canton, OH

Michael J. Marstrell, North Canton, OH

Michael L. & Elizabeth M. Young, North Canton, OH

Mickey P. & Pamela Sue Cutlip, North Canton, OH

Mike Royce, North Canton, OH

Mindy Christy, North Canton, OH

Nadene M. Robinault, North Canton, OH

Nancy Miller, North Canton, OH

Nancy Woodall, North Canton, OH

Natalie H. Weinsz, North Canton, OH

Neil J. & Andrea Page, North Canton, OH

Nicholas S. & Melody C. Pappas, North Canton, OH

Para M Jones, Stark State College, North Canton, OH

Patricia A. Busic, The Busic Living Trust, North Canton, OH

Rebecca Ann Chula, North Canton, OH

Rebecca L. Paulos, North Canton, OH

Regan S. Robinault, North Canton, OH

Richard & Joyce Blough, North Canton, OH

Richard I. Mellinger, North Canton, OH

Richard Radosevic, Etal, North Canton, OH

Robert Bowling, North Canton, OH

Robert E. Mechling, North Canton, OH

Robert Lee & Twila Senften, North Canton, OH

Ronald & Miriam Aman, Trustees, North Canton, OH

Russell V. & Nancy Miller, North Canton, OH

Russell V. Miller, North Canton, OH

Ryan K. & Denise S. Berry, North Canton, OH

Stefanie Reynolds, North Canton, OH

Terri Barbush, North Canton, OH

Timothy J Sloan, North Canton, OH

Timothy P. Johnson, North Canton, OH

Timothy W. & Wendlynn R. Nicholas, North Canton, OH

Virgil E. & Wendy J. Kline, North Canton, OH

William & Kim Trussell, Co-Trustees, North Canton, OH

Akron Canton Regional Airport Authority, North Canton, OH

B & S Transport Inc, North Canton, OH

Hicks Family Trust, North Canton, OH

Margaret M. Wartko Trust, North Canton, OH

NCT Development Corporation, an Ohio corporation, North Canton, OH

Plummer Family Trust, North Canton, OH

The Chase Family Revocable Trust, North Canton, OH

The Reymann Foundation, North Canton, OH

The Spinelli Family Trust, North Canton, OH

The William Starcher, Jr. Revocable Family Trust, North Canton, OH

David L. & Carolyn F. Horst, North Fairfield, OH

Justin & Eberly Stufft, North Lawrence, OH

Charles R. Gish Trust, North Lawrence, OH

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Peggy J. Gish Trust, North Lawrence, OH

Tina Marie Sekeres, North Olmsted, OH

Chris Monti, North Ridgeville, OH

Elliot F. Supers, Trustee, The Norbert F. Supers Trust, North Ridgeville, OH

Richard Hale, Northfield, OH

Gretchen Thomas, Northwood, OH

Lawrence S. & Christie A. Poiry, Northwood, OH

Judy Reynolds, Norton, OH

Gary Gillen, Huron County Engineer's Office, Norwalk, OH

Gregory Fry, Norwalk, OH

Karen A. Gingery, Norwalk, OH

Natalie Fry, Norwalk, OH

Timothy D. Wilcox, Norwalk, OH

Zachary Fry, Norwalk, OH

Bryan Puder, Northern Ohio Rural Water, Norwalk, OH

George Robert Latteman, Norwalk, OH

James D. Heckelman, James D. Heckelman Declaration of Trust, Norwalk, OH

Jerald R. & Beverly J. Rockwell, Norwalk, OH

Margaret F. Heckelman, Margaret F. Heckelman Declaration of Trust, Norwalk, OH

Richard Schlessman, Fort Avery Farms LTD, Norwalk, OH

John Guerriero, Jr., Nuetiltonsville, OH

Melvin R. Brough, Oak Harbor, OH

Shane Vernon Overmyer, Oak Harbor, OH

Fairplay Holdings LLC, Oberlin, OH

Hoffman Judith M & Francis H Trustees, Oberlin, OH

The Almighty Church, Oberlin, OH

WGI Properties LLC, Oberlin, OH

Oasis Animal Shlter, Attn: Vera Opal, Chairman, Oasis Animal Shelter, an Ohio not for profit corporation, Oberlin, OH

Alan W. & Pauline A. Pachinger, Alan W. Pachinger and Pauline A. Pachinger Trust, Oberlin, OH

Alfred W. Brown, Oberlin, OH

Anne W. Wardwell, Oberlin, OH

Barbara A. Schaab, Oberlin, OH

Bill L. Sauer, Oberlin, OH

Bryan T Stubbs, Oberlin, OH

Camden Township Board of Trustees, Oberlin, OH

Carol A. Strayer, Oberlin, OH

Cathy L. Castle, Oberlin, OH

Charles E. & Elizabeth A. Livermore, Oberlin, OH

Christian & Catherine Bjelica, Oberlin, OH

Craig Ksenich, Oberlin, OH

Darcy W. Jr., & Kristi Lynn Yonts, Oberlin, OH

Darrell E. & Dorothy M Hill, Oberlin, OH

David G. & Margaret S. Gueulette, Oberlin, OH

Deborah L. & Donald L. Ortner, Oberlin, OH

Dennis Chan & Meredith J. Bradley, Oberlin, OH

Dennis J. Kothe, Oberlin, OH

Donna J Born, Donna J. Born, Trustee of the Donna J. Born Trust, Oberlin, OH

Dovin Land Co Llc, Oberlin, OH

Edward J. Wardwell, Oberlin, OH

Eileen K. Telegdy, Oberlin, OH

Elena Fuquay, Oberlin, OH

Elizabeth H. McKernan, Trustee, Elizabeth H. McKernan Trust, Oberlin, OH

Elizabeth Jankowski, Oberlin, OH

Eric & Lori McConnell, Oberlin, OH

Eric R. Severs, Oberlin, OH

Estate of Essie Brown, Oberlin, OH

Geoffrey Moore, Oberlin, OH

George & Roberta Simko, Oberlin, OH

J.G.P. & Mary E Leek, Oberlin, OH

James & Mariane Woodrum, Oberlin, OH

James Born, Oberlin, OH

Jeffrey A. & Mary A. Sandrock, Oberlin, OH

Jeffrey Alan and Patricia Ann Hill Holcomb, Oberlin, OH

John B Turner, Oberlin, OH

John E. & Patricia A. Forthofer, Oberlin, OH

John N. Van der Pyl, John N. Van der Pyl Revocable Trust, Oberlin, OH

John R. & Lois A. Fridenstine, Oberlin, OH

John S. Piwinski, Oberlin, OH

Jon D. Clark, City of Oberlin, Oberlin, OH

Joseph & Mary A Tondo, Oberlin, OH

Joyce M. Parker, Oberlin, OH

Karen M. Fridenstine and Kristin H. McDonough, Edith M. Ward Irrevocable Trust Agreement, Oberlin, OH

Karen Mary Corcoran, Oberlin, OH

Kermit & Virginia Seeley, Oberlin, OH

Larry J. & Charlene J. Barbee, Oberlin, OH

Leroy E. & Carol A. Schaefer, Oberlin, OH

Linda Ewell, Oberlin, OH

Lisa Kavanaugh, Oberlin, OH

Mara Capuano, Oberlin, OH

Nelson Eugene & Ethel Joann English, Oberlin, OH

Patricia M. Schaab, Oberlin, OH

Patrick Z. Hozalski, Floyd A. Hozalski Revocable Trust, Oberlin, OH

Paul & Dawn Dellisanti, Oberlin, OH

Phillip W. & Glenda A. Thornton, Oberlin, OH

Piroska Orban, Oberlin, OH

Rebecca Schlather, Oberlin, OH

Richard L Turner, Oberlin, OH

Robert & Wendy Morris, Oberlin, OH

Robert F. Smith, Oberlin, OH

Robert Morris, Oberlin, OH

Robert Pandy, Pandy Farm LLC, Oberlin, OH

Roger & Cynthia Mcvetta, Oberlin, OH

Ronald G. & Nancy E. Hendrikson, Oberlin, OH

Russell & Wilma Hunt, Oberlin, OH

Ruth & Gordon Groot, Oberlin, OH

Sara Pandolfi, Oberlin, OH

Shawn Kenney, Oberlin, OH

Appendix A
Draft EIS Distribution List

Thomas & Joni Ruffner, Oberlin, OH

Timothy Buchs, Oberlin, OH

Tom and Eva Weber, Oberlin, OH

William D. Born, William D. Born, Trustee of the Donna J. Born Trust, Oberlin, OH

William J. and Stephanie K. Forthofer, Oberlin, OH

Wilma C. Hunt, Oberlin, OH

Green Circle Growers, Inc, Oberlin, OH

Kipton Quarry Properties, LLC, Oberlin, OH

SCM Trust VIII, Oberlin, OH

Woodrum Farms LLC, Oberlin, OH

Woodrum Farms, LLC, Oberlin, OH

Nantucket Properties, LLC, Oberlin, OH

Adelbert M Marquard, Oberlin, OH

Corey L & Brandi L Middlebrooks, Oberlin, OH

Dale A Rider, Oberlin, OH

Donna Tjotjos, Oberlin, OH

Dorena Gilchrist, Oberlin, OH

Elizabeth H. McKernan, Oberlin, OH

Fred & Emilie Feddeck, Oberlin, OH

Gregg & Donna Wilson, Oberlin, OH

Harold M & Stacie D Walton, Oberlin, OH

James Covas, Jr., Oberlin, OH

James H. Griner, Jr., Oberlin, OH

Jason D & Virginia O Hudson, Oberlin, OH

Jill M Medina, Oberlin, OH

Joy Harrison, Oberlin, OH

Kathleen A Rednour, Oberlin, OH

Kevin J. & Kristine M. Walz, Oberlin, OH

Lee & Jennifer Wilson, Oberlin, OH

Malachiah & Norma J Saunders, Oberlin, OH

Neil J & Patricia A Bright, Oberlin, OH

Norman D & Crystal R Davis, Oberlin, OH

Richard J & Michelle D Mihna, Oberlin, OH

Rosalee & Daniel P. Ehler, Oberlin, OH

Shanton V & Nola L Bland, Oberlin, OH

Sharyle A Strayer, Oberlin, OH

Yong OK Jackson, Oberlin, OH

The Dolores Mary Lissfelt Trust, Oberlin, OH

Jeffrey Alan & Hill Patricia Ann Holcomb, Oberlin, OH

John A. Freeland, PhD, PWS, Stantec, Okemos, OH

James W Tuttle, Tuttle Family Irrevocable Trust, Olmstead Falls, OH

Ronald J. & Michele S. Baron, Olmsted Falls, OH

Ronald L. Badiu, Olmsted Township, OH

Becky L. Box, Toledo Alfalfa Mills Inc., Oregon, OH

Robert Lefevre, Oregon, OH

Donald Smith, Orrville, OH

Jennifer Meyer, Aspire Energy of Ohio, LLC, Orrville, OH

John Kropft, Orrville, OH

Ted Wohlfarth, Ottawa Hills, OH

Denver Belknap, Paris, OH

Freda Hathaway, Paris, OH

John & Dee Carns, Paris, OH

Reginald & Jennette Stoltzfus, Paris, OH

Thomas Adams, Paris, OH

Tyrone Mark & Kathy S. Rastetter, Paris, OH

Twin Meadows Farm, LLC, Paris, OH

W. M. M. T. LTD, Paris, OH

Dolores M. Billy, Trustee, Dolores M. Billy Trust, Parma, OH

Betty L. Moritz, Pemberville, OH

Dave Welling, Zoning Inspector, Webster Township, Pemberville, OH

Kirt D. & Julie L. Lembke, Pemberville, OH

Dolly A. Buchman Trust, Pemberville, OH

Linter Farms LLC, Pemberville, OH

Alvin J. Swartz II, Perrysburg, OH

Bernard C. & Margaret A. Eckel, Perrysburg, OH

Carl Mauch, Perrysburg, OH

Carol Jean Raifsnider, Perrysburg, OH

Cheryl S. Peters & Loretta M. Hartman, Loretta M. Hartman Irrevocable Trust, Perrysburg, OH

Deborah Berlekamp, Perrysburg, OH

Dustin L. & Melissa S. Schimmoeller, Perrysburg, OH

Galen R. Tipping, Perrysburg, OH

Henry Sr & Oletha Zaborniak, Perrysburg, OH

Ilze Hammersley, Perrysburg, OH

Jack & Gloria Bigelow, Perrysburg, OH

James R. Robertson, Perrysburg, OH

Janet B. Swartz, Perrysburg, OH

Jeanne Johnston, Perrysburg, OH

John & April M. Delgado, Jr., Perrysburg, OH

John T. Bondelier, Perrysburg, OH

Laurie Livingston, Perrysburg, OH

Majorie A. Deal, Perrysburg, OH

Marianne Wagner, Perrysburg, OH

Mary Sherman, Perrysburg, OH

Matthew L. Brinker, Perrysburg, OH

Nicholas A. & Julia L. Link, Perrysburg, OH

Randall S. & Ann Marie VanEtten, Perrysburg, OH

Rebecca McKinney, Charley Asmus Family Farm, Inc., Perrysburg, OH

Rebecca Robertson, Perrysburg, OH

Robert & Maribeth Moser, Perrysburg, OH

Robert E. & Theresa Rickels, Perrysburg, OH

Robert Perry, Perrysburg, OH

Ronald J. Dauer, Perrysburg, OH

Shannon & Lucinda Richards, Perrysburg, OH

Sharon E. Knitt, Perrysburg, OH

Steven A. Brubaker, Perrysburg, OH

Susan L. Brotje, Perrysburg, OH

Jeffrey L. Barnes Trust, Perrysburg, OH

Daniel L. & Janice M. Schimmoeller, Reegan Lands Ltd, an Ohio Limited Liability Company, Perrysburg, OH

Daniel L. & Janice M. Schimmoeller, Perrysburg, OH

Denise S. Eckel, Perrysburg, OH

Appendix A
Draft EIS Distribution List

Eldor H & Dale M. Cohrs, Perrysburg, OH

James A. & Florence A Ryder, Perrysburg, OH

Janice M. Gurtzweiler, Perrysburg, OH

Janis E. Sheldrick, Perrysburg, OH

Richard L. & Harriet C. Ashton, Perrysburg, OH

Robert L. Perry II, Perrysburg, OH

Robert W. & Thelma J. Sibbersen, Perrysburg, OH

Steven E. & Elaine Grolle, Perrysburg, OH

Curtis E Weiland & Rosalyn M Weiland Living Trust, Perrysburg, OH

Ester L. Speck, Trustee, Perrysburg, OH

Judith Ann Loffer, Piqua, OH

Mark Wetzel, Northeast Ohio Natural Gas Corporation, Pleasantville, OH

Scott A. Emch, Port Clinton, OH

William Hammon, Portage, OH

Eugene & Irene Dangel, Powhatan, OH

Susan E Shively & Barbara J. Shively, Prospect, OH

Mary Greer, Ravenna, OH

Mike Watson, Ravenna, OH

Ohio Department of Agriculture, Reynoldsburg, OH

Sharon G. Bluie, MAI, Integra Realty Resources - Cleveland, Richfield, OH

Cross Agricultural, Richfield, OH

Carl J. Hoffman, Rittman, OH

Clinton C. & Danielle N. Fazekas, Rittman, OH

David A. Choban, Rittman, OH

Dennis W. Sylvester, Rittman, OH

Donna L. Ellis, Rittman, OH

Douglas J. & Dianna Bauman, Rittman, OH

Douglas J. Bauman, Rittman, OH

Earl H. Long, Jr., Rittman, OH

Elaine K. Perrigo, Rittman, OH

Emery & Erika L. Gal, Rittman, OH

Erica J. Lyon, Rittman, OH

Gary & Jackie Landis, Rittman, OH

Gary S. & Deborah A. Adkins, Rittman, OH

Hannah Tomes, Rittman, OH

Howard E. & Eleanor B. Shoup, Rittman, OH

Isabel M. Koger, Rittman, OH

James F. Silchuk, Rittman, OH

James R. & Julia L. Miller, Rittman, OH

James W. & Ruth E. Stauffer, Rittman, OH

Jason Scott, S&S Energy Corporation, Rittman, OH

Jason T. & Lisa Balcziunas, Rittman, OH

Jay & Rhonda Landis, Rittman, OH

Jean Carroll Carlson, Rittman, OH

Joe Ramsier, Rittman, OH

John M. & Erin R. Miller, Rittman, OH

Jonathan D. & Jill P. Strong, Rittman, OH

Jonathan P. Hibian, Rittman, OH

Joseph C. Rinal, Rittman, OH

Joseph Ronald & Ruth Ann Giacomoni, Rittman, OH

Joseph S. Vislasky, Rittman, OH

Joshua P. Petroc, Rittman, OH

Judith Sabo, Rittman, OH

Judy Lynn Morgan, Rittman, OH

Kenneth E. & Rona N. Veney, Rittman, OH

Kenneth K. Gillette, Rittman, OH

Kenneth L. & Ruby M. Gumbarevic, Rittman, OH

Louis E. & Barbara A. Herwick, Louis E. & Barbara A. Herwick Revocable Living Trust Agreement, Rittman, OH

Mark A. & Cheryl K. Stephens, Rittman, OH

Marvin J. & Teresa K. Ramsier, Rittman, OH

Marvin P. & Sue L. Hartzler, Rittman, OH

Marvin Ramsier, MNTR Ltd, Rittman, OH

Mary O. Sauer, Rittman, OH

Melvin L. & Patti S. Bowsher, II, Rittman, OH

Michael J. & Julianne S. Stafford, Rittman, OH

Nathaniel F. Helms & Rashelle Norris, Rittman, OH

Pamela S. & Calvin G. Lyons, Rittman, OH

Robert A. & Carolyn W. Bernstorf, Rittman, OH

Robert J. & Frances E. McCormick, Rittman, OH

Rodney V. & Carolyn F. Milburn, Rittman, OH

Ronald & Connie Just, Rittman, OH

Samuel R. & Gail R. Hartzler, Rittman, OH

Scott A & Kathleen N. Deeter, Rittman, OH

Terry A. Schmel, Rittman, OH

Terry Parker, Rittman, OH

Thomas & Ruth M. West, Rittman, OH

Thomas G. Srock, Rittman, OH

Todd J. & Susan J. Brady, Rittman, OH

Wade E. Carpenter, Rittman, OH

Wayne R. Schultz, Rittman, OH

William E. Bauman, Rittman, OH

Black Diamond Farm LLC, Rittman, OH

Estate of Clifford W. Thonen & Helen J. Thonen, Trustee, Rittman, OH

Priority II, LLC, Rittman, OH

Harvey & Stephanie Landis, Rittman, OH

Caleb C & Amanda Marburger, Robertsville, OH

James Robbins, Robertsville, OH

Darlene Herringshaw, Rudolph, OH

Peter Loretta, Sadusky, OH

John J. Wargo, Sagamore Hills, OH

Lance Aaron Rossini, Saint Clairsville, OH

Travis W. Ochsenbine, Saint Clairsville, OH

Clifford Milburn, Salem, OH

Edward & Claire Masters, Sr., Salem, OH

Frederick C. Johnson, W-T Johnson Family Farms, LLC, Salem, OH

James P. Taus, Salem, OH

Appendix A
Draft EIS Distribution List

Jay E. & Pamela G. Herron, Salem, OH

John W. & Elizabeth A. Sanor, Salem, OH

Mark & Shawna L'Italien, Salem, OH

Shawna L L'Italien, Harrington, Hoppe & Mitchell, Ltd, Salem, OH

Tom & Margaret Menning, Salem, OH

Maps Real Estate Ltd, Salem, OH

Paris Avenue Christadelphia Ecclesia, Salem, OH

Bill & Marie Schlabach, Salineville, OH

Coldwell Family Tree Farm LLC, Salineville, OH

James F. Dangelo Revocable Trust, Salineville, OH

James M. & Vada J. Wargo, Salineville, OH

Jeremy Tingler, Utica East Ohio Midstream LLC, Salineville, OH

John P. Wargo, Salineville, OH

Karl H. & Dolores M. Welch, Salineville, OH

Madelein J. Wargo, Salineville, OH

Susan McDaniel, Salineville, OH

Alice M. Fanning, Sandusky, OH

David & Julie Pocock, Sandusky, OH

Gerald J. & Elizabeth A. Boros, Sandusky, OH

James Edward Fanning, Sandusky, OH

Mary M. Matthias, John G. Matthias Declaration of Trust, Sandusky, OH

Matthew H. Miller, Sandusky, OH

Ruth D. Miller, Trust Agreement of Wayne R. Miller, Sandusky, OH

Stuart Wells, Sandusky, OH

Tim D Lloyd, Erie County Engineer, Sandusky, OH

TJ Kresser, Sandusky, OH

Wesley H. Miller, Sandusky, OH

Galloway & Sons LTD, Sandusky, OH

S & M Unlimited LLC, Sandusky, OH

David G. & Kathleen A. Downs, Sandusky, OH

Derek Lundy, Erie County Conservation League, Inc., Sandusky, OH

Edward C. & Nancy L. Stallkamp, Sandusky, OH

Edward S. & Lisa A. Schenk, Sandusky, OH

James Earl Fanning, Sandusky, OH

John & Fred A. Rohrbacher, Sandusky, OH

Michael J. & Denise A. Wyatt, Sandusky, OH

Raymond G. Warner, Sandusky, OH

Richard Norman & Nancy Kay Swanson, Sandusky, OH

Ruth D Miller, Ruth D. Miller Trust, Sandusky, OH

Goodnight Inn, Inc., Sandusky, OH

The Franklin A. Speer Trust, Sandusky, OH

Chuck Soneff, Savannah, OH

Donald Kerr, Sebering, OH

Debra Ruprecht, The Debra A. Ruprecht Revocable Trust, Seviille, OH

Aaron & Melisa Klein, Seville, OH

Adam & Margaret Yonkof, Seville, OH

Alfred & Barbara Ellis, Seville, OH

Alfred P. & Barbara J. Ellis, Seville, OH

Alvin & Kandi Sedinger, Seville, OH

Bede E. Mobley, Seville, OH

Bert & Laura Copley, Seville, OH

Bonnie Swiger, Seville, OH

Brian & Jennifer Heller, Seville, OH

Byron Bombay, Seville, OH

Charles & Marilyn Boedicker, Seville, OH

Chris Wodzak, Seville, OH

Craig & Roseann Wood, Seville, OH

Daniel J. & Cheryl L. Bock, Seville, OH

Dean E. & Tracey L. Rogers, Seville, OH

Debra A Beckstett, Seville, OH

Dennis S. & Debbi S. Boothe, Sr., Seville, OH

Donald O. & Clara B. Nickell, Seville, OH

Douglas & Kathryn Lampert, Seville, OH

Douglas Edward & Katie M. Kreider, Seville, OH

Franklin & Nancy Malcolm, Seville, OH

Gay Boden, Seville, OH

Gregory & Deanna Brenner, Seville, OH

Gregory A. & Ashley E. Wohlwend, Seville, OH

Harold & Judy High, Seville, OH

Harold E. High, Sr., Seville, OH

Jac & Janice Cerovac, Seville, OH

James & Darla Eberly, Seville, OH

Jane Faldetta, Seville, OH

Jeffrey & Sandra Leatherman, Seville, OH

Jeffrey A. & Fay M. Jarrett, Seville, OH

Jesse & Tiffany Shultz, Seville, OH

John & Michelle Rose, Seville, OH

John Troche, Seville, OH

Judy A. Giaque, Seville, OH

Karen Larson, Seville, OH

Karl E. & Terrie L. Bebout, II, Seville, OH

Katie Mullins, Seville, OH

Kemp & Mary Wilson, Seville, OH

Kenneth M. & Connie R. Beery, Sr., Seville, OH

Kent & Pamela Ringstmeier, Seville, OH

Kent Morrison, Kent Morrision, Seville, OH

Lee E. & Mary Ann Straub, Seville, OH

Lisa Winter, Seville, OH

Mark & Elizabeth Ingham, Seville, OH

Mark & Michele Scarberry, Seville, OH

Martin & Dawn Ferro, Seville, OH

Matthew & Jessica Chamberlin, Seville, OH

Matthew Parham, Seville, OH

Michael & Joanne King, Seville, OH

Michael & Tawnya Smith, Seville, OH

Michael Labant, Seville, OH

Michael Smith, Trust, Seville, OH

Nicholas & Gail Furillo, Jr., Seville, OH

Patricia A. Jackson, Seville, OH

Patricia L. Corbet, Seville, OH

Pauline Subich, Seville, OH

Ralph & Mary Beth Goodwin, Seville, OH

Ray Ruprecht, Trustees of Guilford Township, Seville, OH

Raymond A. Ruprecht, The Raymond A. Ruprecht Revocable Trust, Seville, OH

Richard C. & Claudia J. Scranton, Seville, OH

Robert & Maryan Mathis, Seville, OH

Robert & Sharon Alderman, Seville, OH

Robert & Teresa Grimm, Seville, OH

Robert D. & Mary L. Huff, Seville, OH

Ruby Newcomer, Seville, OH

Sean T. & Deborah A. Davis, Seville, OH

Shane Michael Huffman, Seville, OH

Shirley J. Williams, Seville, OH

Stephen D. & Christine M. Mathews, Seville, OH

Steven C. & Denise L. Topp, Seville, OH

Steven K. & Beth A. Fulton, Guilford Township, Seville, OH

Stuart & Charlene Newcomer, Seville, OH

Terry & Lesley Wyszynski, Seville, OH

Thomas Jude Herdman, Seville, OH

Thomas L. & Vicky L. Wellman, Jr., Seville, OH

Thomas V. & Jody A. Clarkson, Seville, OH

Timothy & Noreen Cogar, Seville, OH

Vincent & Kim Jacob, Seville, OH

Wendel Payn, Guilford Township Ohio, Seville, OH

Wesley & Lori Schroeder, Seville, OH

William & Diana Bowman, Seville, OH

William Boden, Seville, OH

Willis & Sandra Galbreath, Seville, OH

Glen E. & Lois A. Morrison Trust, Seville, OH

Jennifer A. Stewart Trust, Seville, OH

Kathryn Rohrer Trust, Seville, OH

Linda R. Straub Trust, Seville, OH

Myron C. Roher Trust, Seville, OH

Newcomer Properties Ltd, Seville, OH

Northern Ohio Beagle Club, Seville, OH

Richard L. Mills and Patricia A. Craiglow-Mills Revocable Trust, Seville, OH

Robert W. Straub Trust, Seville, OH

The Mary Christine Armstrong Living Trust, Seville, OH

The Massi Family Revocable Living Trust, Seville, OH

The Sean E. Reusch Trust, Seville, OH

Trust, Seville, OH

Village of Seville Ohio, Seville, OH

Joseph Thomas, Sprint, Sharonville, OH

Catherine Hozalski, Floyd A. Hozalski Revocable Trust, Sheffield Lake, OH

Darrel & Roxanne Neice, Sherrodsville, OH

Charles Wood, Shreve, OH

Tate Farms Company Ltd, Shreve, OH

Carl D Ternes, Spencer, OH

Carol L & Bernard A Mcatee, Spencer, OH

Eadred Elaine Koch & William W Reisinger & Charlene F Cornish &, Spencer, OH

Eli S & Clara A Hostetler & Abe D & Anna Yoder, Spencer, OH

Glenn A & Carolyn D Gentile, Spencer, OH

James E Miller, Spencer, OH

Julie M Martin, Spencer, OH

Karen Bihn & Kenneth L Wetmore, Spencer, OH

Kenneth L Wetmore & Karen Bihn, Spencer, OH

Neva Marcum, Spencer, OH

Pamela J Oberholtzer, Spencer, OH

Todd C Mosher, Spencer, OH

Indohio Farms LLC, Spencer, OH

John Ternes and William Walter Real Estate Partnership, Spencer, OH

Joyce Hiser, Springfield, OH

Allison J. Craig, St. Clairsville, OH

Keith D. & Autumn J. Stoller, Sterling, OH

Jeffrey S. Gunn, Sterling, OH

Brian Valenti, Stow, OH

David J. & Silvana F. Sensius, Stow, OH

Tracey Moulton, Stow, OH

Ohio Central Railroad Inc, Stow, OH

Jerry & Sandra Hall, Strasburg, OH

Michelle A & Thomas Lille, Strasburg, OH

Susan J. Brewster, Streetsboro, OH

Petrox, Inc, Streetsboro, OH

Sultan Properties & Farms LLC, Sultan Properties & Farms LLC, Strongsville, OH

Andrew P. Strojny, Jr. , Strongsville, OH

Igors & Natalia Pricinovskis, Strongsville, OH

Kent R. & Erica M. Rhodes, Strongsville, OH

Sylvia M. Lutke, Strongsville, OH

Ronald L. & Rosanne Fisher, Stryker, OH

Summitcrest Holdings LLC, Summitville, OH

Watkins Family LP, Summitville, OH

Joseph McKarns, Summitville, OH

Pamela Kosko, Summitville, OH

Renee L. Lamp, Summitville, OH

Paul Gearin, Franklin Township Board of Trustees, Summitville, OH

Johnston Fruit Farms LLC, Swanton, OH

A. Jane Gillen, A. Jane Gillen Family Trust, Swanton, OH

A. Jane Gillen, Gale J. Gillen Family Trust, Swanton, OH

A.W. Schmude, Swanton, OH

Albert L Mackey, Swanton, OH

Alberta L. Smithson & Joseph E. Lewis, Swanton, OH

Alicia S. Bonnell, Swanton, OH

Allyn D. Schmitz, Swanton, OH

Audra L. Klatt, Swanton, OH

Betty Jean Stacey, Swanton, OH

Carol A. Dowling, Swanton, OH

Carol Jacks, Swanton, OH

Carroll Ashley, Swanton, OH

Cathy Kolodziejski, Swanton, OH

Charles D. & June Brown, Swanton, OH

Cherie & David Evanns, Swanton, OH

Chris Thiemon, Swanton, OH

Appendix A
Draft EIS Distribution List

Christine Parker, Swanton, OH

Christopher J. & Velma R. Hallett, Trustees, Swanton, OH

Colleen Taylor, Swanton, OH

David & Darlene L Daugherty, Swanton, OH

David D. Dowling, Swanton, OH

David M. Mossing, Swanton, OH

David N. Walters, Swanton, OH

David S. Smith, Jr., Swanton, OH

David W. & Jean Meller, David W. Meller & Jean Meller Revocable Trust, Swanton, OH

Dean R. Dowling, Swanton, OH

Dennis A. & Jennifer B. Goldsmith, Swanton, OH

Dennis E & Wanda J Flory, Swanton, OH

Dennis J & Denise A Heban, Swanton, OH

Dennis J. & Claudia Duden, Swanton, OH

Dennis M. & Ginger Schwyn, Swanton, OH

Denver J. & Sally J. Mossing, Swanton, OH

Diane M Halsey, Swanton, OH

Don Neifer, Swanton, OH

Doug & Karen Mold, Swanton, OH

Douglas C. & Lisa M. Keil, Swanton, OH

Dowling Farm Partnership, Swanton, OH

Earl L. & Martha M. Rowland, Jr., Swanton, OH

Elaine E. Terman, Swanton, OH

Elfrieda Jewell, Swanton, OH

Elizabeth J Duden, Swanton, OH

Elizabeth Victor, Swanton, OH

Eric M. & Amy S. Swartz, Swanton, OH

Eugene Gombash, Sr., Eugene Gombash Credit Shelter Trust, Swanton, OH

Eva M Waldron, Swanton, OH

Eva M. Lynch, Swanton, OH

Frank Wayne & Paulette M Brewster, Swanton, OH

Frank Wayne & Paulette M. Brewster, Swanton, OH

Frank X. Renner, Swanton, OH

Frederic G. & Nancy M. Foster, Swanton, OH

Frederick L Meyer, Swanton, OH

Fritz E. Wells, Swanton, OH

Gary D. Mohr, Swanton, OH

Gary E Duden, Swanton, OH

Gene & Yvonne Brandenberry, Swanton, OH

Hardress J Waller, Swanton, OH

Helen A. Beroske, Life Estate, Swanton, OH

Jack C & Gale A Parsil, Swanton, OH

James & Laura Cole, Swanton, OH

Janine A. Moon, Swanton, OH

Jason A. and Sarah J. Fagerman, Swanton, OH

Jewell Bryan, Swanton, OH

Joe Gombash, Gombash Brothers Inc., Swanton, OH

John H. & Rhonda L. Gross, Swanton, OH

John J Dowling, Swanton, OH

John Rendle, Swanton, OH

John Schaller, Swanton, OH

John W Miller, Swanton, OH

Joseph A & Cynthia M Zalecki, Swanton, OH

Joyce A. Schwyn, The Joyce A. Schwyn Revocable Trust, Swanton, OH

Julius W. Gombash, Julius W. Gombash Trust Agreement, Swanton, OH

Kamal Parker, Swanton, OH

Karen S. Kendrick, Swanton, OH

Kathy Buckenmeyer, Swanton, OH

Kevin & Melissa Weiss, Swanton, OH

Kevin Seiler, Swanton, OH

Kevin Seiler, Swanton, OH

Lance N. & Barbara A. Seiler, Swanton, OH

Larry & Mary Daubenmeyer, Swanton, OH

Larry J. Truckor, Swanton, OH

Lawrence E. Storeholder, Lawrence E. Storeholder Trust Agreement, Swanton, OH

Lawrence William Konwinski, Swanton, OH

Lois J. Gombash, Lois J. Gombash Credit Shelter Trust, Swanton, OH

Lonnie Snyder, Swanton, OH

Lowell S. & Diane L. Bryan, Swanton, OH

Mack Fowler, Swanton, OH

Margaret A Lehman, Swanton, OH

Mark E. & Pamela L. Loeffler, Swanton, OH

Mark E. Loeffler, Swanton, OH

Mark Waldron, Swanton, OH

Marsha McKenzie, Swanton, OH

Mary Beth Euler, Swanton, OH

Matthew P. & Jean M. Bucher, Swanton, OH

Meredith R. Gillen, Life Estate, Swanton, OH

Merz A & Connie S Little, Swanton, OH

Michael D. & Vicki D. Loeffler, Swanton, OH

Michael D. Loeffler, Swanton, OH

Michael G & Anita M Turner, Swanton, OH

Michael Kolodziejski, Swanton, OH

Michael R. Hofner, Swanton, OH

Michael T Dawe, Swanton, OH

Michael T. Vanwagner, Swanton, OH

Michelle Langenderfer, Swanton, OH

Natalie Pallitta, Swanton, OH

Nathan L. & Jennifer V. Elsworth, Swanton, OH

Nicholas E. Wohlfarth, Swanton, OH

Pat Rizzi, Swanton, OH

Patricia Galvin, Swanton, OH

Patricia H. McNeill, Swanton, OH

Patricia L. Vollmar, Swanton, OH

Patrick H. & Patricia A. Dowling, The Dowling Family Trust, Swanton, OH

Paul and Lauretta Papp, Swanton, OH

Peggy S. Gombash, Peggy S. Gombash Trust Agreement, Swanton, OH

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Draft EIS Distribution List

Penelope G Risher, Swanton, OH

Rachel A. Tyler, Swanton, OH

Randy & Renee Walker, Swanton, OH

Randy E. & Carrie A. Piasecki, Swanton, OH

Raymond K. & Julie A. Szabo, Swanton, OH

Rebecca and Joseph Currier, Swanton, OH

Resident, Swanton, OH

Richard D & Kimberly K Bowser, Swanton, OH

Richard H. & Helen A. Gillen, Swanton, OH

Rick Kazmierczak, Swanton, OH

Rickie J. & Kay L. Dohm, Swanton, OH

Ricky L. Walters, Swanton, OH

Robert E. Schwyn, Robert E. Schwyn Revocable Trust, Swanton, OH

Robert H. & Bonnie Cicora, Swanton, OH

Robert K. Baker, Swanton, OH

Rodney & Bridget Metzger, Swanton, OH

Rodney A Croskey, Swanton, OH

Roger J. Gillen, Roger Gillen Declaration of Trust, Swanton, OH

Roger Truckor, Truckor Farms LLC, an Ohio limited liability company, Swanton, OH

Rosalie A. Gyurko & David L. Albain, Swanton, OH

Rose Ann Loeffler, Swanton, OH

Rosemary Truckor, Swanton, OH

Roy L & Peggy E Fry, Swanton, OH

Sally Wylie, Swanton, OH

Sandra L. Dishong, Swanton, OH

Sandy Lunn, Swanton, OH

Sara A. Phelan, Swanton, OH

Scott A. Storeholder, Swanton, OH

Sharon & Joseph L. Torok, Jr, Swanton, OH

Stephen A. & Cindy E. Klostermeier, Swanton, OH

Stephen E. & Courtney L. Adamczewski, Swanton, OH

Stephen Krueger, Swanton, OH

Steven D. & Alice J. Smith, Swanton, OH

Steven M. & Michelle A. Betz, Swanton, OH

Susan S. Rachlin & John C. Kurivial, Swanton, OH

Theresa A. Athaide, Swanton, OH

Thomas & Patricia Smith, Swanton, OH

Thomas J. Wylie, Sr., Swanton, OH

Timothy P. & Janet L. Wielinski, Swanton, OH

Timothy S Niles, Swanton, OH

Timothy S. Kulczak, Swanton, OH

Tina M. Sigler, Swanton, OH

Trina Houser, Swanton, OH

Trudy A. Foster, Swanton, OH

Vaughn C Miller, Swanton, OH

Victor Marvin, Swanton, OH

Walter & Danuta Lange, Lange Tree Farm, Swanton, OH

Wesley C Green, Swanton, OH

William & Kathryn Mack, Swanton, OH

William A. Stehowsky, Swanton, OH

William H & Jane F Green, Swanton, OH

William H. & Jane F. Green, Swanton, OH

William Krah, Swanton, OH

William S. & Vickie L. Halsey, Swanton, OH

Sean S. Shinaberry Trust, Swanton, OH

Terrence E. Hallett Trust, Swanton, OH

The Florence M. Ort William H. Ort Living Trust, Swanton, OH

Walter H. & Danuta T. Lange Trust, Swanton, OH

Frank Echelmeyer, Sylvania, OH

Frederick Blosser, Sylvania, OH

Jeffrey Peters, Sylvania, OH

Margaret Kohler, Sylvania, OH

Mark Gretsinger, MD, Sylvania, OH

Marvin G. & Kathy E. Wilmoth, Jr., Tallmadge, OH

Andrea Siparsky, Toledo, OH

Beatrice L. Grau, Toledo, OH

Beverly A. Modrowski, Toledo, OH

C. Renee Emrick, Toledo, OH

Donna A. Woodson, MD, Lucas County Regional Health District, Toledo, OH

Eric W. & Tammy R. Filzer, Toledo, OH

Eric Zgodzinski, MPH, RS, CPH, Toledo-Lucas County Health Department, Toledo, OH

Fred Heaney, Toledo, OH

Gene H. Brandeberry, Toledo, OH

James R. Leiter, Toledo, OH

Jeannie Carl, Toledo, OH

Kathryn Brzuchalski, Toledo, OH

Katrina Mechel, Toledo, OH

Kim Kensler-Prager, Toledo, OH

Michael A Dianda, Toledo, OH

Norm Lewallen, Teamsters Local #20, Toledo, OH

Norman Dixon, Toledo, OH

Paul H. and Betty Jane Kaseman, Trustees, Toledo, OH

Robert A Ganss, Toledo, OH

Ronald Wolniewicz, Toledo, OH

Steven Pecsenyne, Toledo, OH

Stewart Hinze, Toledo, OH

Taylor Barton, Toledo, OH

Thomas McDonald, Toledo, OH

Thomas R. Schoen, Toledo, OH

Tim Schefter, Toledo Metro Park Bd, Toledo, OH

Tom Henry, Toledo, OH

William B. Crockett Jr., William B. Crockett Jr. Trust, Toledo, OH

Yvonne D. Spence, Toledo, OH

Culvur W. & Marie D. Knollman Trust, Toledo, OH

H.M. Dodge Trust, Toledo, OH

Lucas County Board of Commissioners, Toledo, OH

State of Ohio, Toledo, OH

Toledo Trust Company, Trustee, Toledo, OH

Gene R. Abercrombie, Eastman & Smith Ltd, Toledo, OH

John Martin, Louisville Title Agency for NW Ohio Inc, Toledo, OH

Marvin & Judith Haas, Toledo, OH

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Terry Lodge, Freshwater Accountability Project, Toledo, OH

David & Nancy Prosser, Toronto, OH

Anthony J. & Sharen L. Campitelli, Uniontown, OH

Arthur L. & Janet L. Fessler, Uniontown, OH

Atlee & Cynthia Coblentz, Uniontown, OH

Bijan Aboutorabi, Uniontown, OH

Bill Anstine, Anstine Properties, LLC, Uniontown, OH

Bonnie L. Latampa, Uniontown, OH

Brandon & Ashley Livengood, Uniontown, OH

Breanna M. Smith, Uniontown, OH

Brenda Wendell, Uniontown, OH

Brian F. Keller, Uniontown, OH

Brian H. & Lisa L. Kay, Uniontown, OH

Bruce C. & Shirley A. Kent, Uniontown, OH

Candido N. & Marietta B. Vina, Uniontown, OH

Charles & Cheryl A. Marcelli, Uniontown, OH

Charles D. Park, II, Uniontown, OH

Cheryl & James Santmyer, Uniontown, OH

Christopher J. & Abigail G. Porter, Uniontown, OH

Christopher J. Gaertner, Uniontown, OH

Cory J. & Sarah C. Boyle, Uniontown, OH

Courtney Paul, Uniontown, OH

Daniel E. & Claudia E. Rocus, Uniontown, OH

Danielle L. Cunningham, Uniontown, OH

Darla D. Brown, Uniontown, OH

David A. Hoffman, Uniontown, OH

David Kurkey, Uniontown, OH

David R. & Debra J. Denholm, Uniontown, OH

David S. & Kathryn L. Miller, Uniontown, OH

David W. & Catherine Rama Reese, Uniontown, OH

Deborah D. Marino, Uniontown, OH

Diane Opala, Uniontown, OH

Donald F. & Laura E. Whitman, Uniontown, OH

Donald R. & Christine E. Wagner, Uniontown, OH

Donald Ziccardi, Uniontown, OH

Elizabeth A. Wargo, Uniontown, OH

Gary R. Jr & Bridget D. Jones, Uniontown, OH

Geoffrey L. Miller, Uniontown, OH

Gerald R. & Rosemarie A. Detchon, Uniontown, OH

Gloria L. Gonzalez, Uniontown, OH

Gregory & Stacie A. Stearn, Jr., Uniontown, OH

Gregory A. Kenepp, Uniontown, OH

Gregory P. & Korey E. Shank, Uniontown, OH

Harold R. & Deirdre Baughman, Uniontown, OH

James C. & Diana S. Biddle, Uniontown, OH

James E. & Cora B. Leiser, Uniontown, OH

Jason N. & Kimberly R. Rimmele, Uniontown, OH

Jeffrey Jay Smith, Uniontown, OH

Joel L. & Megan Schlabach, Uniontown, OH

John W. & Sara L. Chambers, Uniontown, OH

Jon M. Lemasters, Uniontown, OH

Joshua R. & Juliana L. Welling, Uniontown, OH

Kathy A. Berrens, Uniontown, OH

Keith A. Sherer, Uniontown, OH

Kelsey M. Allen, Uniontown, OH

Kenneth C. II & Kara A. Harland, Uniontown, OH

Kenneth R. Sommers, Uniontown, OH

Larry W. Sommers, Uniontown, OH

Linda M. Menyes, Uniontown, OH

Mark A. & Cynthia S. Fusco, Uniontown, OH

Mark A. & Laura K. Thompson, Uniontown, OH

Mark D. & Lisa M. Nesline, Uniontown, OH

Mark G. Fusco, Uniontown, OH

Mary Ellen Summers, Uniontown, OH

Maurice A. Barillas, Uniontown, OH

Melinda K. Slabaugh, Uniontown, OH

Melvin A. & Rebecca S. Schafer, Uniontown, OH

Michael & Katlyn Williams, Uniontown, OH

Michael E. White, Jr., Uniontown, OH

Michael G. & Ann E. Sowd, Uniontown, OH

Michael L. Sommers, Uniontown, OH

Michael P. & Antoinette C. Viscounte, Uniontown, OH

Michelle M. Judd, Uniontown, OH

Michelle Vance, Uniontown, OH

Nelson L. & Patricia A. Shammo, Uniontown, OH

Nickolas A. Bair, Uniontown, OH

Nicole D. Marks, Uniontown, OH

Patrick A. & Claudia A. Darrah, Uniontown, OH

Patrick K. & Shelley A. Ramey, Uniontown, OH

Paul W. & Rebecca J. Schwender, Uniontown, OH

Peter A. Nervo, Uniontown, OH

Queen of Heaven Catholic Church, Uniontown, OH

Randall E. & Carol J. Foxx, Uniontown, OH

Richard L. & Patsy M. Sherer, Uniontown, OH

Robert C. & Deborah J. Braham, Uniontown, OH

Robert D. & Shelly Feinman, Uniontown, OH

Robert L. Pavkov II & Carrie L. Pavkov, Uniontown, OH

Robert Paul Hiley, Uniontown, OH

Sandy Shelestovich, Uniontown, OH

Sean M. Tracey, Uniontown, OH

Sheldon D. & Chandra R. Coblentz, Uniontown, OH

Stephen L. & Susan M. Partridge, Uniontown, OH

Stephen Padermos, Uniontown, OH

Suzanne Fisher, Uniontown, OH

Tammy Daly, Green Meadows HOA, Uniontown, OH

Teresa R. Coulas, Uniontown, OH

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Draft EIS Distribution List

Thomas A. & Lori M. Shevlin, Uniontown, OH

Tom Colston, Jr., Uniontown, OH

Wayne R. Pryor, Uniontown, OH

William D. & Janice L. Pahl, Uniontown, OH

William E. & Kelli R. Vannatten, Uniontown, OH

William E. McGhee, Uniontown, OH

William R. & Marion K. Snow, Uniontown, OH

William T. & Cindy R. Tropf, Uniontown, OH

Yvonne Wendell, Uniontown, OH

B & B Realty Ltd, Uniontown, OH

Coblentz Family Limited Partnership, Uniontown, OH

Colonial Homes Inc., Uniontown, OH

Hopes Anchor LLC, Uniontown, OH

Resonate Real Estate Holdings LLC, Uniontown, OH

SEC Property Holdings, LLC, Uniontown, OH

The David Noel and Margaret W. Noel Revocable Living Trust, Uniontown, OH

The Henry J. Coblentz and Savilla M. Coblentz Revocable Living Trust, Uniontown, OH

The Wise Family Trust, Uniontown, OH

Roger M Hight, Upper Sandusky, OH

Roger M. Hight, Upper Sandusky, OH

Rocky River Watershed Council, Valley View, OH

Neill Welch, Welch Fruit Farms Inc., Vermilion, OH

Zack Doylek, Vermillion, OH

David A. & Daniel M. Warner, Warner Brothers Farm, an Ohio Partnership, Vickery, OH

David A. Perry, Vickery, OH

Emily K. Petronella, Vickery, OH

Mary C. Clonch, Vickery, OH

Michael James Norrocky, Vickery, OH

Otis R. McClain, Vickery, OH

Patrick Balduff & Kevin Balduff, Lekepa Farms, a Partnership, Vickery, OH

Patrick L. & Kevin L Balduff, Vickery, OH

Amy Giovannone, Millwood Natural, Vienna, OH

Allen & Carol Drown, Wadsworth, OH

Andrew & Pamela Daulbaugh, Wadsworth, OH

Bill Orr, Wadsworth, OH

Brett & Heather Richards, Wadsworth, OH

Bruce & Laurel Herron, Wadsworth, OH

Charles Schickler, Wadsworth, OH

Christopher & Susan Gambaccini, Wadsworth, OH

Clifford E. Lowe, Wadsworth, OH

Corin & Lisa Boruvka, Wadsworth, OH

Cory Boruvka, Wadsworth, OH

Craig T. Hecker, Wadsworth, OH

Daniel E. & Anita M. Pope, Wadsworth, OH

David & Donna Copeland, Wadsworth, OH

Dean & Cheryl Marshall, Wadsworth, OH

Donald R. Snyder, Wadsworth, OH

Douglas Mcintire, Wadsworth, OH

Dwayne & Judith Lahmann, Wadsworth, OH

Eric Orlando, Wadsworth, OH

Gerald & Michelle Munyan, Wadsworth, OH

Gregory & Debbie Pegrim, Wadsworth, OH

Jeff Hoerger, Wadsworth Township, Wadsworth, OH

Jeffrey & Michelle Gibson, Wadsworth, OH

Josh & Nicole Cook, Wadsworth, OH

Kurt & Rene Gerschutz, Wadsworth, OH

Kurt Gerschutz, Wadsworth, OH

Kyle M. Rohrig, Wadsworth, OH

Loren & Susan Lee, Wadsworth, OH

Lori & Thomas Prather, Wadsworth, OH

Mark & Kimberly Crow, Wadsworth, OH

Martin W. & Kathleen L. Marrin, Wadsworth, OH

Mary Saurer, Wadsworth, OH

Merle R. & Bonnie S. Hartzler, Wadsworth, OH

Michael J. & Patricia L. Sega, Wadsworth, OH

Paul & Maureen Hardy, Wadsworth, OH

Raymond G. Landis, Wadsworth, OH

Richard & Theresa Leibold, Wadsworth, OH

Richard E. & Patricia A. Lowe, Wadsworth, OH

Robert & Teri Gourley, Jr., Wadsworth, OH

Robert J Sega, Wadsworth, OH

Robert Patrick, The City of Wadsworth, Wadsworth, OH

Robin Lee & Paula Kay Hart, Wadsworth, OH

Rull & Dawn Rist-Opal, Wadsworth, OH

Russ Callahan, Wadsworth, OH

Russell & Cheryl Callahan, Wadsworth, OH

Ryan & Andrea Moore, Wadsworth, OH

Sean Leatherman, Chippewa Meats Inc, Wadsworth, OH

Seth Whitney, Wadsworth, OH

Shane & Julie Humes, Wadsworth, OH

Stephan T. & Myrna C. Farkas, Wadsworth, OH

Timothy Reed, Wadsworth, OH

Todd & Brenda Jones, Wadsworth, OH

Vernon Landis, Wadsworth, OH

The Guilford Farms Development, Wadsworth, OH

Damar Valley LLC, Wadsworth, OH

Gatliff Building Company, Wadsworth, OH

Rohrig Living Trust, Wadsworth, OH

The Guilford Farms Development, Wadsworth, OH

The Guilford Farms Development, Wadsworth, OH

The Guilford Farms Development, Wadsworth, OH

The Guilford Farms Development, Wadsworth, OH

The Lowe Farm Family Limited Partnership, Wadsworth, OH

Sayler Family Farms Llc, Wakeman, OH

Alice Ross, Wakeman, OH

Annetta M. Wuitowicz, Wakeman, OH

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Anthony R & Peggy Lee Shamblin, Wakeman, OH

Arthur W. Daniels, Daniels Family Revocable Living Trust, Wakeman, OH

Carol Butler, Wakeman Township, Wakeman, OH

Catherine E. Watson, Wakeman, OH

Charles F., Jr. & Beryl Jean Moehl, Wakeman, OH

Christopher L. Hozalski, Wakeman, OH

Courtney Ortner, Wakeman, OH

Dale R. & Louise Jackson, Wakeman, OH

Dale W. & Rita A. Daniels, Wakeman, OH

Dennis H. Watson, Wakeman, OH

Donald H. & Stacia L. Daniels, Wakeman, OH

Edward J. Kukucka, Wakeman, OH

Eleanor F. Hopkins, Life Estate, Wakeman, OH

Elwin E. & Nancy E. Sayler, Wakeman, OH

Frederick J. & Diane A. Wolf, Wakeman, OH

Gary & Debbie L. Carruthers, Wakeman, OH

Gary A. Coultrip, Wakeman, OH

George & Sandy Springer, Wakeman, OH

George Henry Dalton, Jr., Wakeman, OH

Girl Scouts of North East Ohio, Camp Timberlane, Wakeman, OH

Harland K. & Margaret L. Holcomb, Wakeman, OH

James L Parker, Wakeman, OH

Jared S. & Rebecca Kopocs, Wakeman, OH

Jerry W & Darlene E. Trimble, Wakeman, OH

John H. Moehl, Wakeman, OH

John K. Krumwiede, Wakeman, OH

Judy A. Brock, Wakeman, OH

Karen M. Johnson, Wakeman, OH

Kathy Woljevach, Wakeman, OH

Leslie D. & Truetta R. Ealy, Wakeman, OH

M. Elizabeth Murdock, Robert G. Murdock Trust, Wakeman, OH

Melinda Dalton aka Melinda M Dalton, Wakeman, OH

Melinda M. Dalton, Harold S. Dalton, Jr. Trust, Wakeman, OH

Michael & Palli Holubar, Wakeman, OH

Michael A. & Kathy L. Littleton, Wakeman, OH

Michael W. Coultrip, Wakeman, OH

Patricia Balmert Bates, Wakeman, OH

Patrick J. & Connie M. Blewitt, Wakeman, OH

Raymond G. Jr. & Kristine J. Sterk, Wakeman, OH

Robert C. Quester, Wakeman, OH

Robert L. Blankinsop, Wakeman, OH

Steve Ortner, Wakeman, OH

Susan Ann Carroll, Wakeman, OH

Terry W. Buchs, Wakeman, OH

Thomas J. Krumwiede, Wakeman, OH

William C. & Marlene M. Ray, Wakeman, OH

William J. & Pamela E. Sharp, Wakeman, OH

William Ray, Wakeman, OH

Credit Shelter Trust B of the Daniels Family Revocable Trust, Wakeman, OH

Girl Scouts of East Ohio, Wakeman, OH

Edward Dalton, Dalton Acres, LLC., an Ohio Limited Liability Company, Wakeman, OH

Gerald L. & Alice M. Krumwiede, Wakeman, OH

Mary Jo Harris, Wakeman, OH

William E. & Michael J. Hanko w/LE of Norman J. Hanko and Kathleen Ann Hanko, Wakeman, OH

Arlyn L. & Sue L. Brinker, Walbridge, OH

Whitney N. Keyser, Warren, OH

Bonnie J Smallwood, Waterville, OH

Brent L. & Jaime R. Lamarand, Remainderman, Waterville, OH

Brooke E. Clouse, Waterville, OH

Burton L. & Joanne J. Finch, Jr., Waterville, OH

Charles R. & Kathryn A. Gifford, Waterville, OH

Christopher Robert Weimer, Waterville, OH

Daniel J. & Lisa M. Goetz, Waterville, OH

David G. & Darlene Bell, Waterville, OH

David Subleski, Browning Masonic Community, Inc, Waterville, OH

Eric & Diane Durbin, Waterville, OH

Gina Guzowski, Waterville, OH

Gus J. Campagna, Waterville, OH

H. Squire Young, Waterville, OH

Jeffery A. & Carrie L. Dress, Waterville, OH

Jenna Ditzig, Waterville, OH

Jesse L. Winslow, Life Estate, Waterville, OH

Jesse S. & Sharon L. Winslow, Waterville, OH

Joseph P. & Carrie M. Hertzfeld, Waterville, OH

Keith & Brenda Moosman, Waterville, OH

Kreg A. & Danya Moosman, Waterville, OH

Kreg Moosman, Waterville, OH

Laura Ann Elder, Waterville, OH

Lindsay M. Eberly, Waterville, OH

Marjorie R. Hertzfeld, Marjorie R. Hertzfeld Trust, Waterville, OH

Michael L. & Kimberly J. Hertzfeld, Waterville, OH

Nicholas & Marcia Styacich, Waterville, OH

Nicholas P & Marcia Styacich, Waterville, OH

Patricia A. Weimer, Patricia A. Weimer Trust, Waterville, OH

Priscilla & Aaron Bersee, Waterville, OH

Richard Hertzfeld, Waterville, OH

Richard R. & Laura H. Hertzfeld, Waterville, OH

Robert Black, Waterville Gas Company, Waterville, OH

Robert F. Weimer, Robert F. Weimer Trust, Waterville, OH

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Robert J. & Carol A. Zeigler, Waterville, OH

Rolland B. Moosman, Trustee, Waterville, OH

Ronald L. Hood, Waterville, OH

Roy L. & Claudia C. Sidener, Waterville, OH

Ruth Gwynne, Waterville, OH

Ryan J. & Cristy L. Belkofer, Waterville, OH

Toby & Sarah Miller, Waterville, OH

William K. & Robin L. Gernheuser, Waterville, OH

F. & N. Hertzfeld, An Ohio Partnership, Waterville, OH

Fritzie May & Richard E. Schifferly Trust, Waterville, OH

Jane E. Imes Trust, Waterville, OH

John T. Hanifan Trust, Waterville, OH

Marjorie R. Hertzfeld Trust, Waterville, OH

Mark & Bonnie L. Hearndon Trust, Waterville, OH

Mary Frances Bell Trust, Waterville, OH

Richard G. Hertzfeld, Jr. Trust, Waterville, OH

Robert F. & Patricia A. Weimer Trust, Waterville, OH

Rolland B. Moosman Trust, Waterville, OH

Thad W. & Barbara E. Jones Trust, Waterville, OH

The Schifferly Family Trust, Waterville, OH

Toledo, Lake Erie & Western Railway Museum, Inc., Waterville, OH

Ziad Musallam, Fulton County Sanitary District, Wauseon, OH

Barbara Neice, Waynesburg, OH

Donald & Virginia Vanvoorhis, Trustees, Waynesburg, OH

Gary Mckinney, Waynesburg, OH

Howard B O'neill, Trustee, Howard B O'Neill Rev Trust, Waynesburg, OH

Jean Gotchall, Waynesburg, OH

Michael & Trina Griffith, Waynesburg, OH

Patty J Dalton, Trustee, Waynesburg, OH

Ralph Foster, Trustee, Ralph G Foster Rev Trust, Waynesburg, OH

Ray W & Jill Vanvoorhis, Waynesburg, OH

Roger S & Lori Oliver, Waynesburg, OH

Shirley Neice, Waynesburg, OH

JMF Land Co., LLC, Wellington, OH

Becky Mcdonnell, Wellington, OH

Beverly Berner, Wellington, OH

Brill View Farms Inc, Wellington, OH

Charles Norton, Wellington, OH

Chester Bowling, Wellington, OH

Dale Norton, Trustee, Wellington, OH

David & Sandra Romanchik, Wellington, OH

Dennis & Carol Shumaker, Wellington, OH

Donald Mariast, Wellington, OH

Dwight & Lisa Rice, Wellington, OH

Gregory A Moss, Wellington, OH

Harold & Beverly Norton, Wellington, OH

Harold Weaver, Wellington, OH

James & Darcy Klier, Trustees, Wellington, OH

James & Joanna Sue Barbor, Wellington, OH

Janet Dinieri, Wellington, OH

John Dovin, Wellington, OH

Joyce Darakis, Trustee, Wellington, OH

Kelley Hannema, Wellington, OH

Kevin & Debra Gott, Wellington, OH

Larry & Elizabeth Hurst, Wellington, OH

Larry & Elizabeth Hurst, Wellington, OH

Laura Kalat, Wellington, OH

Lora Vanderwyst, Wellington, OH

Matthew Goebel, Wellington, OH

Matthew Knapp, Wellington, OH

Nancy & Rodger Ferguson & Babbitt Investment, Wellington, OH

Nancy M. Ferguson-Land, Wellington, OH

Norman & Connie Bradley, Wellington, OH

Paul Walko, Wellington, OH

Randall & Brenda Leiby, Wellington, OH

Rebecca & David Jones, Wellington, OH

Richard & Brenda Hergina, Wellington, OH

Richard & Carol Discus, Wellington, OH

Richard Maurer, Wellington, OH

Robert & Martha Eyring, Wellington, OH

Scott E & Bonnie K Cooper, Wellington, OH

Steve & Renee Pavelko, Wellington, OH

Thomas & Carrie Stannard, Wellington, OH

Timothy & Lois Wulfhoop, Wellington, OH

Virginia Olienechak, Wellington, OH

William & Patricia Flynn, Wellington, OH

Babitt Investment Co LLC, Wellington, OH

Gordon Farms Partnership Llp, Wellington, OH

Hollstein Farm Ii LLC, Wellington, OH

Lorain-Medina Electric Coop Inc, Wellington, OH

Sunny Valley Land Co Xv LLC, Wellington, OH

Geraldine Y. Albaneso, Wellsville, OH

Anthony Myer, West Salem, OH

Betty J Kiczek, West Salem, OH

Betty Kiczek, Trustee, West Salem, OH

Brenda Nichols, West Salem, OH

Bruce Imhoff, West Salem, OH

Bruce Koch, West Salem, OH

Conrad & Christine Amstutz, West Salem, OH

Daniel & Karen Freitag, West Salem, OH

David & M Devore, West Salem, OH

David Davore, West Salem, OH

Dean Mcilvaine, West Salem, OH

Dennis Foltz, West Salem, OH

Eli Gingerich, West Salem, OH

Eugene Lowe, Trustee, West Salem, OH

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Joanna Ulrich-Melert & James T Melert, West Salem, OH

Joe & Diana Miley, West Salem, OH

John & Linda Badger, West Salem, OH

Jonathan & Amy Miley, West Salem, OH

Kymberlee D & Christopher S Gibson, West Salem, OH

Leonard J. Bunyak, Jr., West Salem, OH

Lereta Llc, West Salem, OH

Linda Mcweeny, West Salem, OH

Margarete Wise, West Salem, OH

Michael Colvin, Trustee, West Salem, OH

Randall Ross, West Salem, OH

Raymond J Paul, West Salem, OH

Richard Billman, Trustee, West Salem, OH

Robert C Cole, West Salem, OH

Robert J Steurer, West Salem, OH

Robert R & Thomas Angus, West Salem, OH

Roger & Wayne Koch, West Salem, OH

Roy & Kathlee Hochstetler, West Salem, OH

Stacey R Gehring & Robert A Lambert, West Salem, OH

Todd Jackson, West Salem, OH

Wade Yoss, West Salem, OH

Commercial & Savings Bank, West Salem, OH

Corelogic, West Salem, OH

Cowan of River Corners LLC, West Salem, OH

Jai Real Estate Holdings LLC, West Salem, OH

Mcilvaine Land Co LLC, West Salem, OH

Sovereign Investments LLC, West Salem, OH

Donald & Nanette Davis, Westerville, OH

Richard A. & Gay N. Baumgartner, Westlake, OH

Spiro Vamvakas, Westlake, OH

Joann Euler, Weston, OH

Heilmann Farms Inc. An Ohio Corp, Whitehouse, OH

Alyssa D. Hodge, Whitehouse, OH

Andrew Lyke, Whitehouse, OH

Arthur T. & Karen E. Asbury, Whitehouse, OH

Brent L. & Jamie R. Lamarand, Whitehouse, OH

Cale R. & Lindsay A. Jones, Whitehouse, OH

Cherie Blair, Whitehouse, OH

Debra Stadler, Whitehouse, OH

Dorothy Danhauer, Whitehouse, OH

Gordon L. Rhoades, Gordon L. Rhoades via Declaration of Trust, Whitehouse, OH

James R. Fisher, Whitehouse, OH

Jane Walther, Whitehouse, OH

Jean N. Herman, Whitehouse, OH

Jeff Thomas, Thomas Farms, Inc., Whitehouse, OH

John Romaker, Whitehouse, OH

Joyce and Brian Donahue, Whitehouse, OH

Kevin B. & Rebecca L. Taylor, Whitehouse, OH

Lonnie Perry, Lonnie Perry Farms Ltd. An Ohio LLC, Whitehouse, OH

Margaret Shaw, Whitehouse, OH

Matt Meeker, Whitehouse, OH

Michael A. & Kimberly D. Drake, Whitehouse, OH

Michael L. Stokes, Whitehouse, OH

Nancy Dangler, Whitehouse, OH

Neil Hilfinger, Whitehouse, OH

Property Manager, Lonnie Perry Farms LTD an Ohio LLC, Whitehouse, OH

Randy & Shirley Mastin, Whitehouse, OH

Richard McCraney, Whitehouse, OH

Robert Rolfes, Whitehouse, OH

Rosanna Roche, Whitehouse, OH

Tara & Steve D'Amore, Whitehouse, OH

Thomas N & Diana J Herman, Whitehouse, OH

Victoria Malenfant, Whitehouse, OH

4 D Farms, LLC, Whitehouse, OH

Heilmann Acres LLC, Whitehouse, OH

Stacy L. Owen Trust, Whitehouse, OH

The Wayne H. Fisher Trust, Whitehouse, OH

Myron Ray Grim, Willard, OH

Constance L. Taylor, Willoughby, OH

Carol M. Lewis, Willsonville, OH

Wilderness Center Inc, Wilmot, OH

John W. Detweiler, Etal, Windsor, OH

Black Swamp Holdings LLC, Woodville, OH

Lions Investment LLC, Woodville, OH

Allan P. Huss, Woodville, OH

Anthony C. & Samantha Schroeder, Woodville, OH

Bruce A. & Theresa M. Stone, Woodville, OH

Deborah S. Schultz, Woodville, OH

Emil J. Konesky, Emil J. Konesky Living Trust, Woodville, OH

Eric J. Hardy, Woodville, OH

Forrest & Alice M. Fork, Woodville, OH

Frederick C. Johlin, Orewood LLC, Woodville, OH

Gary L. & Cheryl A. Hoodlebrink, Gary L. Hoodlebrink and Cheryl A. Hoodlebrink Joint Living Trust, Woodville, OH

Greg A. and Rachel M. Hoodlebrink, Woodville, OH

James A. & Rebecca L. Kohn, Woodville, OH

James L. & Mona M. Borcherding, Woodville, OH

James M. & Brenda L. Brien, Woodville, OH

Jeffrey A. Fork, Woodville, OH

John C. & Tracey J. Huss, Woodville, OH

Kristy L. Miesle, Woodville, OH

Robert Keith Schlachter, Woodville, OH

Rodney S. Chesnutte, Woodville, OH

Sandy Bringman, Woodville, OH

Stephen A. & Cynthia A. Huss, Woodville, OH

Tracy R. Rife, Woodville, OH

Verna J. Konesky, Verna J. Konesky Living Trust, Woodville, OH

Virginia M. Swartz, Woodville, OH

William H. & Cedele S. Emch, Woodville, OH

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Draft EIS Distribution List

Credit Shelter Trust of the Hoodlebrink Family Trust, Woodville, OH

Aaron Keim, Wooster, OH

Allen Brubaker, Wooster, OH

Andrew & Christina Coblentz, Wooster, OH

Bennie R. & George A. Barner, Wooster, OH

Blanche M. Barner, Wooster, OH

Bradley & Amy Yound, Wooster, OH

Clyde & Cheryl Crisco, Wooster, OH

Connie Reed, Wooster, OH

Curtis Crocker, Wooster, OH

David & Christene Acker, Wooster, OH

David Troyer, Wooster, OH

Dawson & Judy Alsdorf, Wooster, OH

Eberly Farms, Wooster, OH

Elizabeth Garrett, Wooster, OH

Gary Bonewitz, Wooster, OH

Gerald Klingerman, Wooster, OH

Glenn James, Wooster, OH

Gregory & Carol Webb, Wooster, OH

Gregory & Dianne Sautter, Wooster, OH

Gregory & Peggy Tieche, Wooster, OH

Herbert & Anita Berry, Co-Trustees, Wooster, OH

Jay & Ellen Firebaugh, Wooster, OH

Jeffrey Bower, Trustee, Wooster, OH

Joanne & Paul Richard, Wooster, OH

Joanne Tate, Wooster, OH

John Winkler, Wooster, OH

Johnathan & Debbie Berger, Wooster, OH

Joseph & Naomi Richard, Wooster, OH

Karol Mairs, Wooster, OH

Keith Speelman, Wooster, OH

Kelly Hawk, Wooster, OH

Kenneth & Susan Madick, Trustees, Wooster, OH

Lavon & Julia Weaver, Wooster, OH

Leroy Yoder, Wooster, OH

Lester Howman, Wooster, OH

Lloyd James, Wooster, OH

Lorna Speelman, Wooster, OH

Lynette Geitgey, Wooster, OH

Mark Mcclure, Wooster, OH

Martha & Steven Starr, Wooster, OH

Michael & Sharon Porter, Wooster, OH

Michael Hoefer, Wooster, OH

Michael Shultz, Wooster, OH

Michele Bowers, Wooster, OH

Mike Barnhouse, Wayne County Engineer, Wooster, OH

Nelson Miller, Wooster, OH

Oren Sanderson, Wooster, OH

Parry & Susan Cochran, Wooster, OH

Patricia Digiacomo, Trustee, Wooster, OH

Paula & Travis Mcfadden, Wooster, OH

Peggy Elvey, Trustee, Wooster, OH

Randall & Sue Ann Berry, Co-Trustees, Wooster, OH

Randall Bowers, Wooster, OH

Rod Crider, CEcD, CCE, Wayne Economic Development Council, Wooster, OH

Roger & Rita Dush, Wooster, OH

Roger Maurer, Wooster, OH

Roger Phillip Smailes, Trustee, Wooster, OH

Roger Zimmerly, Wooster, OH

Roy & Doris Bowers, Wooster, OH

Ruth Kaplan, Wooster, OH

Ruth Tisher, Wooster, OH

Scott Martin, Wooster, OH

Tammy Sue Immel, Wooster, OH

Ted Holvey, Wooster, OH

Thomas Walton, Wooster, OH

Troy Immel, Wooster, OH

Wanda Kaufman, Wooster, OH

Wilbur & Alverda Bowers, Wooster, OH

Yvonne Mckee, Wooster, OH

Ach Payments Semi Annual, Wooster, OH

Corelogic, Wooster, OH

Corelogic, Wooster, OH

Corelogic, Wooster, OH

Corelogic, Wooster, OH

Corelogic, Wooster, OH

Corelogic, Wooster, OH

Corelogic, Wooster, OH

Dna Wine Properties, LLC, Wooster, OH

Info-Pro Lender Services, Wooster, OH

Ki Ja Mar Farms LLC, Wooster, OH

Lone Oak Farm LLC, Wooster, OH

Neighborhood Pantry LLC The, Wooster, OH

Park National Bank, Wooster, OH

Prairie Lane Farms Inc Ohio Corp, Wooster, OH

Rastetter Farm LLC, Wooster, OH

RRC Investment Group LLC, Wooster, OH

Rwm & M Development Corporation, Wooster, OH

Rwm & M Development Corporation, Wooster, OH

State of Ohio OARDC, Wooster, OH

The Lila M. Woods Living Trust, Wooster, OH

The Samuel J. Woods Living Trust, Wooster, OH

Wayne County Commissioners, Wooster, OH

Anthony F. Jr. Cutrona, Youngstown, OH

John Thomas, Youngstown, OH

Richard W. & Lauren S. McCarthy, Youngstown, OH

John McGehee, Ypsilanti, OH

Monty E Harris, Berlin Heights, OH

The Stone Family Trust, Little Rock, AR

Linda D. Welsch, George A. Russell and Norma E. Russell Trust, Camp Verde, AZ

Steven L. & Billie Miller, Fort Mohave, AZ

Republic Services of Ohio Ii LLC, Phoenix, AZ

Patricia Kay Bolen, Prescott Valley, AZ

Property Manager, Green Tree Servicing, LLC, Tempe, AZ

Patricia L. Barnhart, Tucson, AZ

Jacob S. Wargo, Cucamonga, CA

Earl D. Benton, Huntington Beach, CA

Delamore Lake Shore LP, Newport Beach, CA

Appendix A
Draft EIS Distribution List

Valerie Wheeler, Wheeler 2012 Revocable Trust, Sacramento, CA

Benjamin Cooper, Brighton, CO

Marianne Grantham, Northern Ohio & Western Railway, Denver, CO

Spencer's Woods, LLC, Durango, CO

Jerry Kuner, Longmont, CO

General Telephone Co, Norwalk, CT

Robin Rorick, American Petroleum Institute, Washington, DC

Edward L. Macek, Altha, FL

Alden Ritter, Belleair, FL

The Melba V. Withrow Trust, Beverly Hills, FL

Karen G. Arft, Bradenton, FL

Donald E. & Mary Myers, Estero, FL

Marlene Payette, Gainsville, FL

Donna Killingsworth, Genesee & Wyoming Railroad Services Inc., Jacksonville, FL

Csx Transportation Inc, Jacksonville, FL

MSI Property Management Co., Jacksonville, FL

Thomas Lee Griffiths, Lady Lake, FL

Robbins Family Revocable Trust, Lake Worth, FL

Elizabeth Pierce, Leesburg, FL

The Betty L. Faust Revocable Trust, New Port Richey, FL

Margarita A. Meyers, Orange Park, FL

Don E. Monroe, Port Charlotte, FL

Jerre Murray, Sarasota, FL

Dawn Davis-Carpenter, CSX Transportation, Ohio, South Jacksonville, FL

Larry J. & Terri L. Gabric, St. Petersburg, FL

Patricia Ann Tredway, Wildwood, FL

Ach Escrow-Monthly, Wildwood, FL

William W. & Caroline G. Van Eaton, Winter Haven, FL

The Shirley A. Sell Trust, Zephyr Hills, FL

William J. Sell, The Marvin L. Sell Trust, Zephyrhills, FL

Norfolk Southern Corporation, Atlanta, GA

ABP MI (Detroit), LLC c/o BlueLinx Corporation, Atlanta, GA

Norfolk Southern Railroad Corporation, Atlanta, GA

Clemmie Foley, Decatur, GA

Brenda Davis-Murrell, Hampton, GA

Scott Busson, Woodstock, GA

Charles J. Karlen, Kihei, HI

Sandra Soloman, Des Moins, IA

Michael E. Schmidt, Dows, IA

William D. Cupps, Champaign, IL

Virginia Laszewski, US EPA, Region 5, OECA, NEPA Implementation Section, Chicago, IL

American Landfill Inc, Chicago, IL

CWM Holdings Inc., a Delaware Corporation, Chicago, IL

Alan & Jordan Merry, Elgin, IL

Brownell Knight, Elgin, IL

Cara Armitage, Elgin, IL

Charles L & Martha Asplin, Elgin, IL

Christopher & Aimee Stutz, Elgin, IL

Danny & Jacqueline Reeves, Elgin, IL

Darvin & Barker Cortez, Elgin, IL

Deborah Pesko, Elgin, IL

Donald & Emily Hester, Elgin, IL

Donald & Sharon Charnetzky, Elgin, IL

Dustin Pry & Sarah Lehman, Elgin, IL

Elmer & Karen Johnston, Elgin, IL

George & Young Belinda Knetsch, Elgin, IL

Gerald Beshore, Elgin, IL

Gregory A & Vicki Luckring, Elgin, IL

Jackson & Heidi Williamson, Elgin, IL

Joseph M Leary, Etal, Elgin, IL

Justin & Eberly Stufft, Elgin, IL

Michael & Stephanie Manon, Elgin, IL

Michael W & Stephanie Manon, Elgin, IL

Nelson Poland & Debra Mutigli, Elgin, IL

Philip & Lisa Glasgow, Elgin, IL

Philip Berresford, Elgin, IL

Regina Riley, Elgin, IL

Richard N & Donna Mayle, Elgin, IL

Richard P & Wendy Neice, Elgin, IL

Robert & Candy Carroll, Elgin, IL

Ronald & Valarie Feucht, Elgin, IL

Ronald L & Tessa Lambert, Elgin, IL

Thomas A & Jeannette Blackburn, Elgin, IL

Wesley Smith & Maria Tilton, Elgin, IL

Jay Doyle, 1659 Beverly, LLC, Grayslake, IL

Sean McDonald, BP Pipelines (North America), Naperville, IL

Willow Run Business Center, LLC., Oak Brook, IL

Kevin J. Simecek, Remainderman, Spring Grove, IL

The Big Till, LLC, an Ohio Limited Liability Company, Freetown, IN

Danny Cochran, Kinder Morgan Pipeline, Goshen, IN

Thomas Dunlap, Haustadt, IN

Nancy J. Marshall, Roanoke, IN

T.R. Stumbo, Lexington, KY

Corman R J Railroad Company/Cleveland Line, Nicholasville, KY

Carolyn A. Filzer, Filzer Irrevocable Trust, Owensboro, KY

Kevin Magsig, Prospect, KY

Robert Magsig, Prospect, KY

Steven Magsig, Prospect, KY

2462 Greensburg Road, LLC, Staffordsville, KY

Lucas Missong, Oregon Clean Energy, LLC, Needham, MA

Richard Clark, Westport Point, MA

Rick Arndt, Bethesda, MD

Joanne Wachholder, Boyds, MD

C&P Railroad, Cumberland, MD

Patricia Ann Heinz, Dayton, MD

Ronald Christopher, Fort Washington, MD

Monica Miller, New Market, MD

Christine Detroy, Brunswick, ME

Mike Harris, Enbridge Pipeline, Duluth, MN

The Melvin F. Dailey Trust, Milan, MN

Abby Korte, Merjent, Minneapolis, MN

Appendix A
Draft EIS Distribution List

Andrea Sampson, Merjent, Minneapolis, MN

Andrew Karpinnen, Merjent, Minneapolis, MN

Bec Gawtry, Merjent, Minneapolis, MN

Casey Warner, Merjent, Minneapolis, MN

Dean Sather, Merjent, Minneapolis, MN

Diana Richards, Merjent, Minneapolis, MN

Graham Brook, Merjent, Minneapolis, MN

Jessica Dozier, Merjent, Minneapolis, MN

John Muehlhausen, Merjent, Minneapolis, MN

Kari Krause, Merjent, Minneapolis, MN

Kyle Solberg, Merjent, Minneapolis, MN

Nicole Sherry, Merjent, Minneapolis, MN

Shannon Hansen, Merjent, Minneapolis, MN

Pamela L. Hartley, Mountain View, MO

Theresa A. Brandel, Mountain View, MO

Ira S. Johnston, Orrick, MO

Dennis Swartlander, Chapel Hill, NC

Hannah P. W. Andrews, Chapel Hill, NC

Everett Leroy Grim, Coats, NC

Clayton & Lisa Over, Durham, NC

Marie R. Quinn, REMAINDERMAN, Mooresville, NC

Mary Lou Hanson, Robert P. Weideman Trust No. 1, Indianola, NE

Mellinger Farm Ohio State Univ, Omaha, NE

Andrew Kehn, Manchester, NH

Melissa G. Ronches, Parsippany, NJ

Velma L. Ronches, Parsippany, NJ

Judith Langano, NRG Energy, Inc., Princeton, NJ

Randall Martin Bury, Remainderman, Las Vegas, NV

Dean Edward Schultz, Land Contract Vendee, Reno, NV

S & R Recycling, Inc., Brewster, NY

Hilda Ruth Knoblauch, Ithaca, NY

Joseph Byrne, New York, NY

Karl Raymond Bury, Remainderman, New York, NY

Carolyn Cox, Pittsford, NY

Catherine Boyd, Pittsford, NY

Lafayette Cox, et al, Pittsford, NY

Paulyn Cox, Pittsford, NY

Thomas H. Casey, Pittsford, NY

John Hudson, Jennings, OK

USA Secretary of HUD, Oklahoma, OK

Terry L. Langley, Pipeliners Union 798, Tulsa, OK

Jeannette Fluke, Buckeye Pipeline Company & Dominion East Ohio Gas Company, Breinigsville, PA

Jeannette Fluke, NORCO Pipe Line Company, LLC, Breinigsville, PA

Quarto Mining Co., Canonsburg, PA

Susan K. Paterini, Davidsville, PA

James McKay, Norfolk Southern Railroad, Philadelphia, PA

Kate McGrath, MDOT (Amtrak), Philadelphia, PA

Jim Bischoff, Carmeuse Lime Inc., Pittsburgh, PA

Julie Grant, Pittsburgh, PA

Loretta Marie Young, Pittsburgh, PA

Pittsburgh Plate Glass Company, Pittsburgh, PA

Sue Erickson, Sunoco Logistics, LP, Sinking Spring, PA

William E. Riffle, Spring Grove, PA

Colleen Unroe, State College, PA

Cynthia Kay Burnham, Beech Island, SC

Jeffrey R. Heuerman, Greer, SC

Matthew J. & Jennifer G. Weidner, Hilton Head Island, SC

Thomas E. & Ann H. Roberts, Myrtle Beach, SC

Danny Porter, Sturgis, SD

Richard A. Littleton, Alcoa, TN

Robert Carl Archer, Nashville, TN

Taylor Farris, Omega Rail Management, Nashville, TN

Wendel Edward Archer, Nashville, TN

NewPar, c/o Duff & Phelps, Addison, TX

John Stevens, Federal National Mortgage Association, Dallas, TX

Tina, Safeguard Property Department, Bank of America, NA, Ft. Worth, TX

The Shelby L. Estep and Evelyn V. Estep Trust, Haslet, TX

Rodger W. Asmus, Houston, TX

ANR Pipeline Company, Houston, TX

Utica East Ohio Midstream LLC, Houston, TX

George L. Adams, III, Magnolia, TX

The Lee W. Taylor Trust, Marquez, TX

Lisa M. Wirtenberger, Richardson, TX

Cory Woody, Utica East Ohio Midstream c/o KE Andrews & Co., Rowlett, TX

Rover Pipeline LLC, Rowlett, TX

Dennis A. Conrad, San Antonio, TX

Ching R. Plue, Waco, TX

William Michael Foyes, Manassas, VA

Diane Lynn Williams Easley, North Garden, VA

Fred Marx, East Ohio Gas Co., Richmond, VA

Pennsylvania Lines LLC, Roanoke, VA

Gregory A & Alene M Peters, Trustees, Sterling, VA

Kenneth & Jennifer Millerschone, Suffolk, VA

William H & Mary Christina Woodward, Jr., Seattle, WA

Jason Bonomo, Bronze Stone Cemetery Association of Ohio, Inc., an Ohio non-profit corporation, Nashotah, WI

The Isley Family Trust, Somerset, WI

Belden & Blake Corporation, Charleston, WV

Enervest Operating L, Charleston, WV

Alese R. Robertson, Fort Gay, WV

Gary Ray & Beverly Ann Amie, Wheeling, WV

Mary Alexiou, Kogarah, NSW, Australia

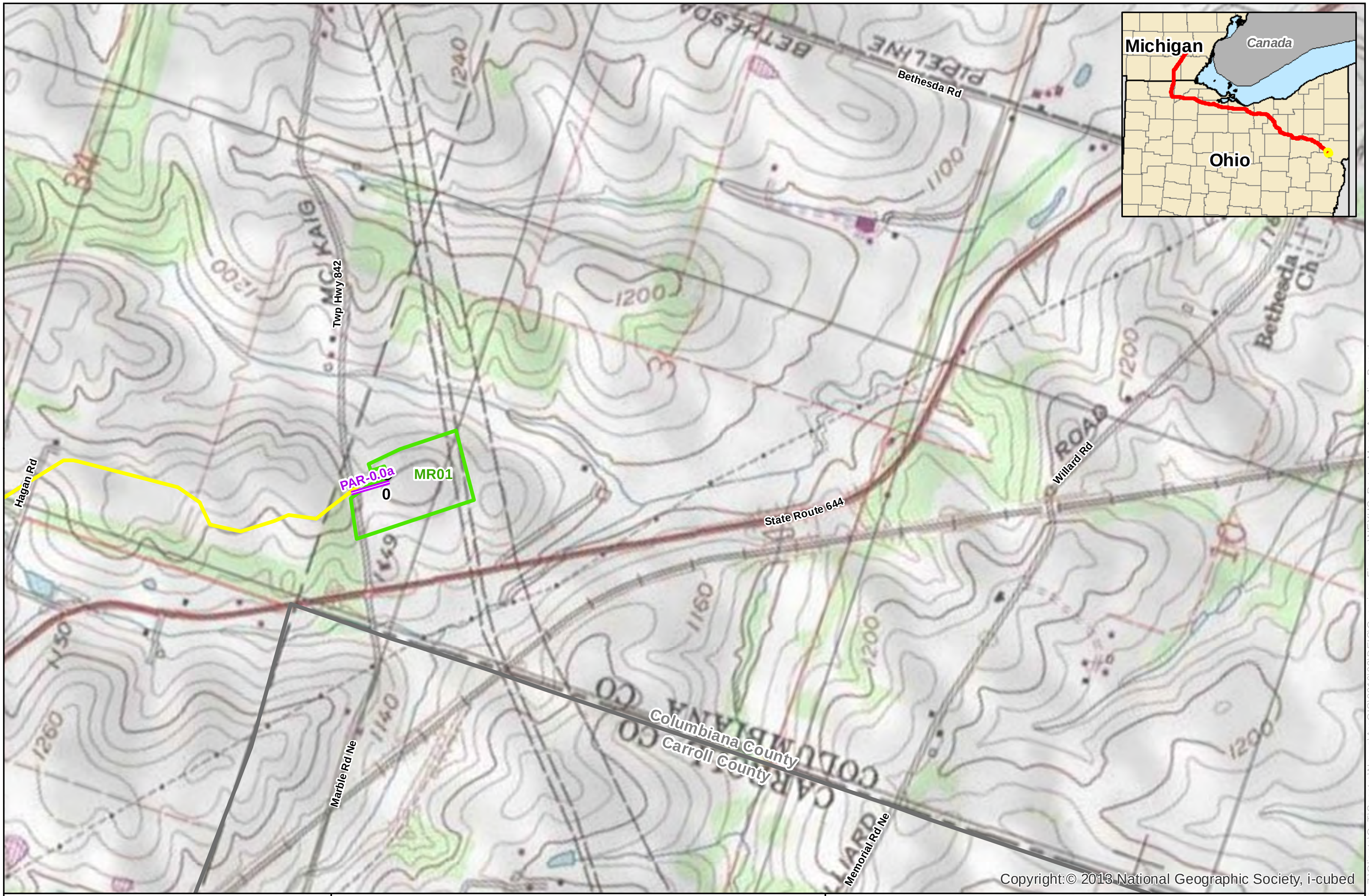
Brenda Breton, Welland, Ontario

APPENDIX B

NGT AND TEAL PROJECT ROUTE MAPS

APPENDIX B-1

NGT PROJECT ROUTE MAPS



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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⋈	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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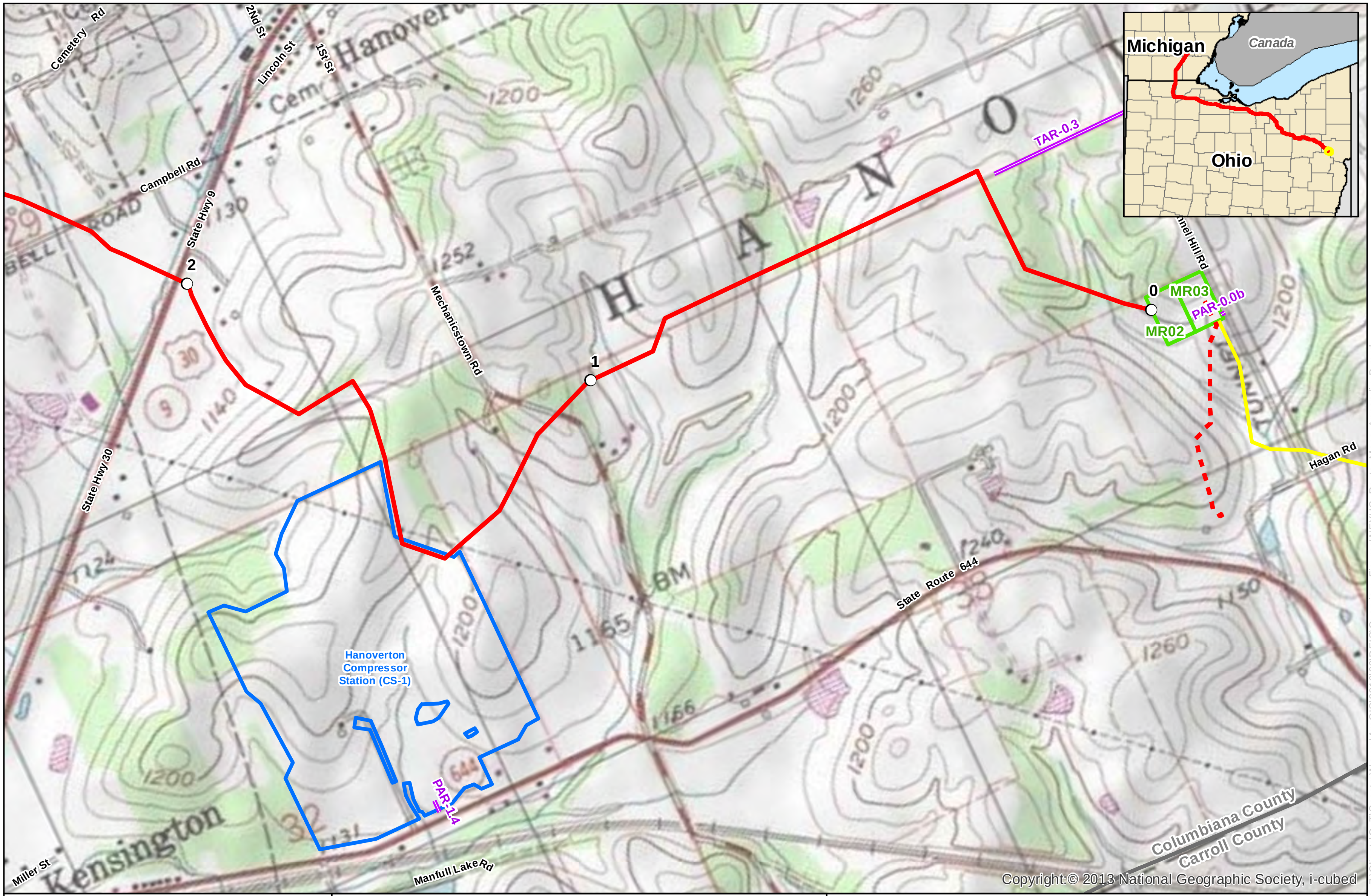

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Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⋈ Proposed Main Line Valve

━ Proposed NEXUS Mainline Pipeline

╍ Proposed TEAL Connecting Pipeline

━ Proposed TGP Interconnect

═ Proposed Access Road

☐ Proposed Compressor Station

☐ Proposed Ware Yard

☐ M&R Station

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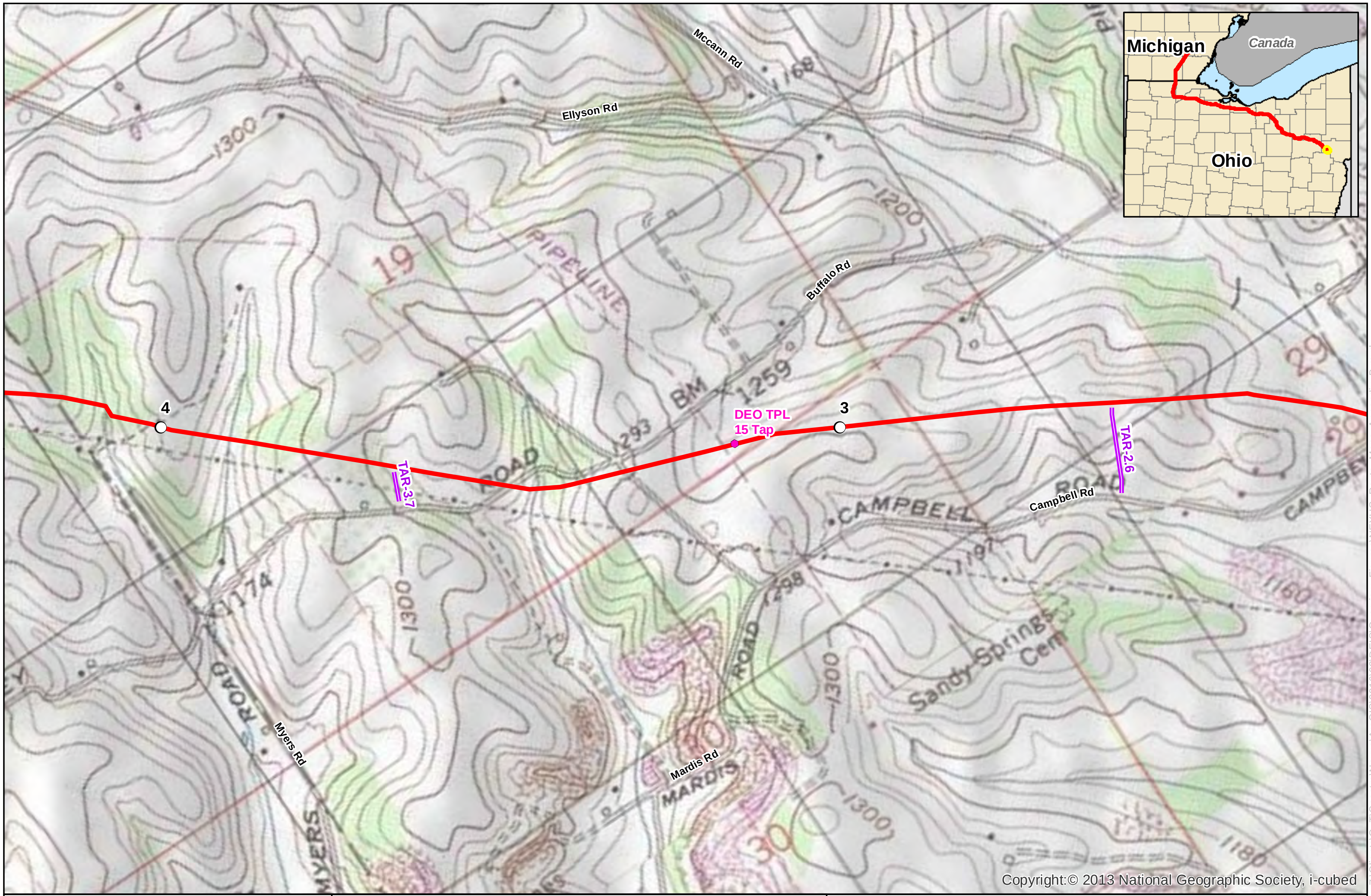

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Route Map

○	Milepost	🟨	Proposed TGP Interconnect
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🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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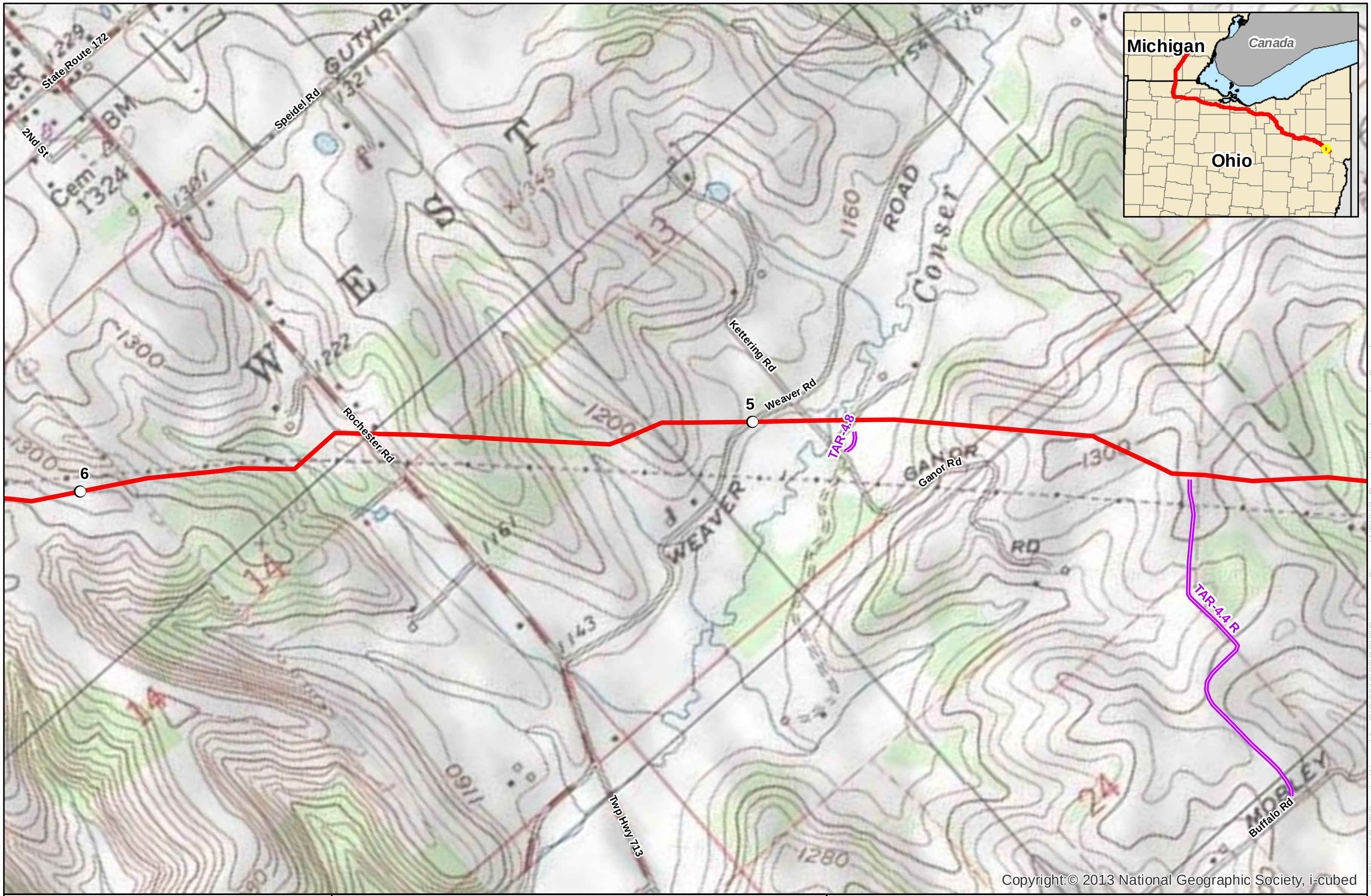

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Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⧓ Proposed Main Line Valve

— Proposed NEXUS Mainline Pipeline

- - - Proposed TEAL Connecting Pipeline

— Proposed TGP Interconnect

— Proposed Access Road

☐ Proposed Compressor Station

☐ Proposed Ware Yard

☐ M&R Station

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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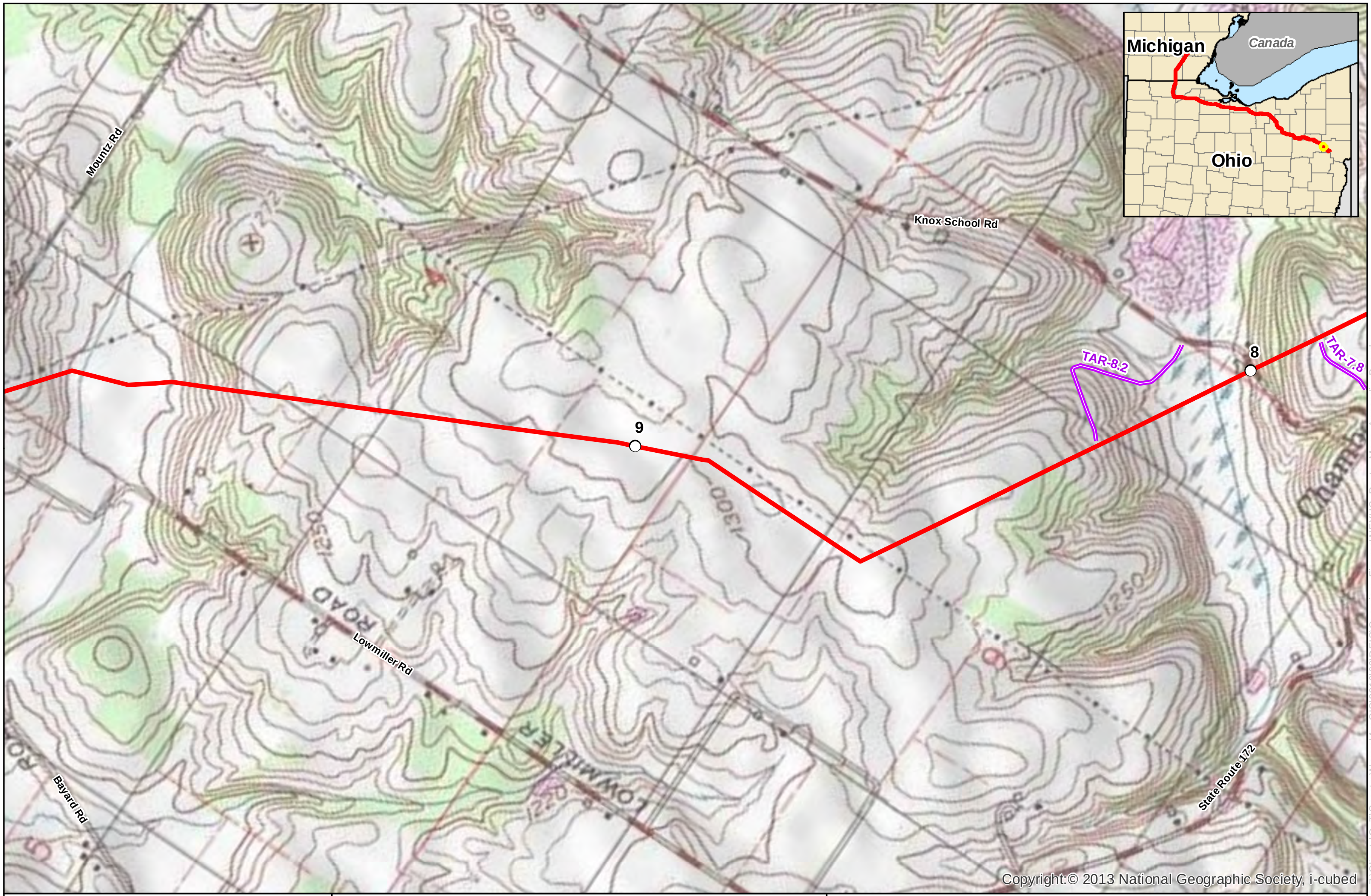

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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Appendix B-1
NGT Project
Route Map

○ Milepost	━ Proposed TGP Interconnect
● Tee-Tap Location	═ Proposed Access Road
⧓ Proposed Main Line Valve	▢ Proposed Compressor Station
━ Proposed NEXUS Mainline Pipeline	▢ Proposed Ware Yard
- - - Proposed TEAL Connecting Pipeline	▢ M&R Station

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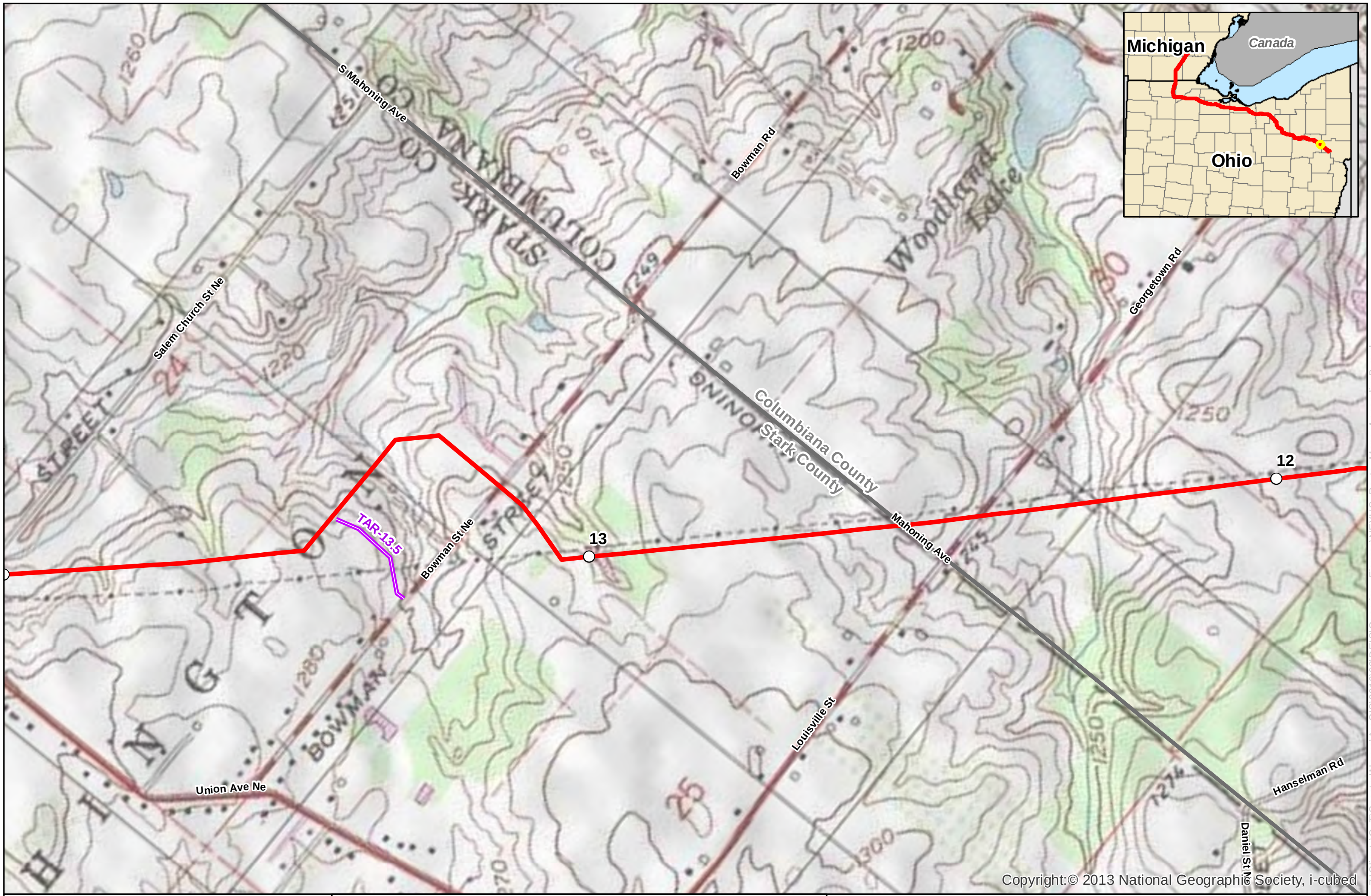

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⧓ Proposed Main Line Valve
━ Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
━ Proposed TGP Interconnect
═ Proposed Access Road
▭ Proposed Compressor Station
▭ Proposed Ware Yard
▭ M&R Station

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	☐	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	☐	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	☐	M&R Station

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Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

Proposed Main Line Valve

Proposed NEXUS Mainline Pipeline

Proposed TEAL Connecting Pipeline

Proposed TGP Interconnect

Proposed Access Road

Proposed Compressor Station

Proposed Ware Yard

M&R Station

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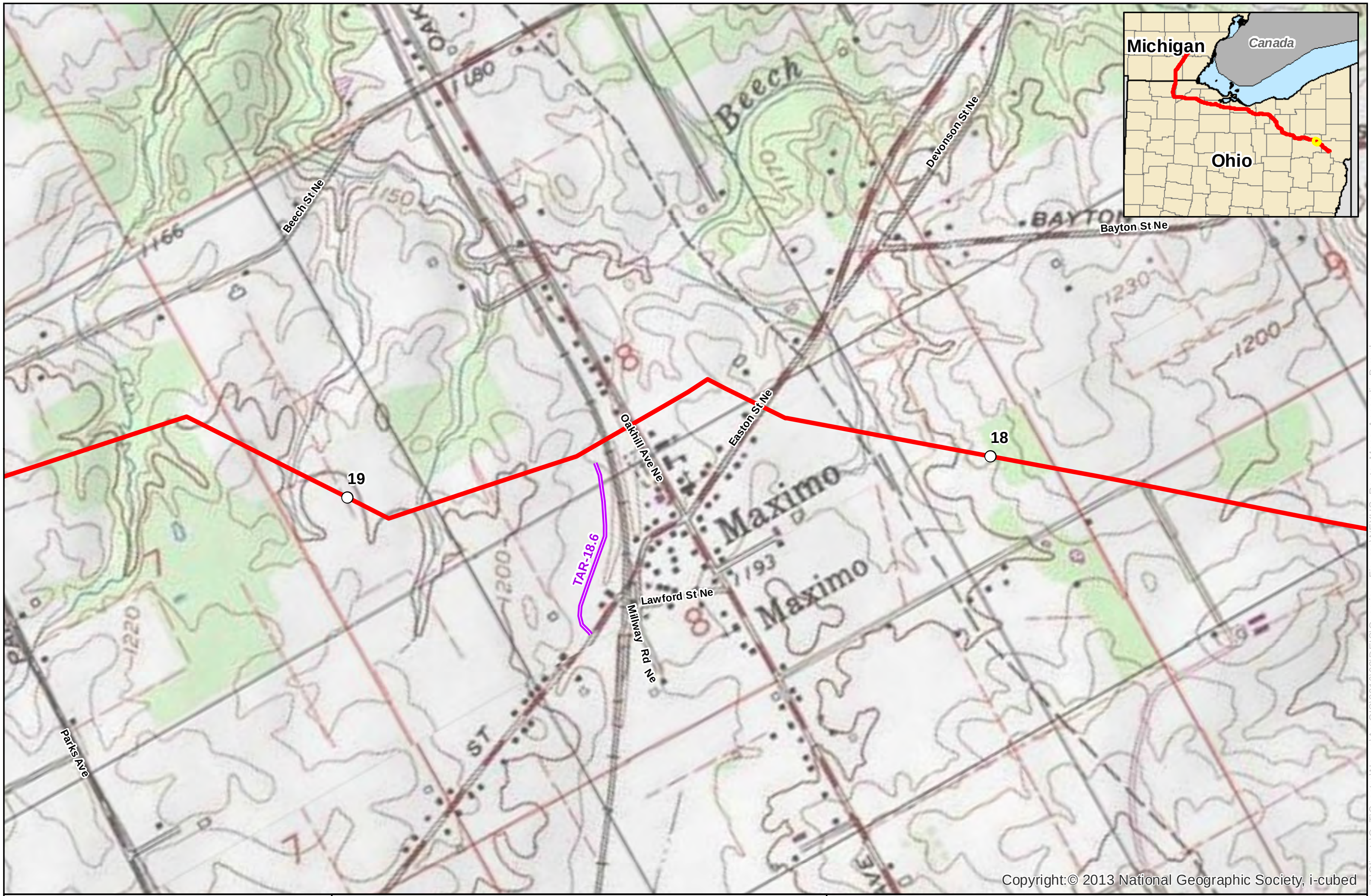

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	═	Proposed Access Road
⧓	Proposed Main Line Valve	▢	Proposed Compressor Station
━	Proposed NEXUS Mainline Pipeline	▢	Proposed Ware Yard
╍	Proposed TEAL Connecting Pipeline	▢	M&R Station

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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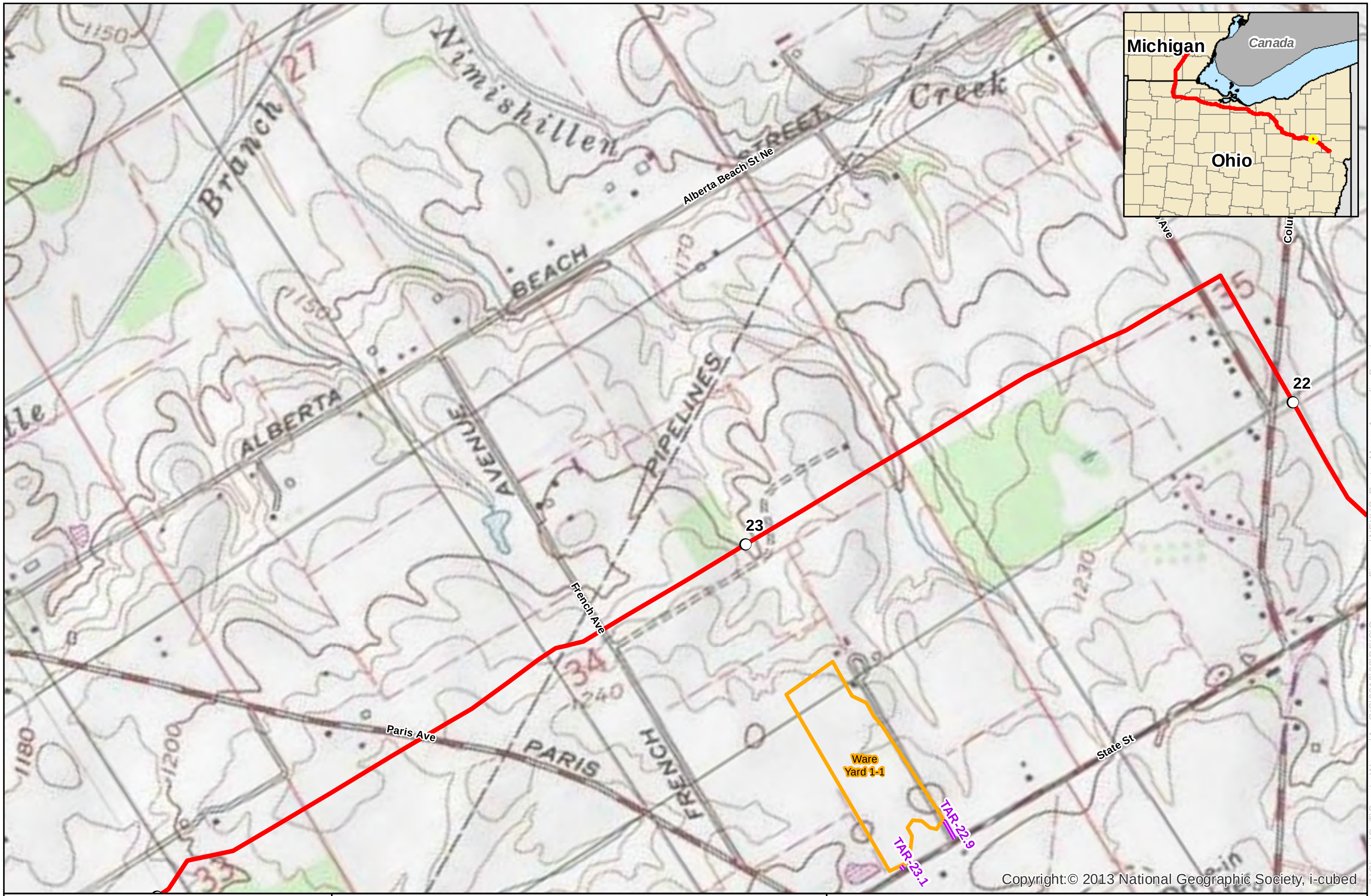

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⧓ Proposed Main Line Valve
- ━ Proposed NEXUS Mainline Pipeline
- ╍ Proposed TEAL Connecting Pipeline
- ━ Proposed TGP Interconnect
- ═ Proposed Access Road
- ▭ Proposed Compressor Station
- ▭ Proposed Ware Yard
- ▭ M&R Station

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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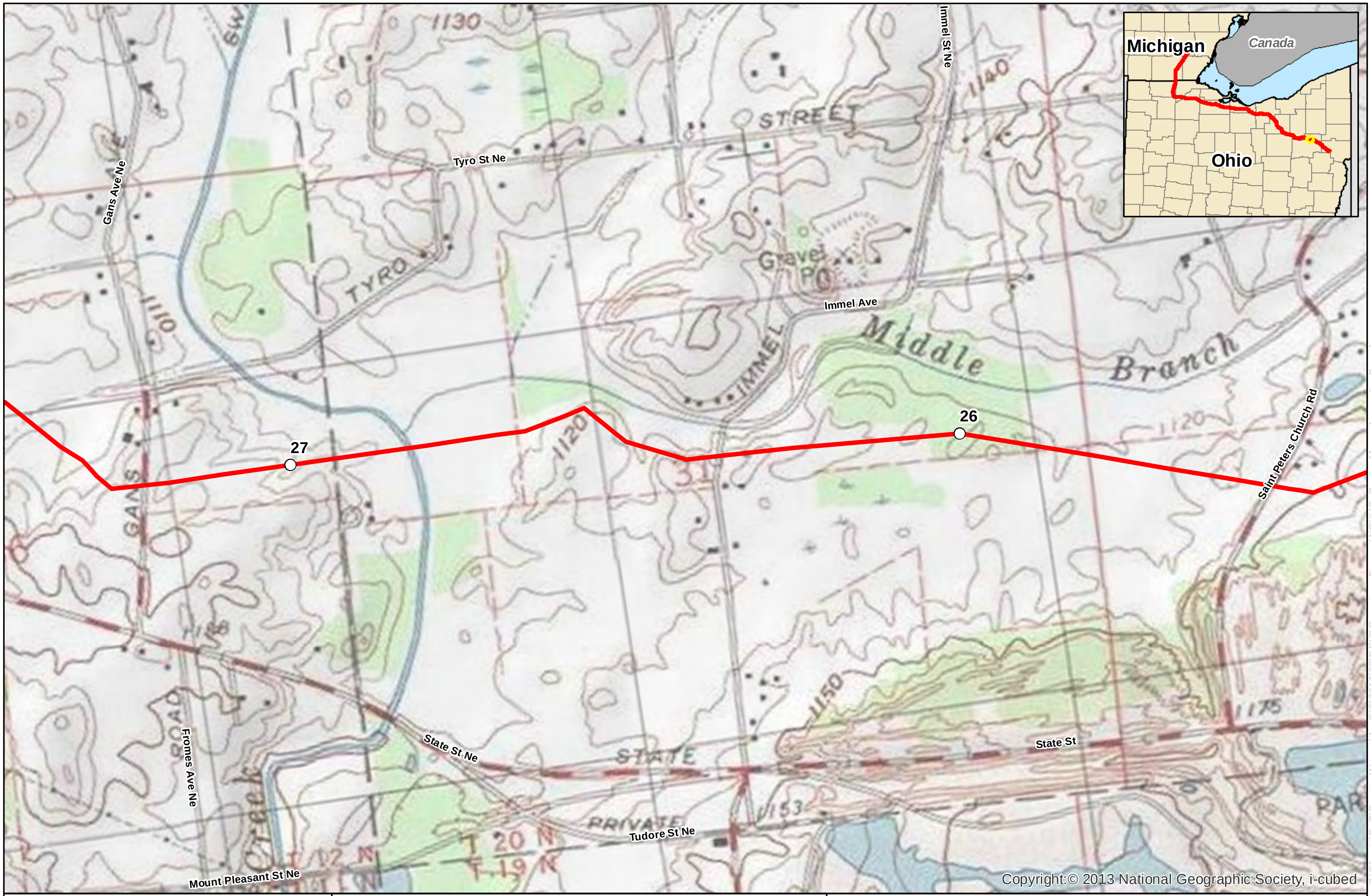

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Appendix B-1
NGT Project
Route Map

○	Milepost		Proposed TGP Interconnect
●	Tee-Tap Location		Proposed Access Road
⋈	Proposed Main Line Valve	☐	Proposed Compressor Station
—	Proposed NEXUS Mainline Pipeline	☐	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	☐	M&R Station

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⋈ Proposed Main Line Valve
- ━ Proposed NEXUS Mainline Pipeline
- ╍ Proposed TEAL Connecting Pipeline
- ━ Proposed TGP Interconnect
- ━ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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Appendix B-1
NGT Project
Route Map

○	Milepost		Proposed TGP Interconnect
●	Tee-Tap Location		Proposed Access Road
⧓	Proposed Main Line Valve	☐	Proposed Compressor Station
	Proposed NEXUS Mainline Pipeline	☐	Proposed Ware Yard
	Proposed TEAL Connecting Pipeline	☐	M&R Station

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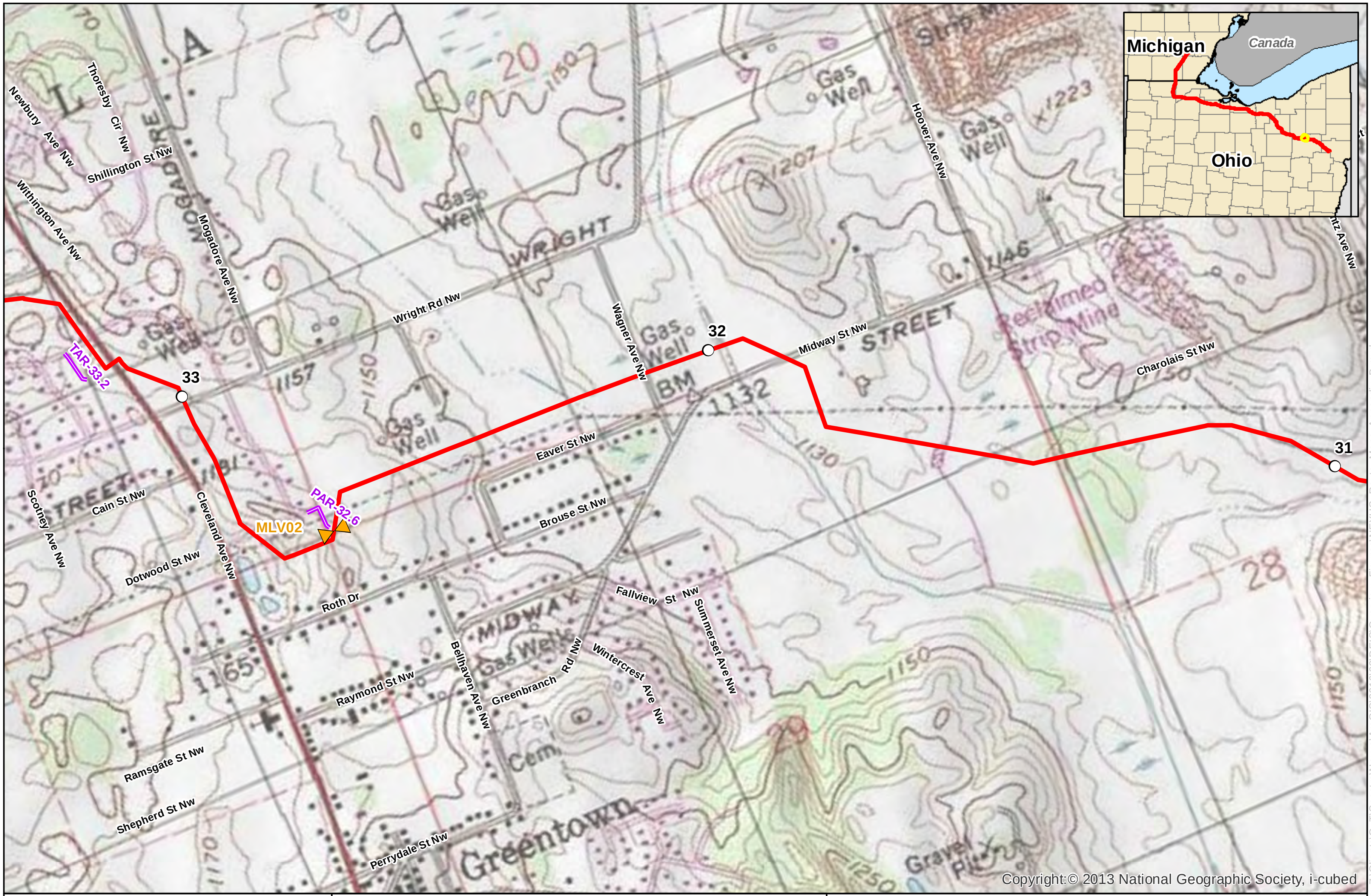

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⋈ Proposed Main Line Valve
- — Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
- — Proposed TGP Interconnect
- — Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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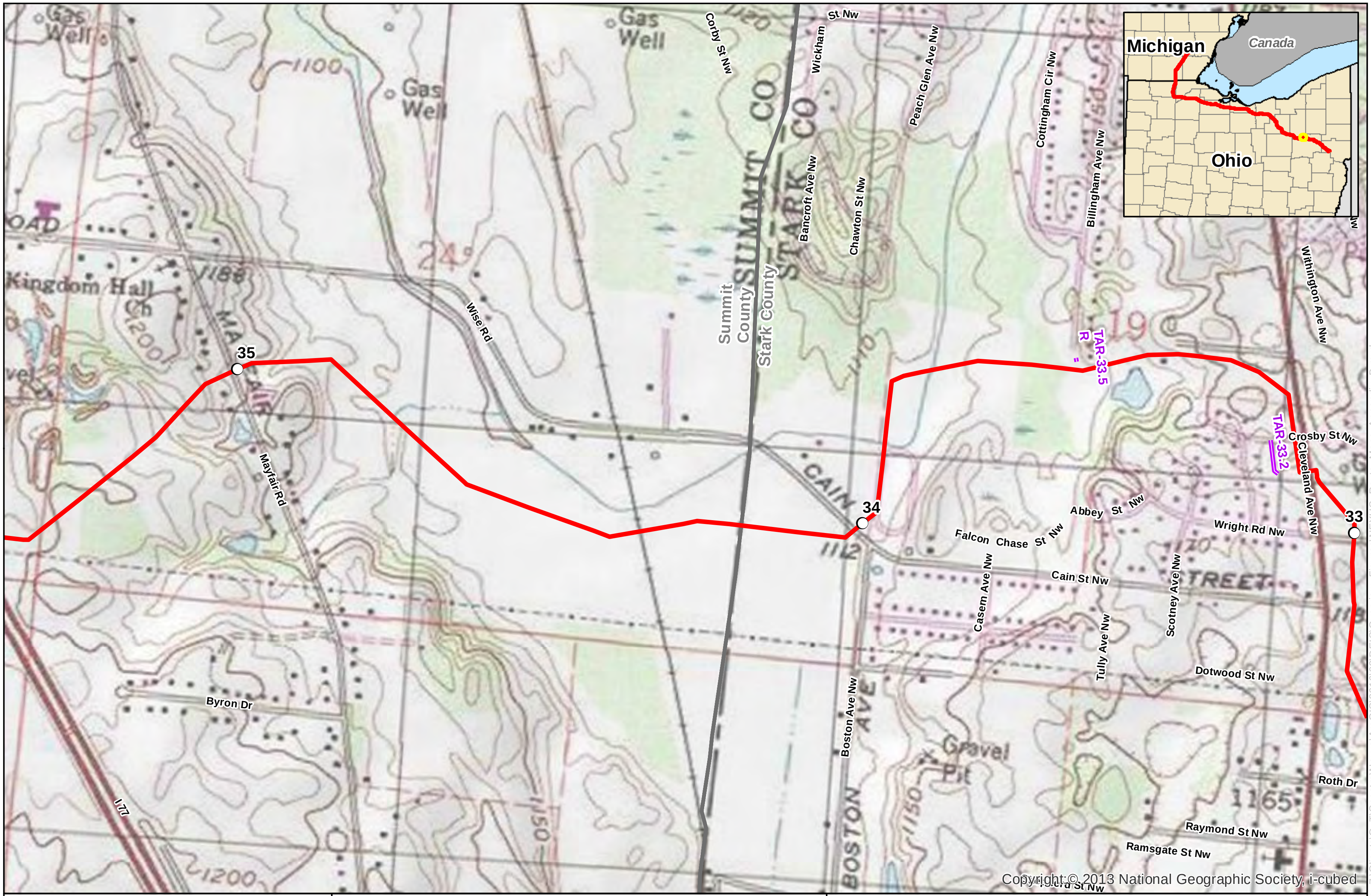

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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0 500 1,000 Feet

1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○	Milepost
●	Tee-Tap Location
⋈	Proposed Main Line Valve
━	Proposed NEXUS Mainline Pipeline
┅	Proposed TEAL Connecting Pipeline
━	Proposed TGP Interconnect
━	Proposed Access Road
▢	Proposed Compressor Station
▢	Proposed Ware Yard
▢	M&R Station

Source: Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\03\DEIS\Overview_Figures\NEXUS_Route_Maps_Appendix_B.mxd

Date: (6/20/2016)

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⧓ Proposed Main Line Valve
- Proposed NEXUS Mainline Pipeline
- Proposed TEAL Connecting Pipeline
- Proposed TGP Interconnect
- Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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Feet

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⋈ Proposed Main Line Valve
— Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
— Proposed TGP Interconnect
— Proposed Access Road
☐ Proposed Compressor Station
☐ Proposed Ware Yard
☐ M&R Station

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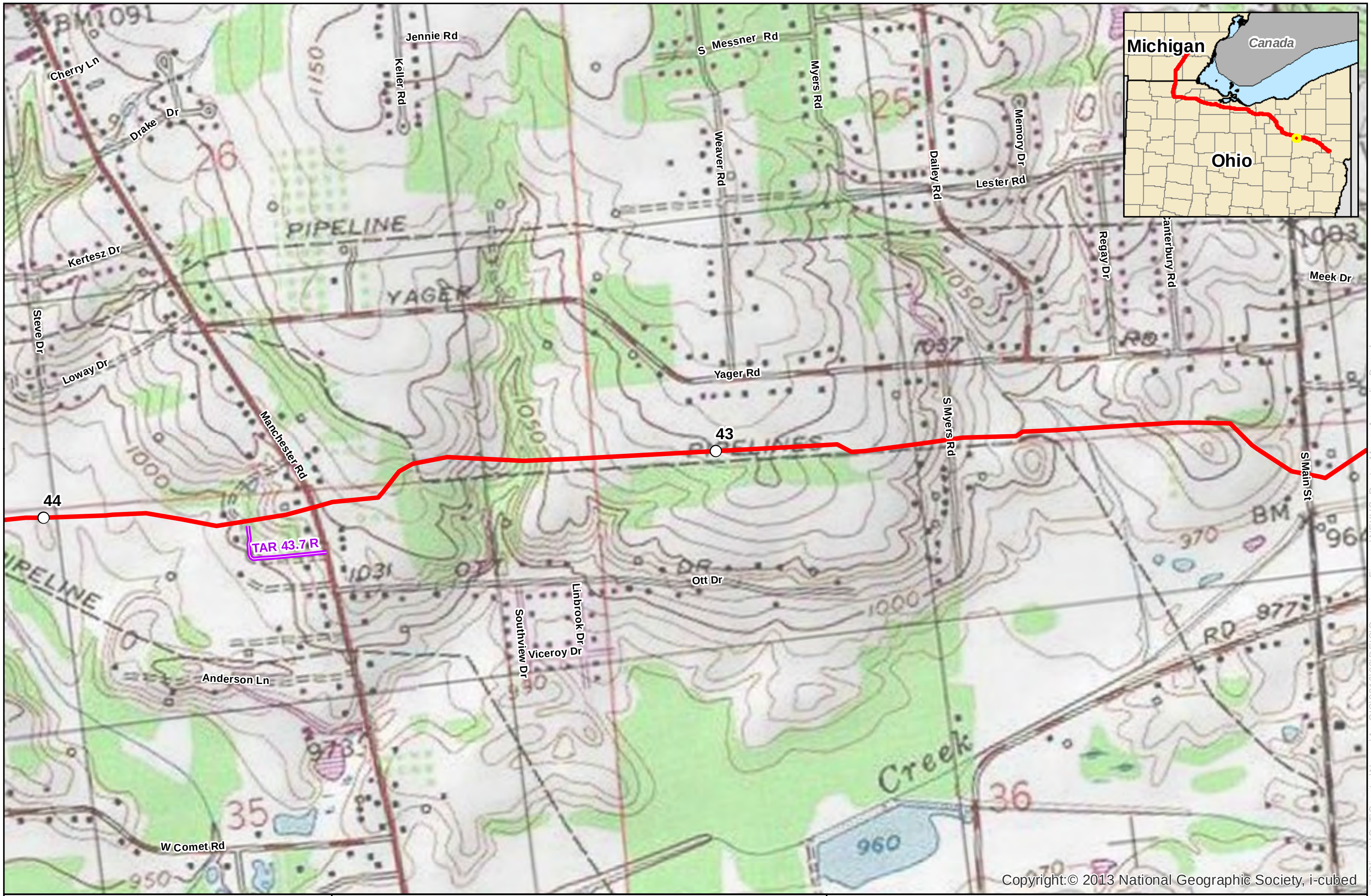

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1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○	Milepost		Proposed TGP Interconnect
●	Tee-Tap Location		Proposed Access Road
⋈	Proposed Main Line Valve	☐	Proposed Compressor Station
	Proposed NEXUS Mainline Pipeline	☐	Proposed Ware Yard
	Proposed TEAL Connecting Pipeline	☐	M&R Station

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⋈ Proposed Main Line Valve
- ▬ Proposed NEXUS Mainline Pipeline
- ‐ ‐ Proposed TEAL Connecting Pipeline
- ▬ Proposed TGP Interconnect
- ▬ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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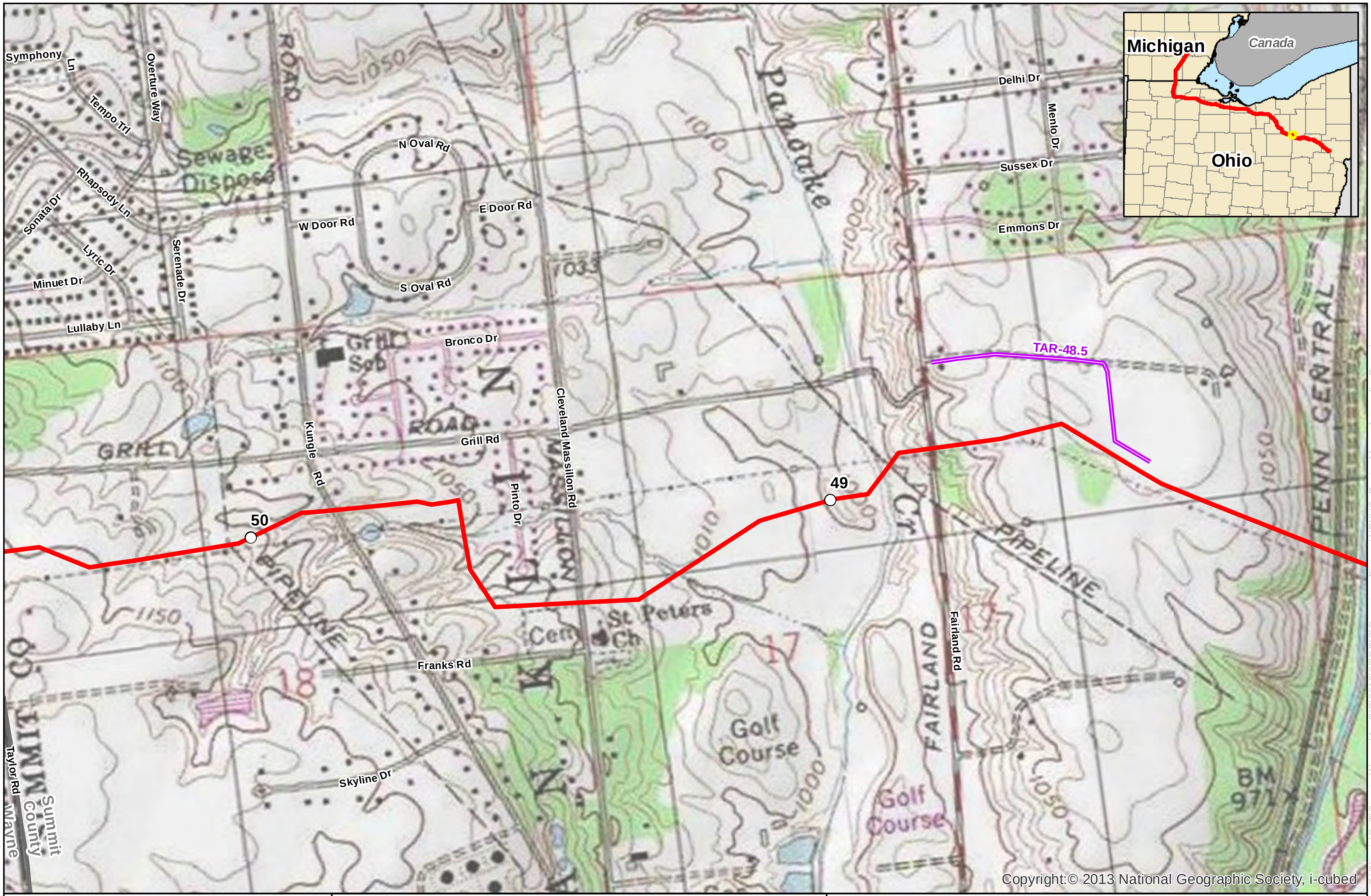

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⋈ Proposed Main Line Valve
━ Proposed NEXUS Mainline Pipeline
┅ Proposed TEAL Connecting Pipeline
━ Proposed TGP Interconnect
━ Proposed Access Road
☐ Proposed Compressor Station
☐ Proposed Ware Yard
☐ M&R Station

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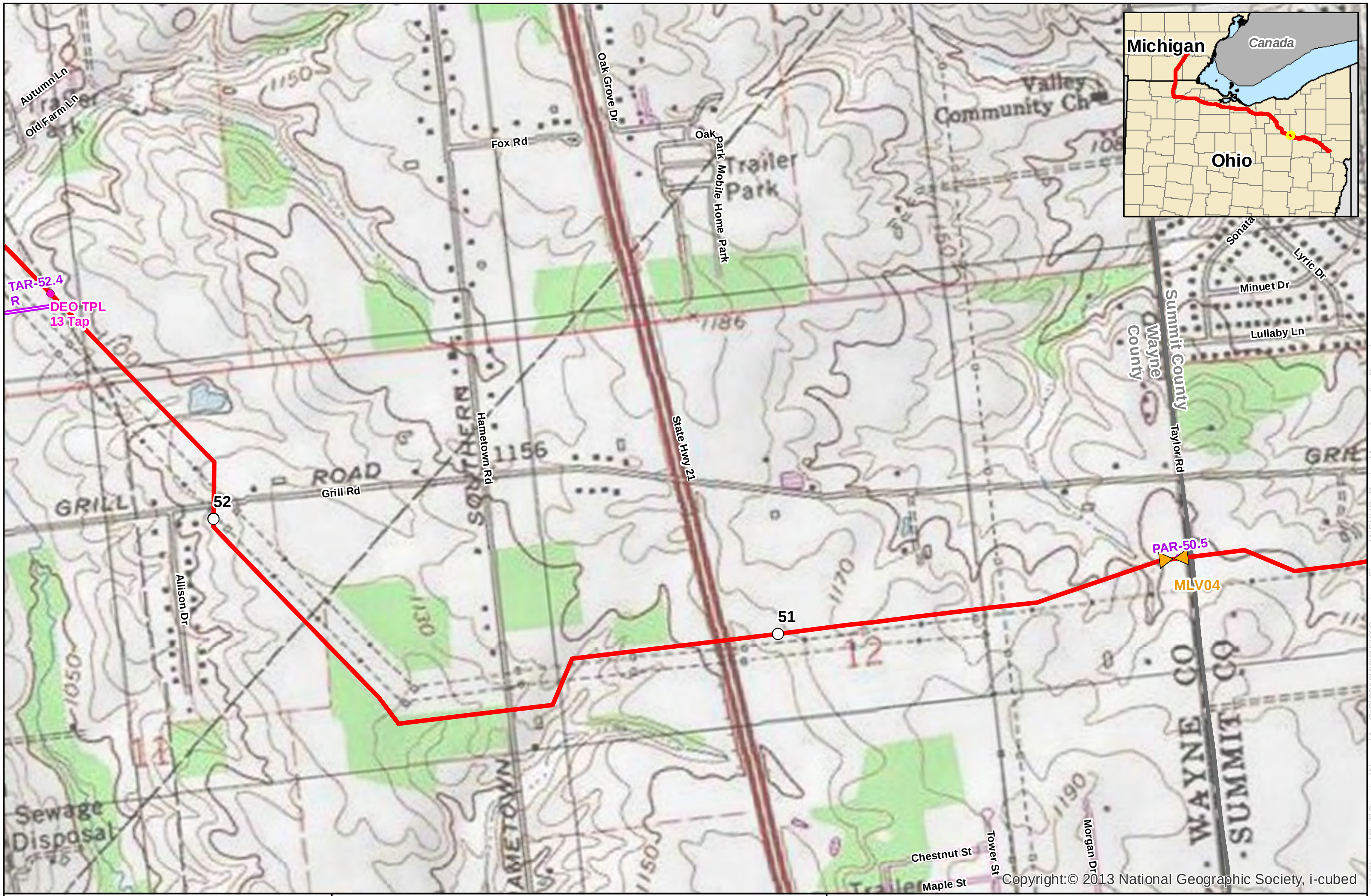

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Appendix B-1
NGT Project
Route Map

○	Milepost		Proposed TGP Interconnect
●	Tee-Tap Location		Proposed Access Road
⧓	Proposed Main Line Valve	▢	Proposed Compressor Station
—	Proposed NEXUS Mainline Pipeline	▢	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	▢	M&R Station

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⋈ Proposed Main Line Valve
- — Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
- — Proposed TGP Interconnect
- — Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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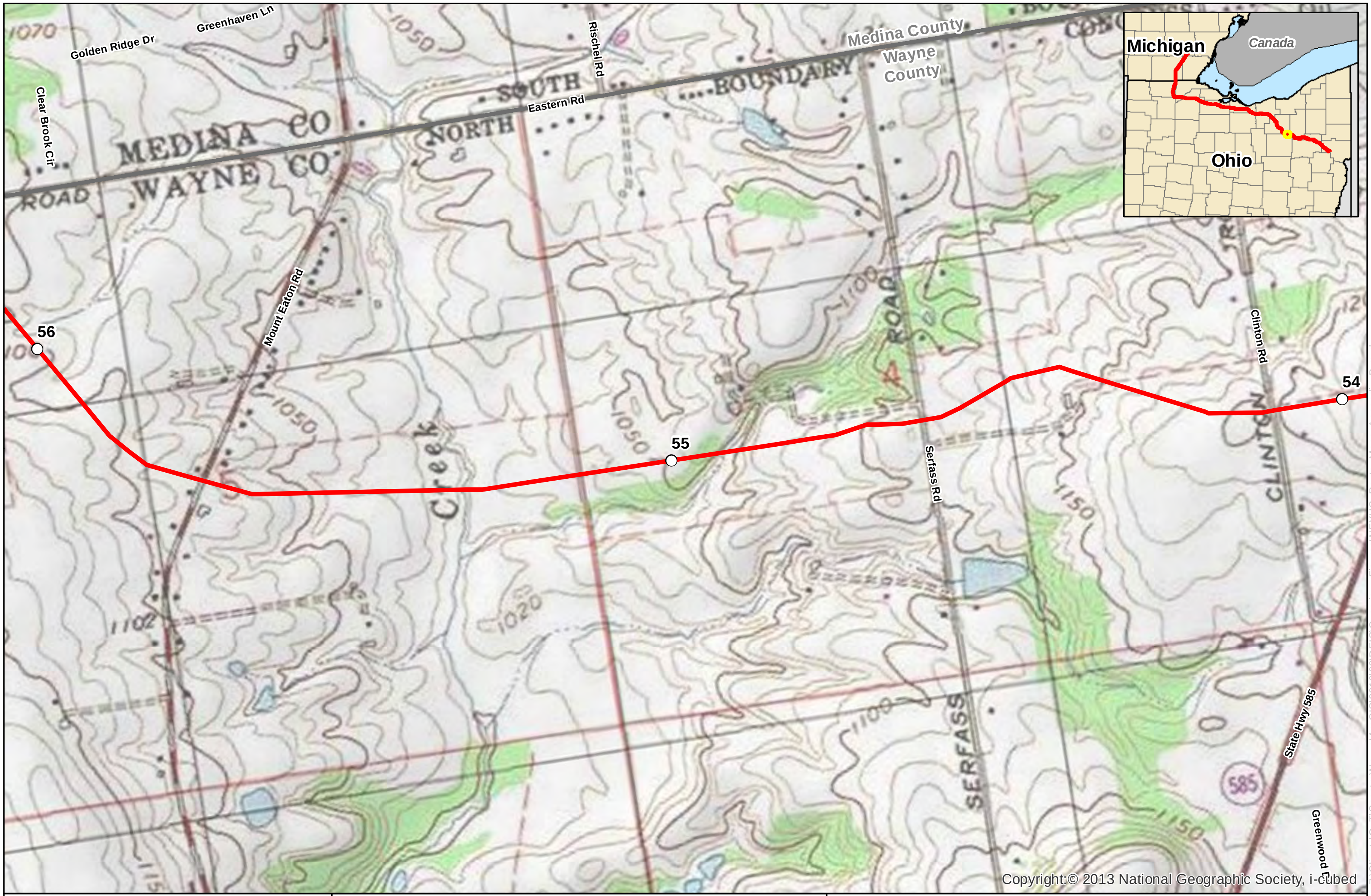

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Feet
1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⋈ Proposed Main Line Valve
— Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
— Proposed TGP Interconnect
— Proposed Access Road
☐ Proposed Compressor Station
☐ Proposed Ware Yard
☐ M&R Station

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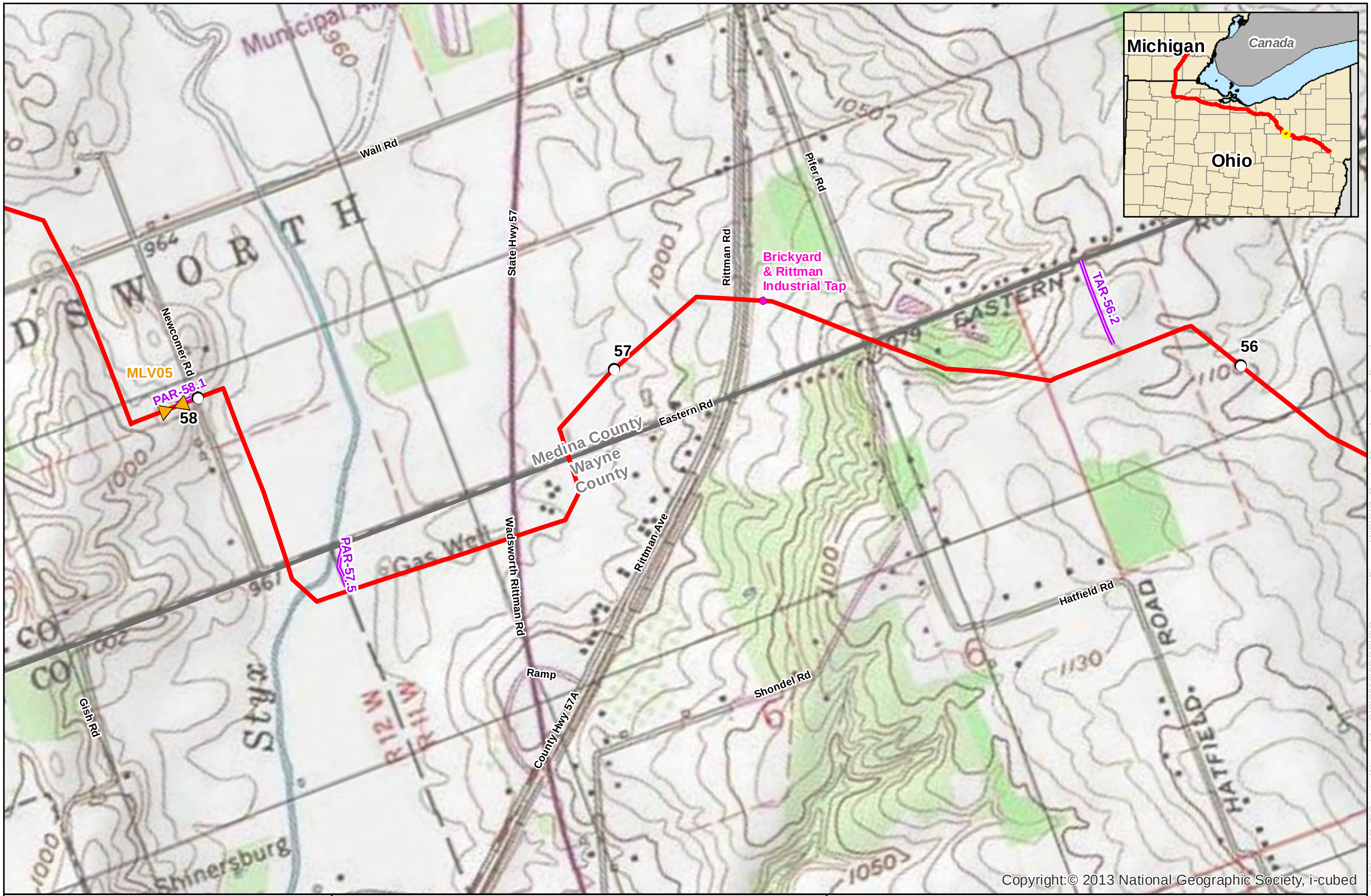

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1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○	Milepost		Proposed TGP Interconnect
●	Tee-Tap Location		Proposed Access Road
⋈	Proposed Main Line Valve	☐	Proposed Compressor Station
	Proposed NEXUS Mainline Pipeline	☐	Proposed Ware Yard
	Proposed TEAL Connecting Pipeline	☐	M&R Station

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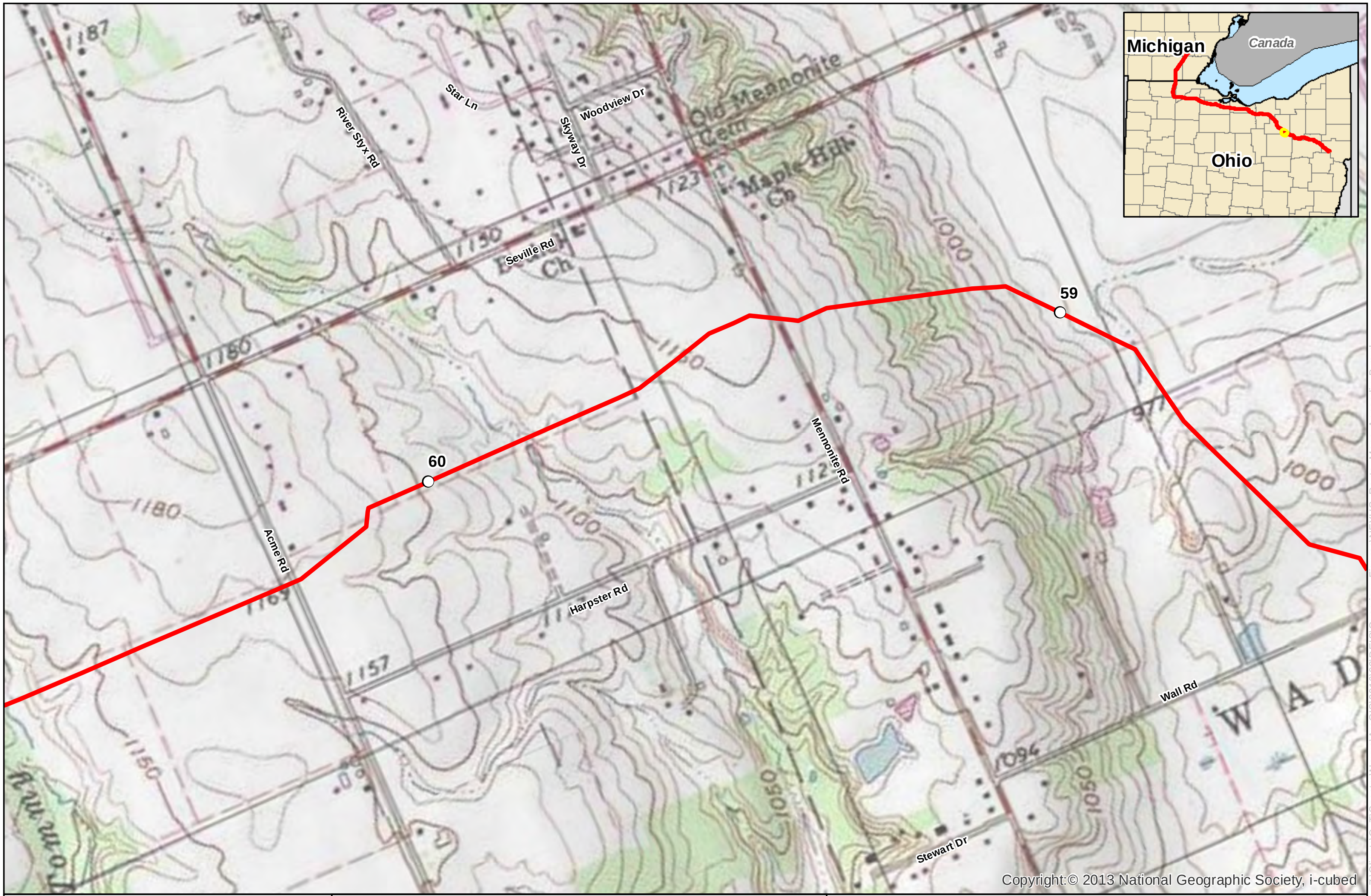

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Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⋈ Proposed Main Line Valve

— Proposed NEXUS Mainline Pipeline

- - - Proposed TEAL Connecting Pipeline

— Proposed TGP Interconnect

— Proposed Access Road

☐ Proposed Compressor Station

☐ Proposed Ware Yard

☐ M&R Station

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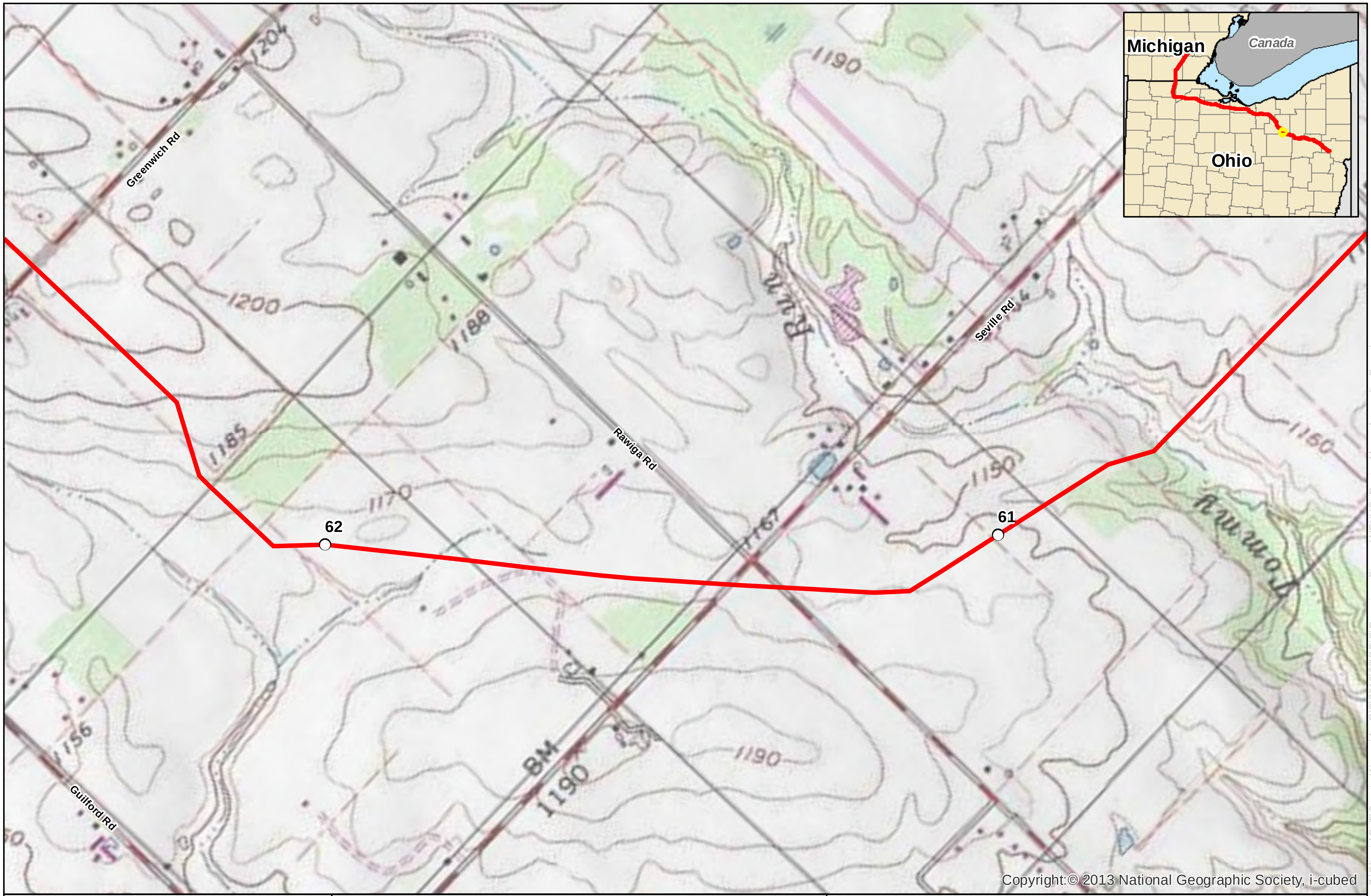

0 500 1,000 Feet

1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⋈ Proposed Main Line Valve
- ― Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
- ― Proposed TGP Interconnect
- ― Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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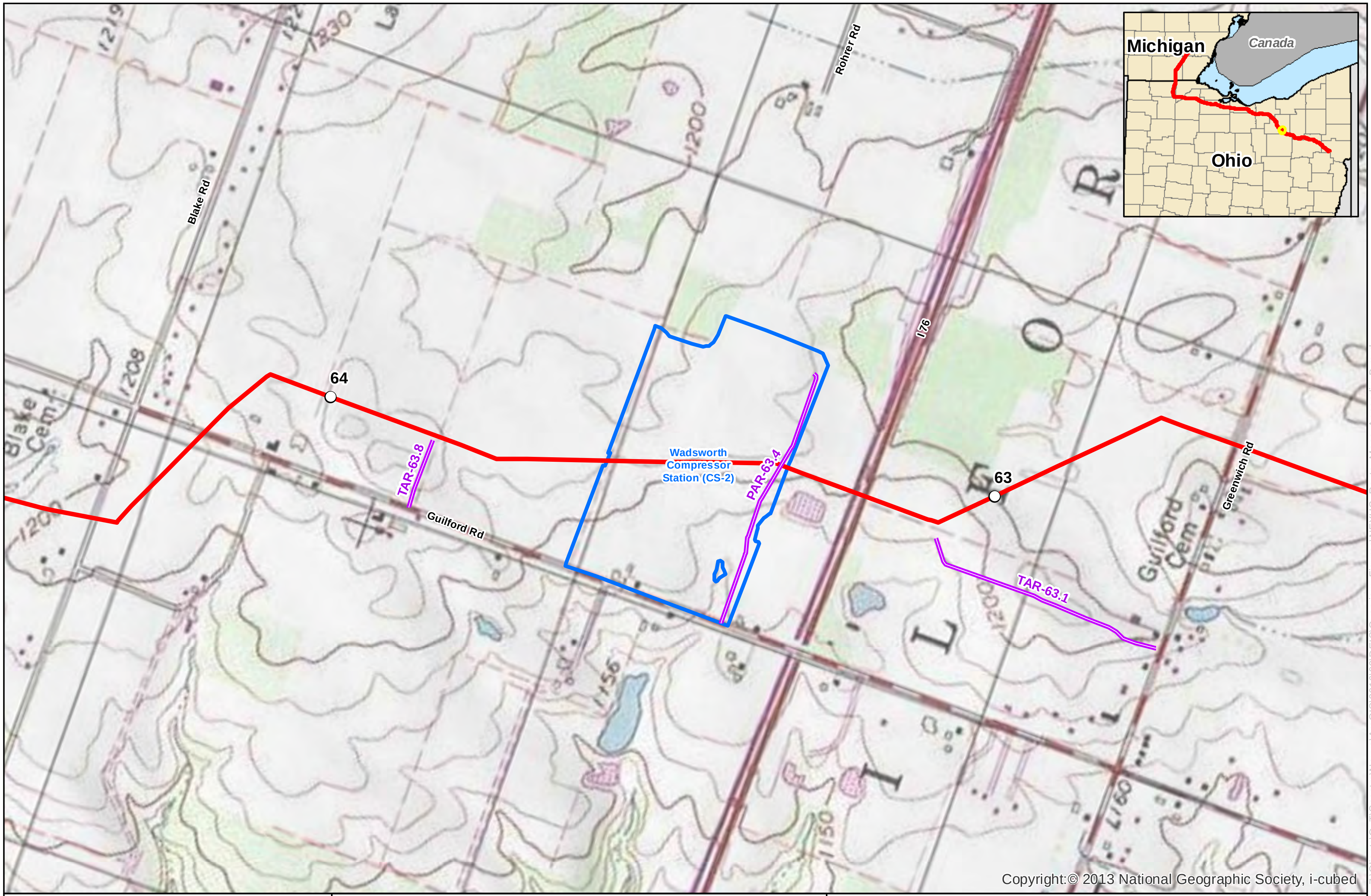

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1 inch = 1,000 feet

Appendix B-1

NGT Project

Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	▢	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	▢	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	▢	M&R Station

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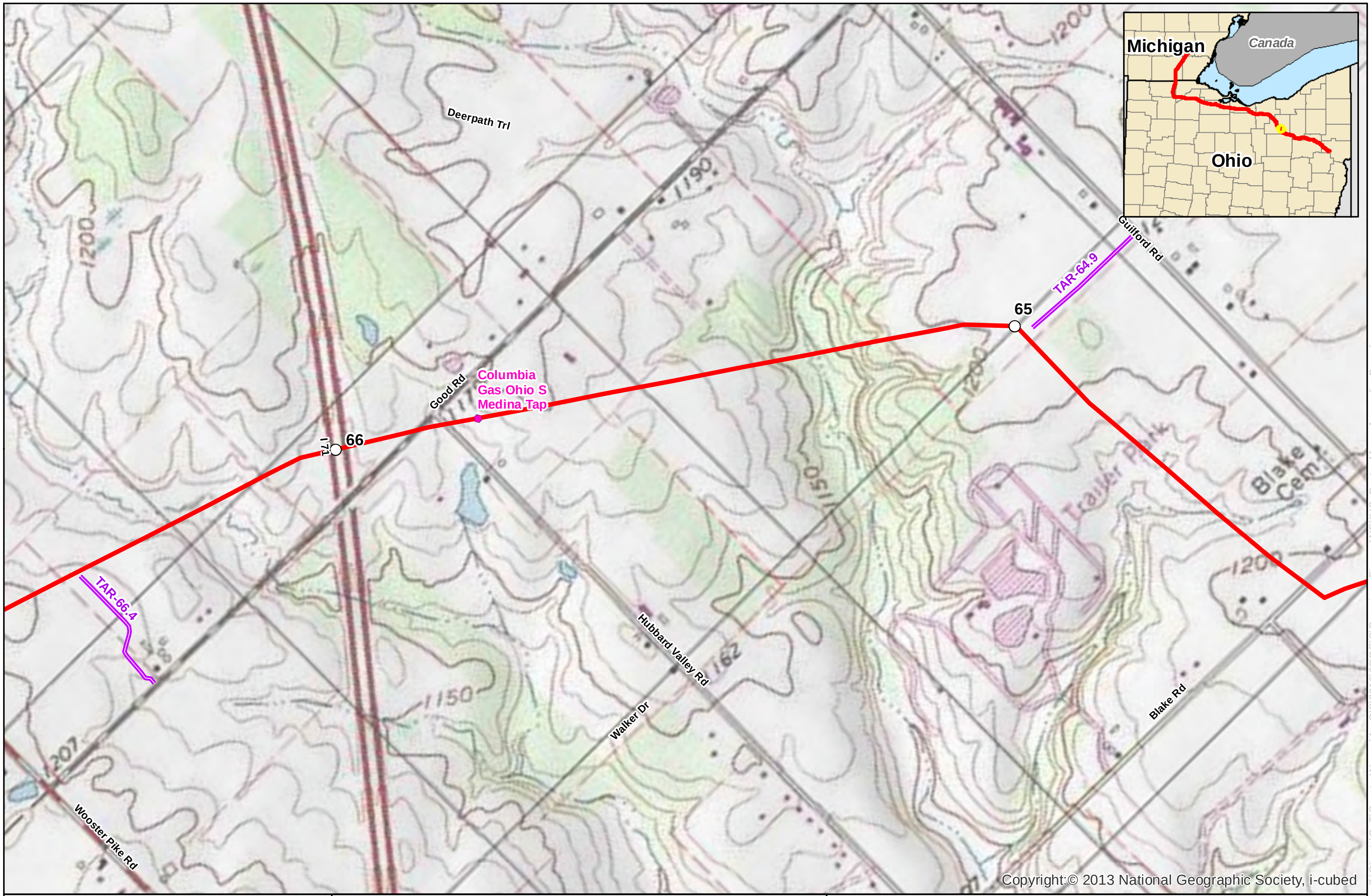

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⧓ Proposed Main Line Valve
— Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
— Proposed TGP Interconnect
— Proposed Access Road
☐ Proposed Compressor Station
☐ Proposed Ware Yard
☐ M&R Station

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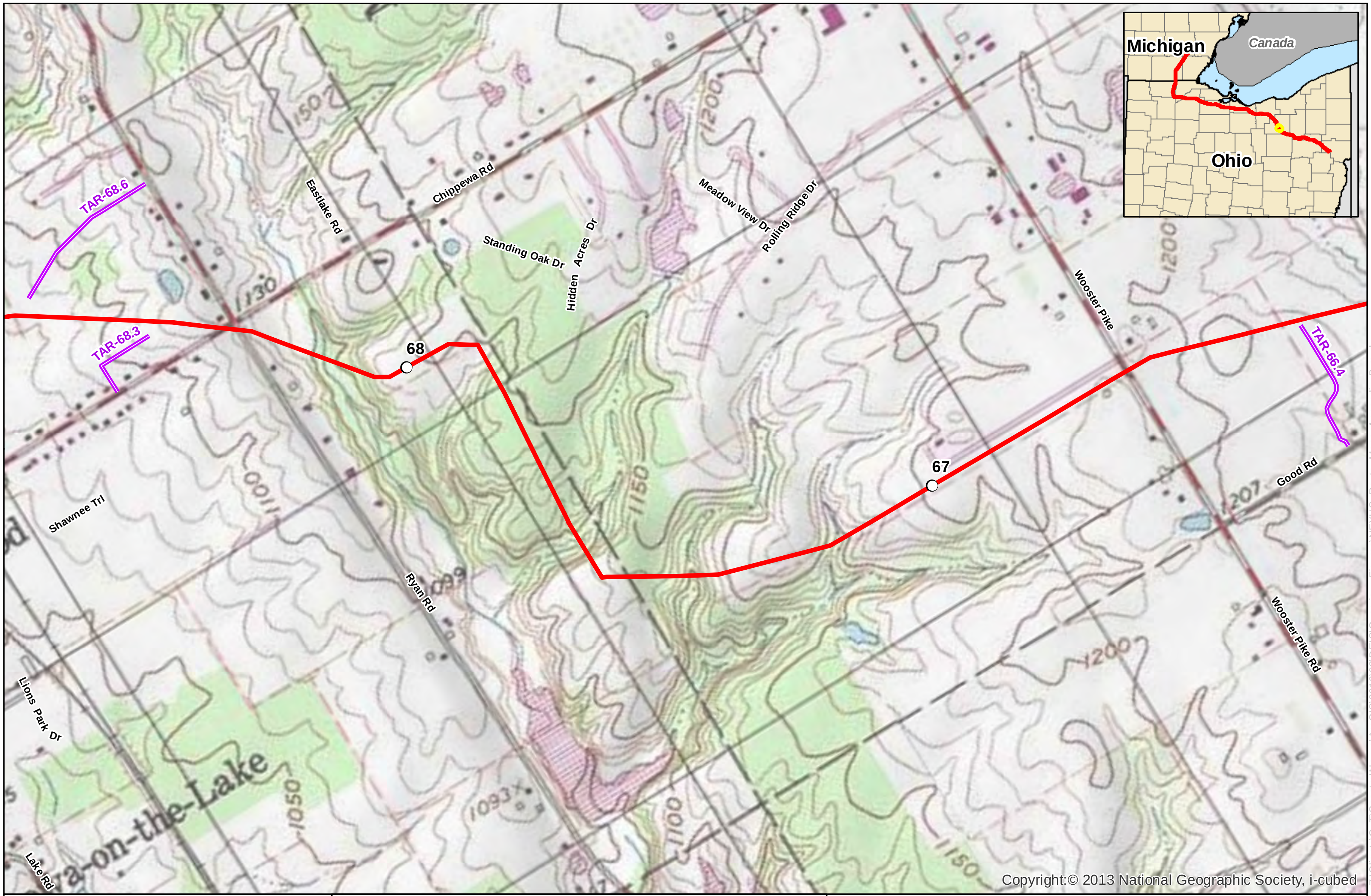

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Feet

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⧓ Proposed Main Line Valve
- ━ Proposed NEXUS Mainline Pipeline
- ┅ Proposed TEAL Connecting Pipeline
- ━ Proposed TGP Interconnect
- ═ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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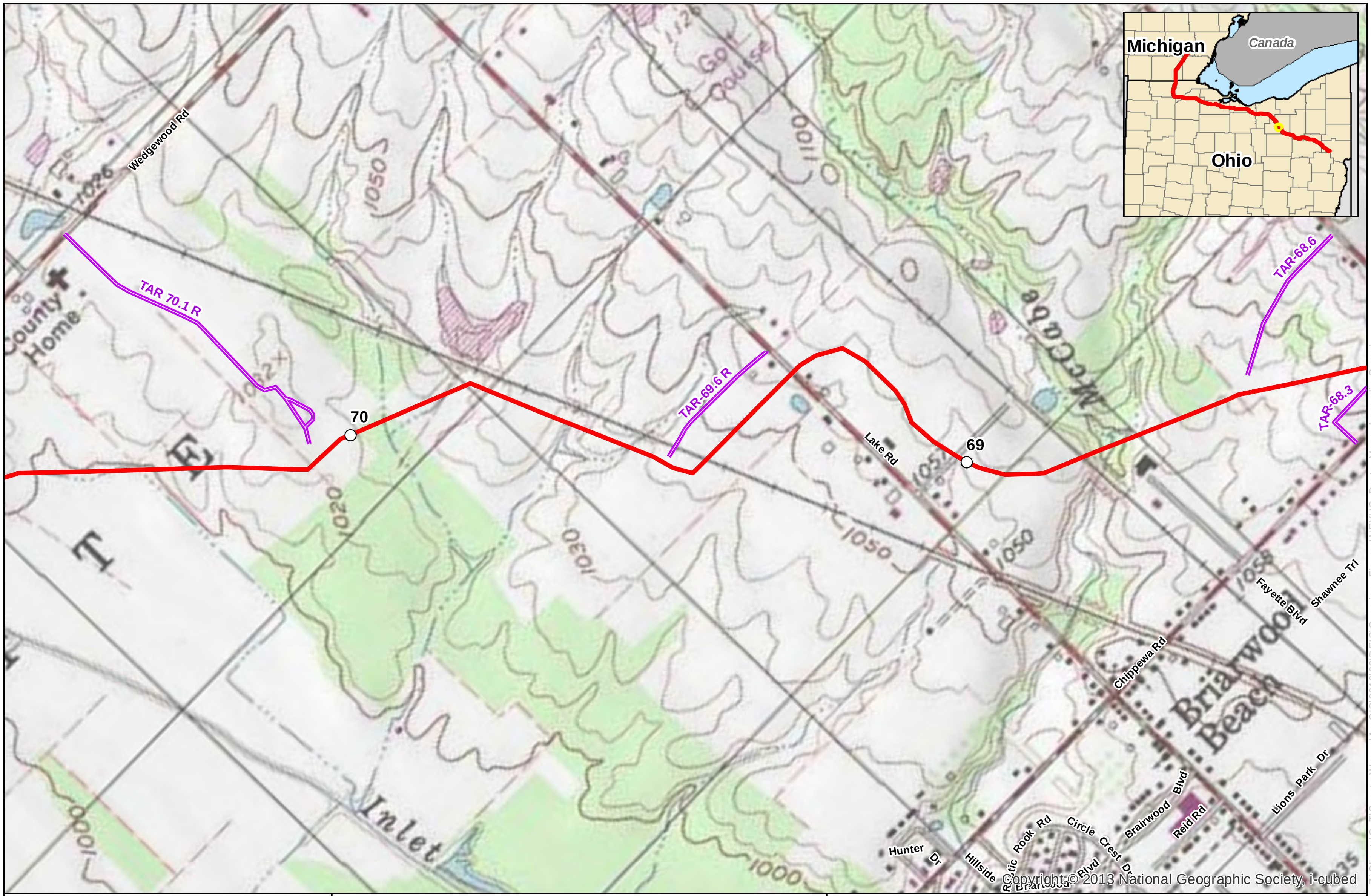

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Feet

1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⧓ Proposed Main Line Valve
- ━ Proposed NEXUS Mainline Pipeline
- ╍ Proposed TEAL Connecting Pipeline
- ━ Proposed TGP Interconnect
- ═ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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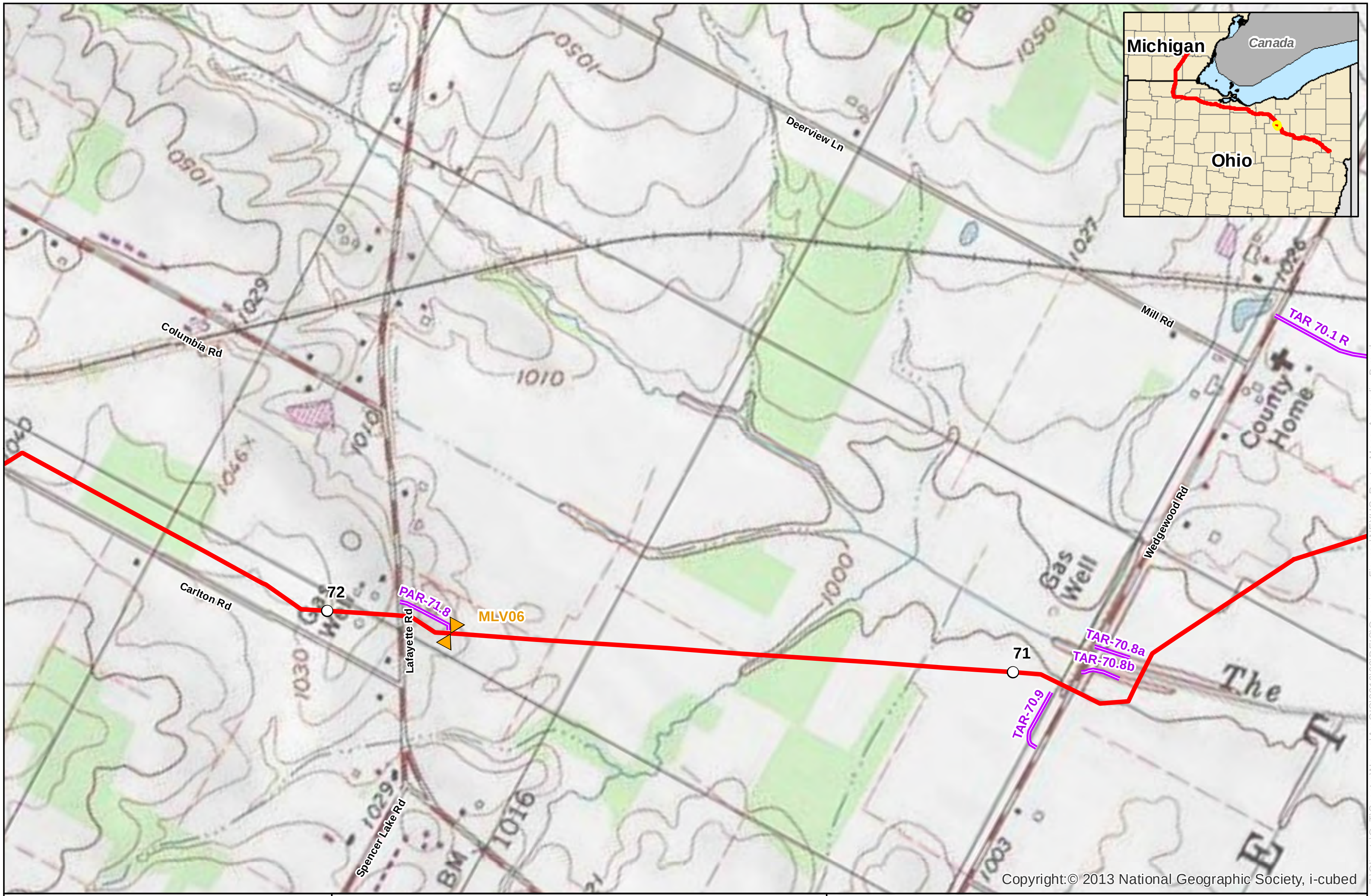

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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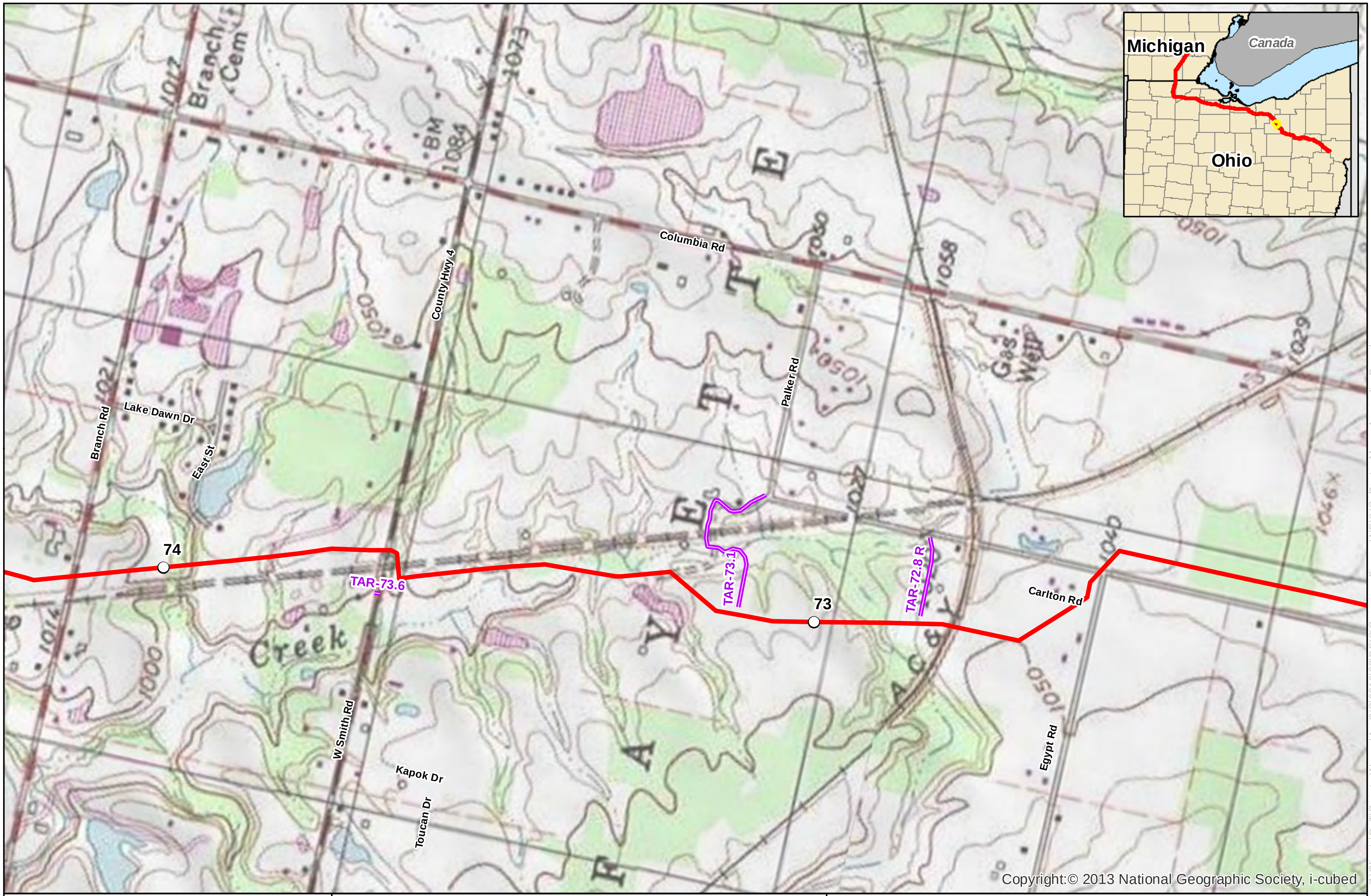

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1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○	Milepost		Proposed TGP Interconnect
●	Tee-Tap Location		Proposed Access Road
⧓	Proposed Main Line Valve	☐	Proposed Compressor Station
	Proposed NEXUS Mainline Pipeline	☐	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	☐	M&R Station

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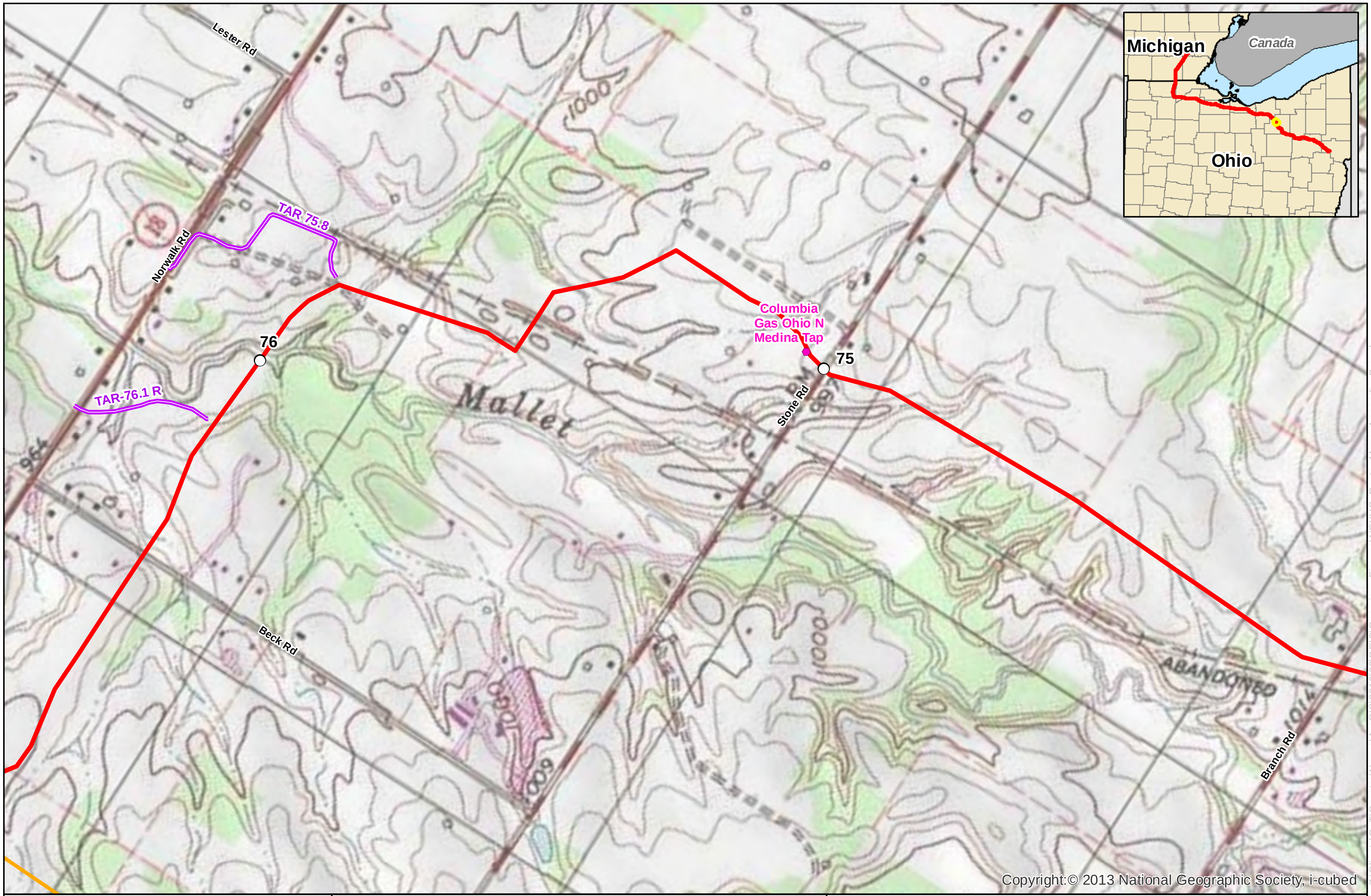

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1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⋈ Proposed Main Line Valve
━ Proposed NEXUS Mainline Pipeline
╍ Proposed TEAL Connecting Pipeline
━ Proposed TGP Interconnect
═ Proposed Access Road
☐ Proposed Compressor Station
☐ Proposed Ware Yard
☐ M&R Station

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Feet

1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⋈ Proposed Main Line Valve
- ━ Proposed NEXUS Mainline Pipeline
- ┅ Proposed TEAL Connecting Pipeline
- ━ Proposed TGP Interconnect
- ═ Proposed Access Road
- ▭ Proposed Compressor Station
- ▭ Proposed Ware Yard
- ▭ M&R Station

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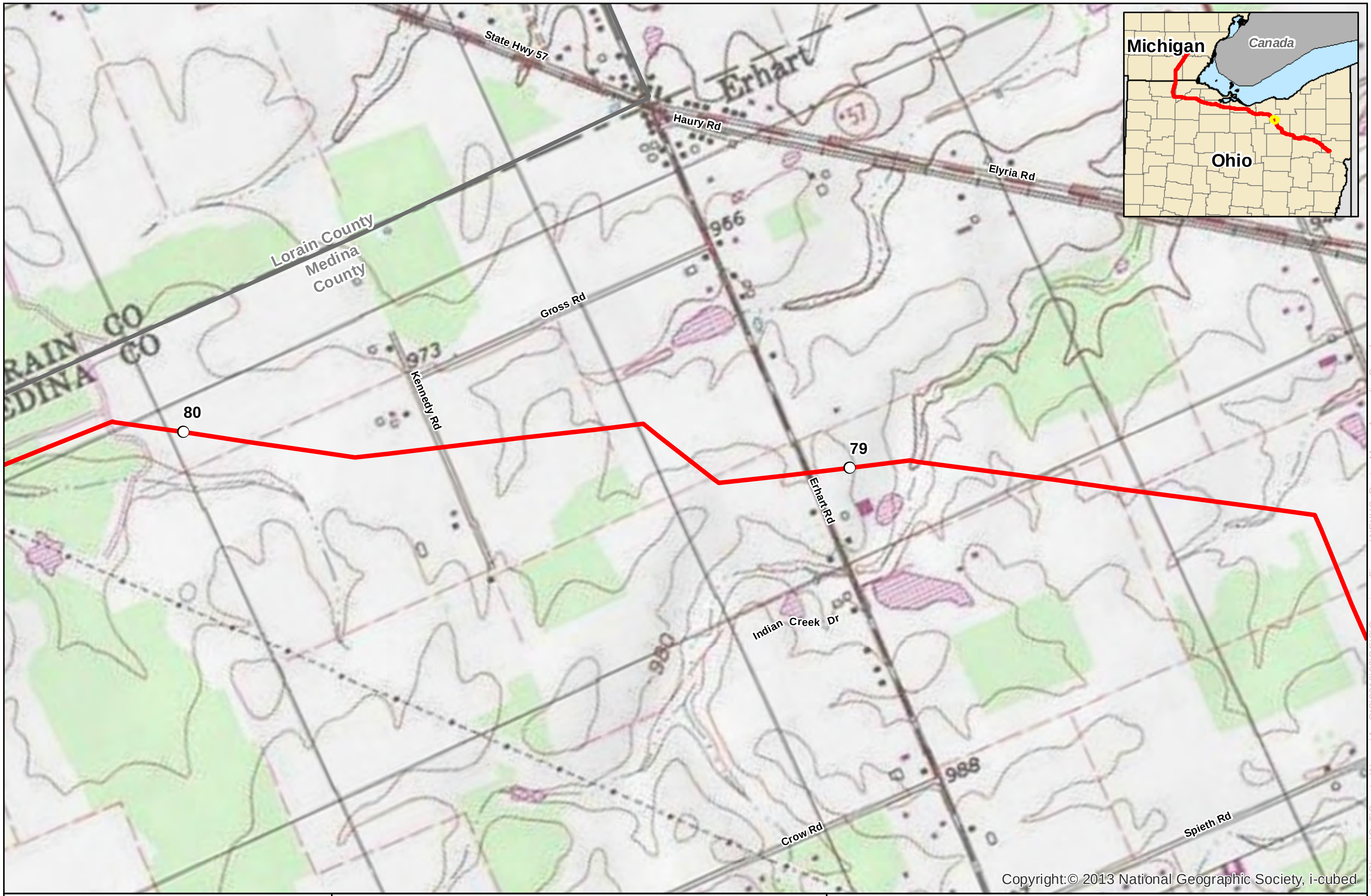

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⋈	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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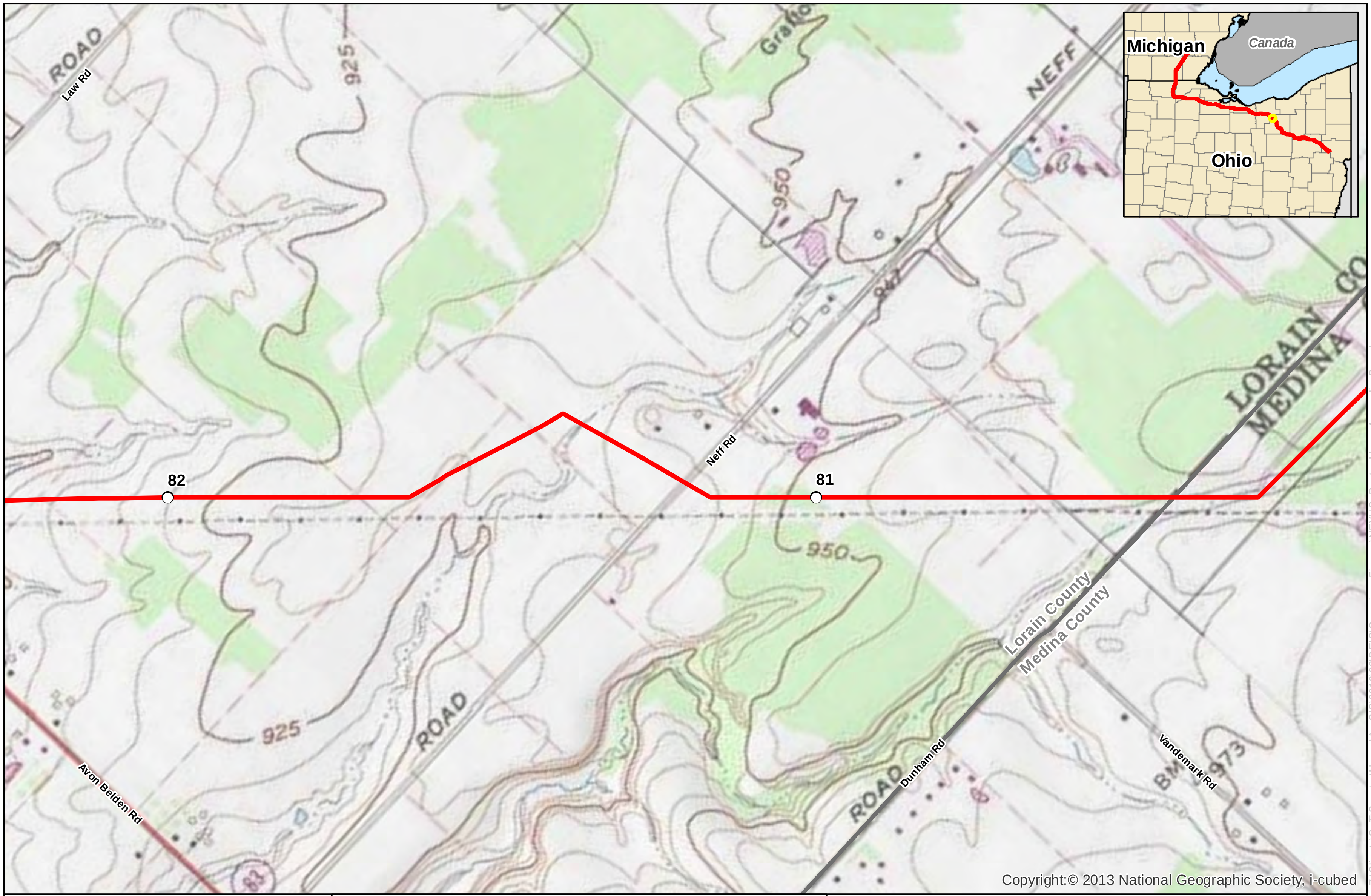

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Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⋈ Proposed Main Line Valve

— Proposed NEXUS Mainline Pipeline

- - Proposed TEAL Connecting Pipeline

— Proposed TGP Interconnect

— Proposed Access Road

☐ Proposed Compressor Station

☐ Proposed Ware Yard

☐ M&R Station

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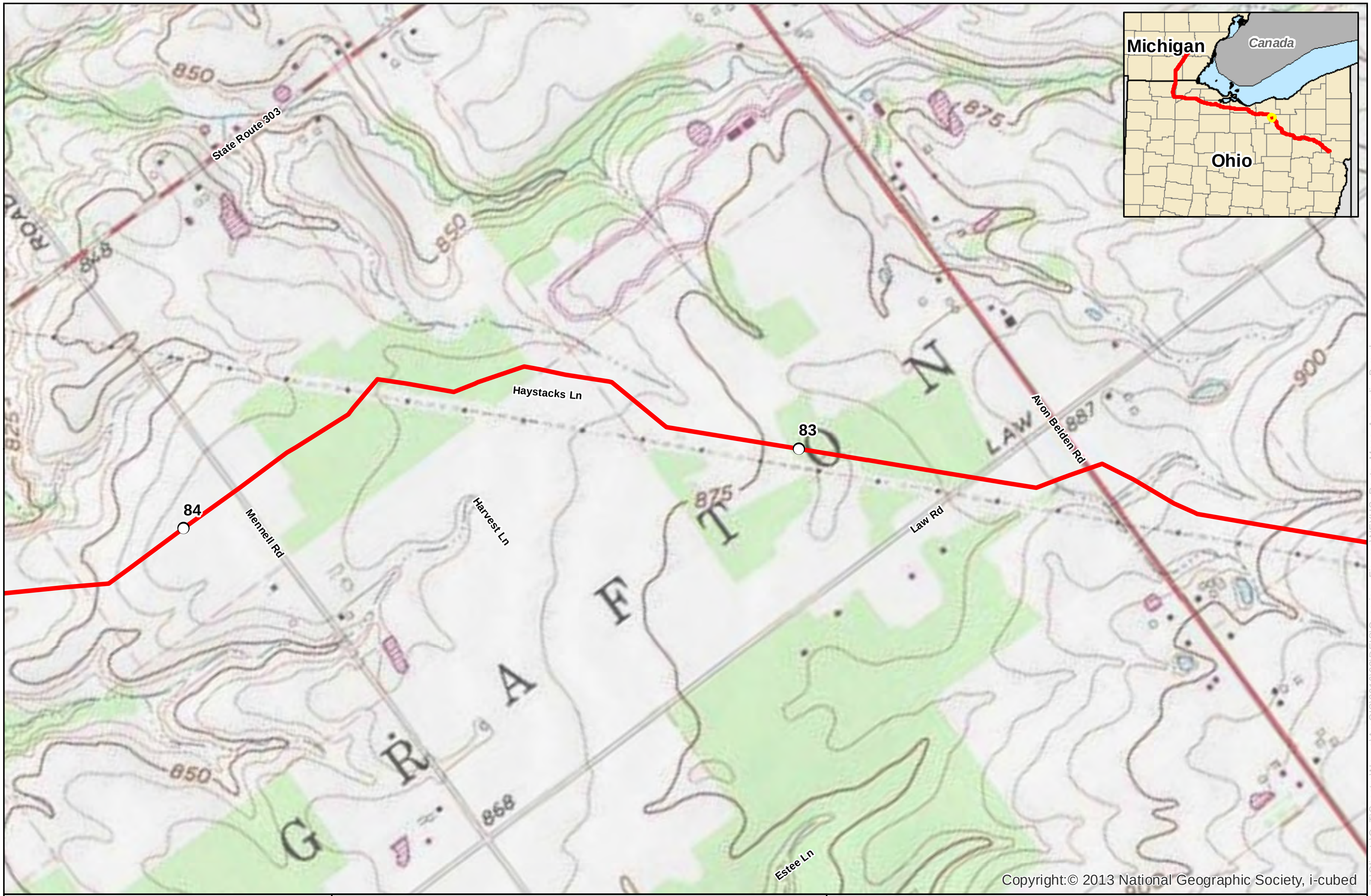

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1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⧓ Proposed Main Line Valve
— Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
— Proposed TGP Interconnect
— Proposed Access Road
☐ Proposed Compressor Station
☐ Proposed Ware Yard
☐ M&R Station

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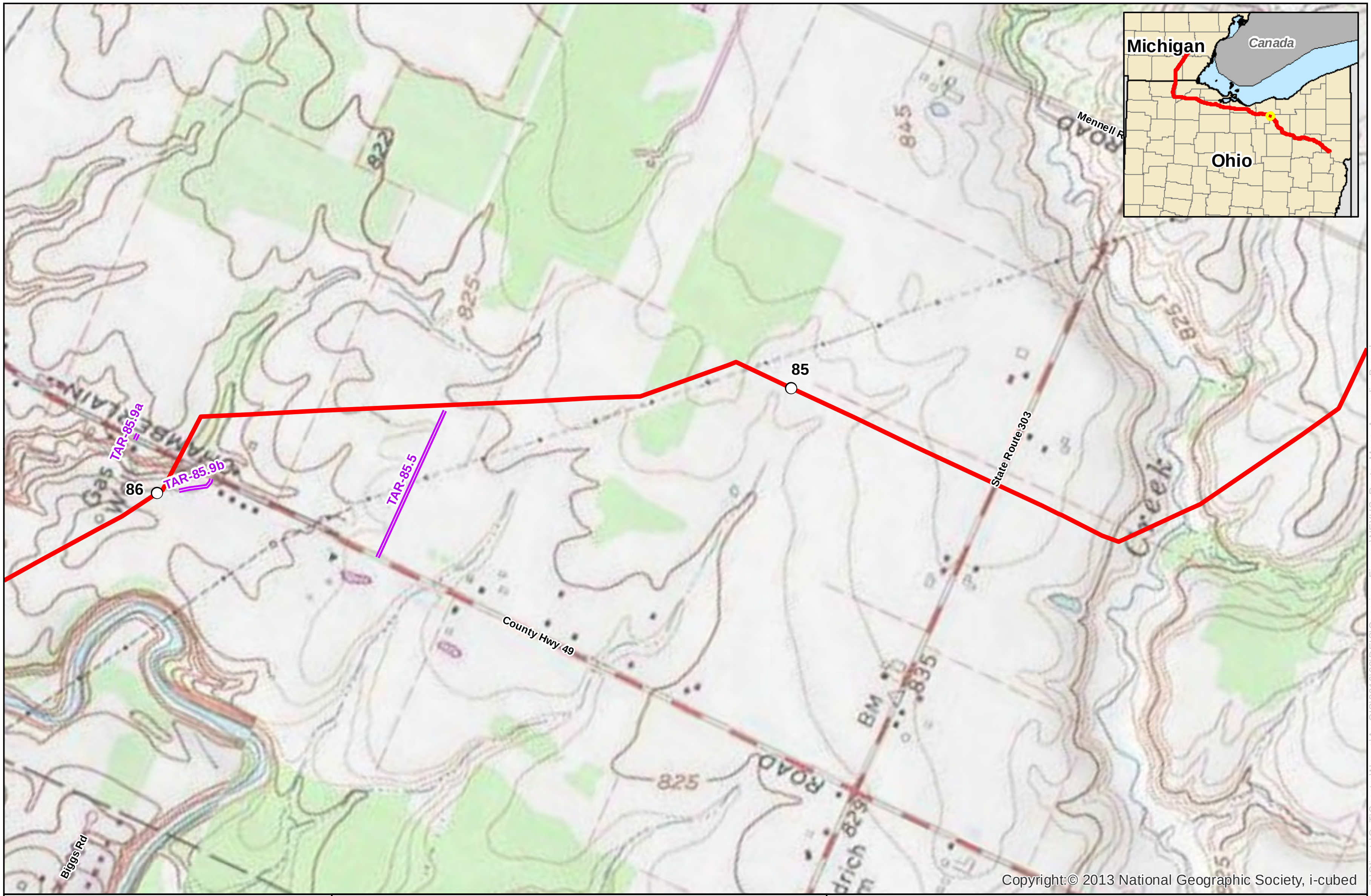

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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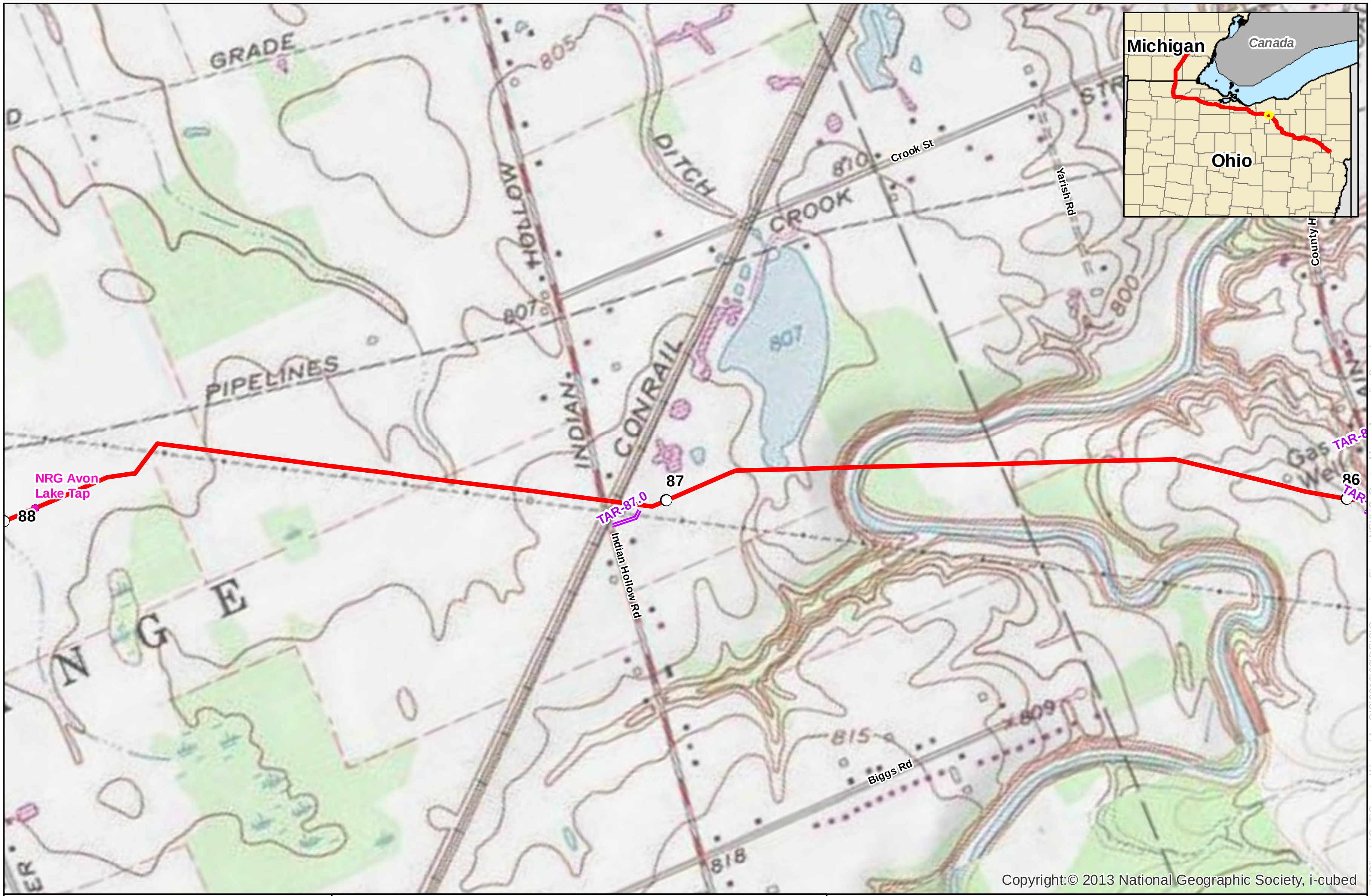

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Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⋈ Proposed Main Line Valve

— Proposed NEXUS Mainline Pipeline

- - - Proposed TEAL Connecting Pipeline

— Proposed TGP Interconnect

═ Proposed Access Road

▢ Proposed Compressor Station

▢ Proposed Ware Yard

▢ M&R Station

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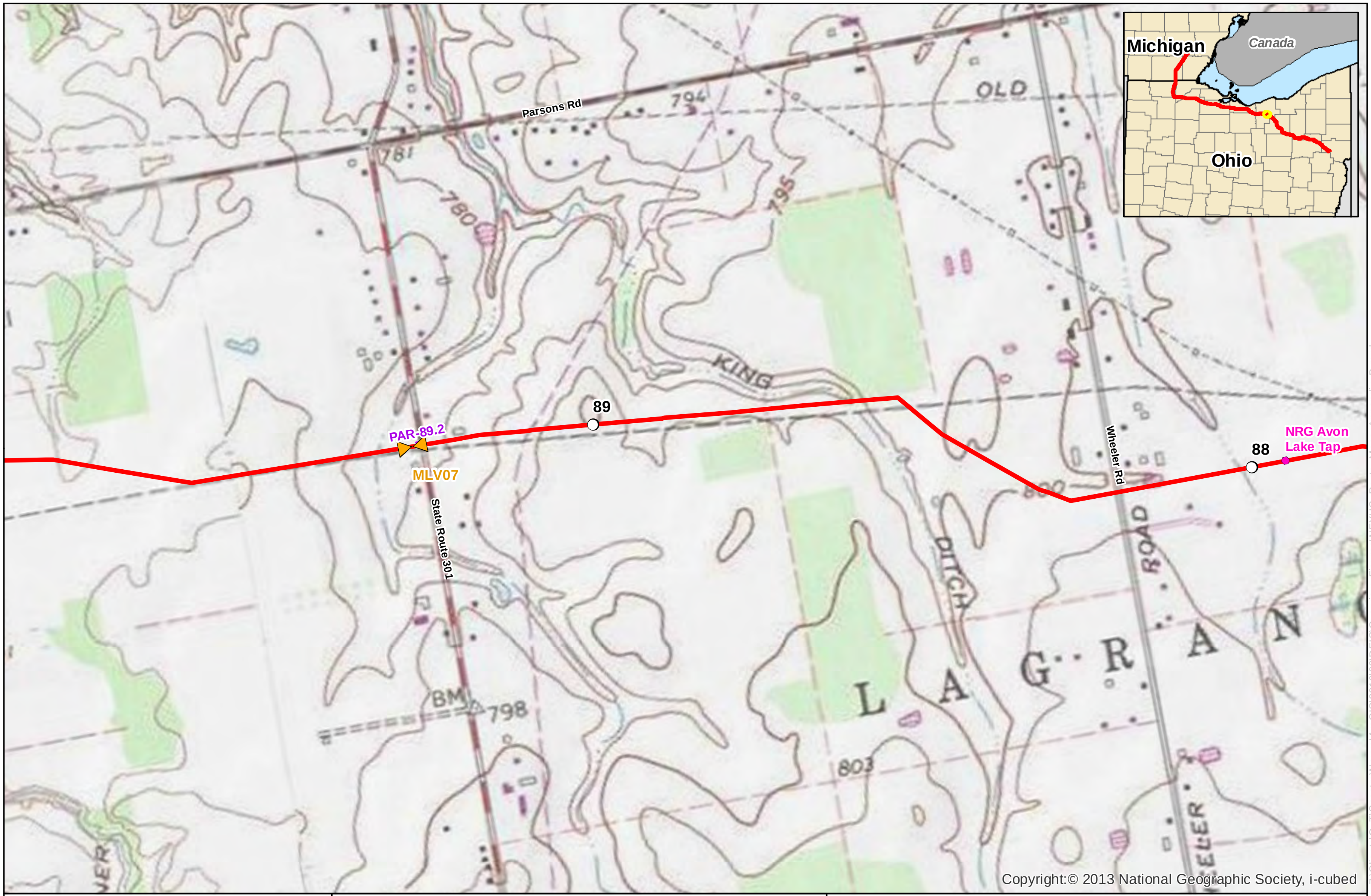

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1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⋈ Proposed Main Line Valve

— Proposed NEXUS Mainline Pipeline

- - - Proposed TEAL Connecting Pipeline

— Proposed TGP Interconnect

═ Proposed Access Road

☐ Proposed Compressor Station

☐ Proposed Ware Yard

☐ M&R Station

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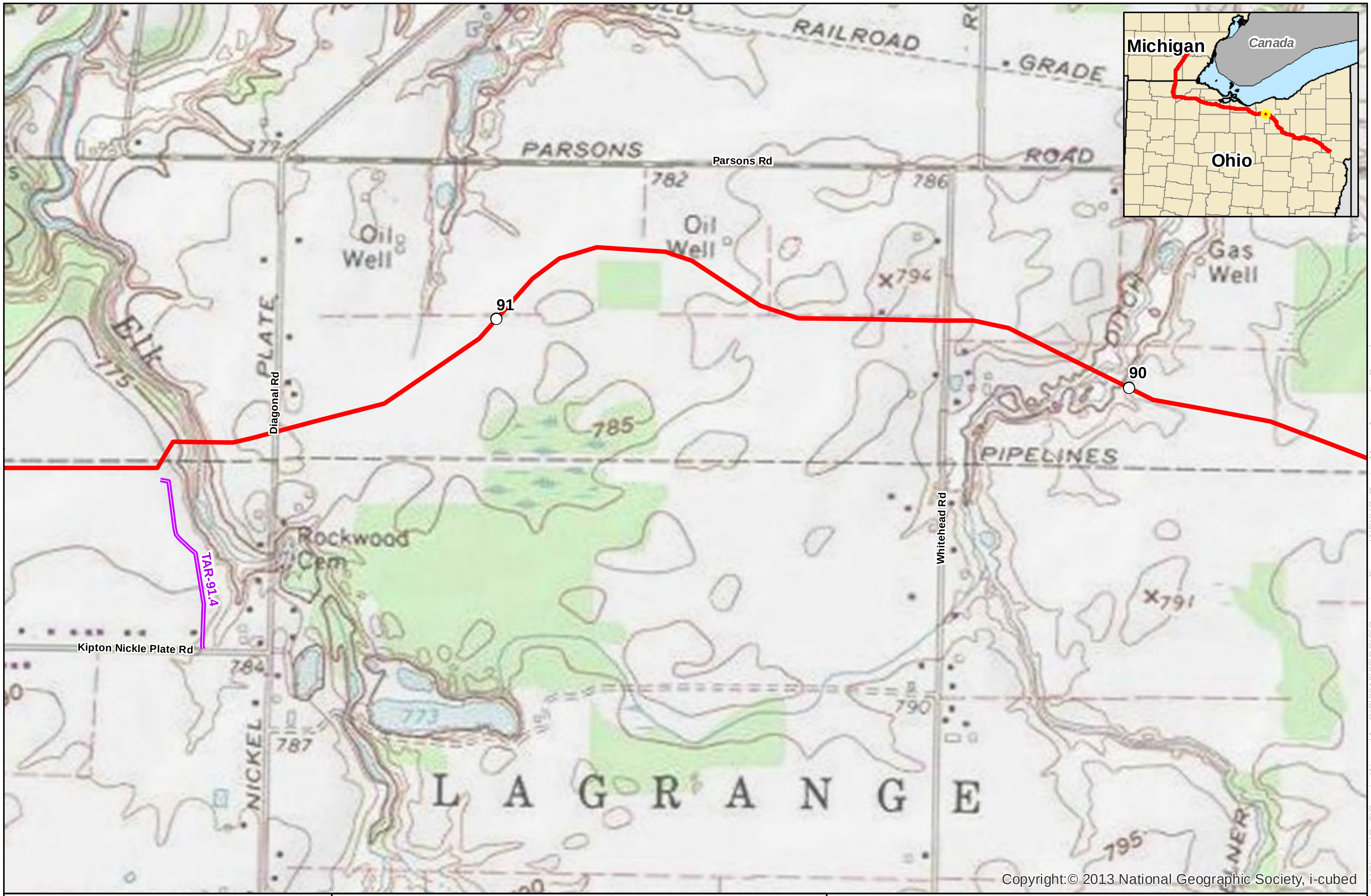

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0 500 1,000
Feet

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⧓ Proposed Main Line Valve
- ━ Proposed NEXUS Mainline Pipeline
- ┅ Proposed TEAL Connecting Pipeline
- ━ Proposed TGP Interconnect
- ━ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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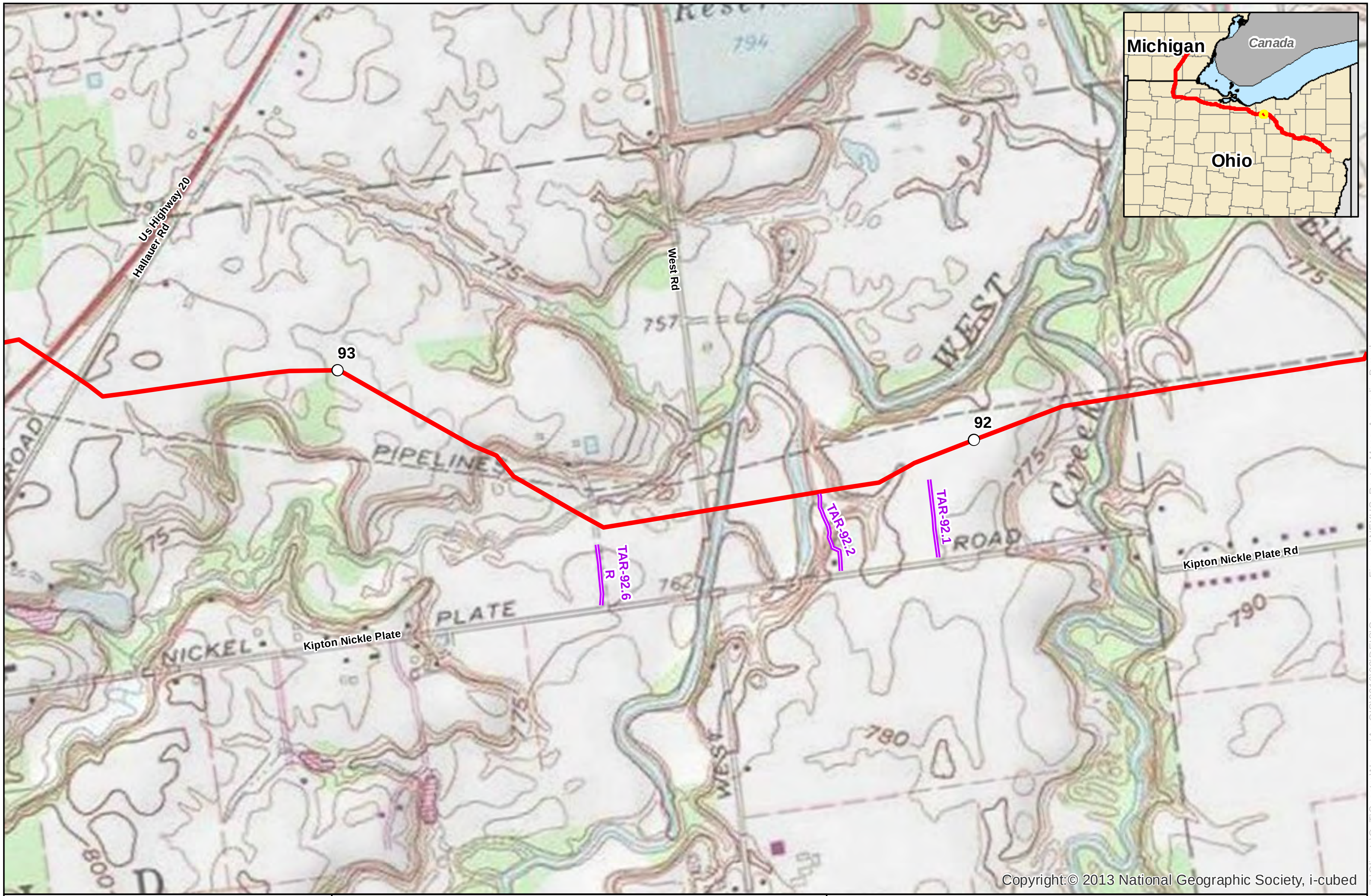

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Feet

1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

○	Milepost		Proposed TGP Interconnect
●	Tee-Tap Location		Proposed Access Road
⧓	Proposed Main Line Valve	☐	Proposed Compressor Station
	Proposed NEXUS Mainline Pipeline	☐	Proposed Ware Yard
	Proposed TEAL Connecting Pipeline	☐	M&R Station

Source: Z:\Clients\O_T\Spectra\Nexus\ArcGIS\2016\03\DEIS\Overview_Figures\NEXUS_Route_Maps_Appendix_B.mxd

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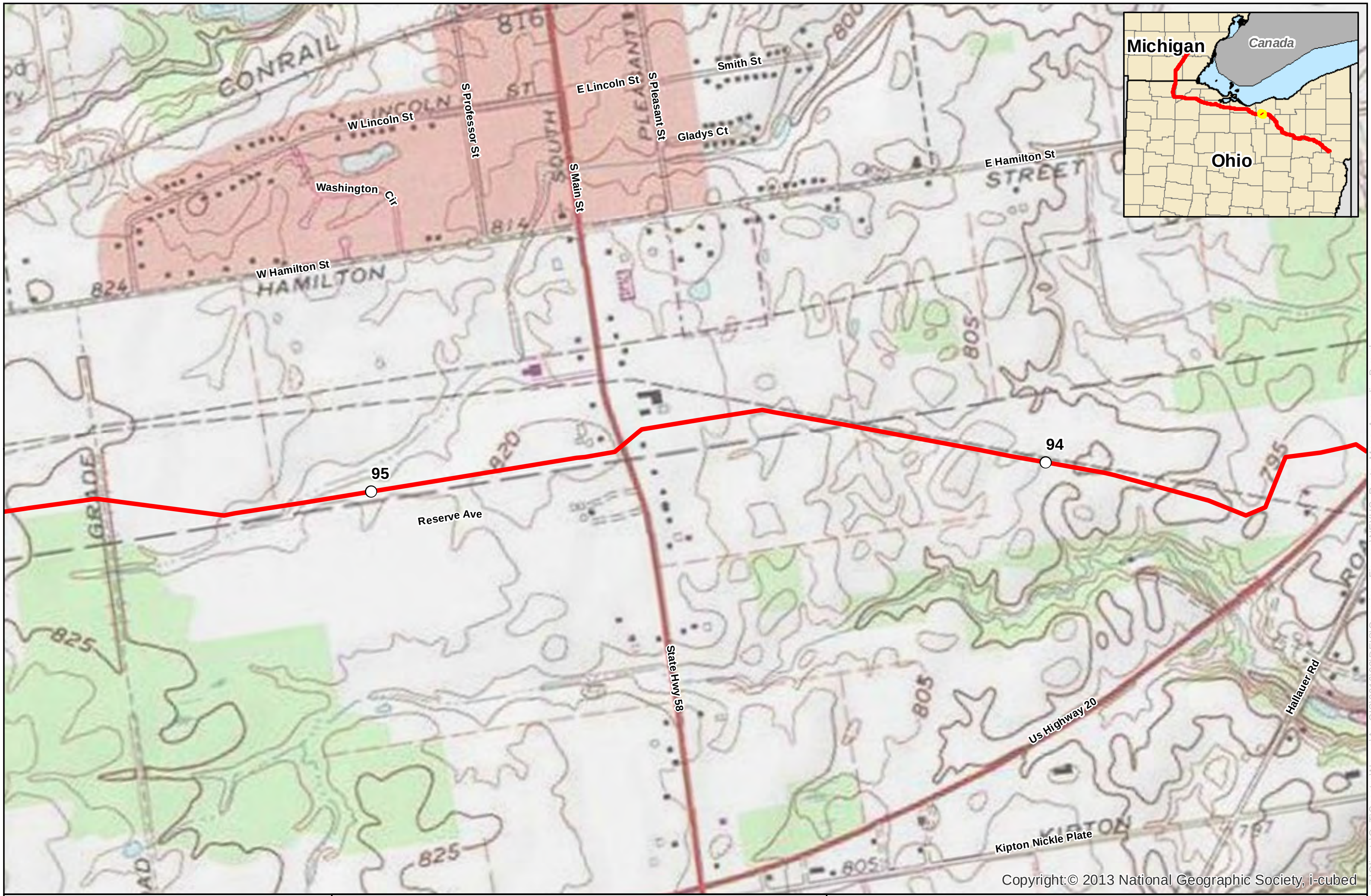

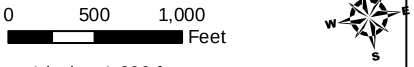

1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
┅	Proposed TEAL Connecting Pipeline	🟩	M&R Station

Source: Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\03\DEIS\Overview_Figures\NEXUS_Route_Maps_Appendix_B.mxd

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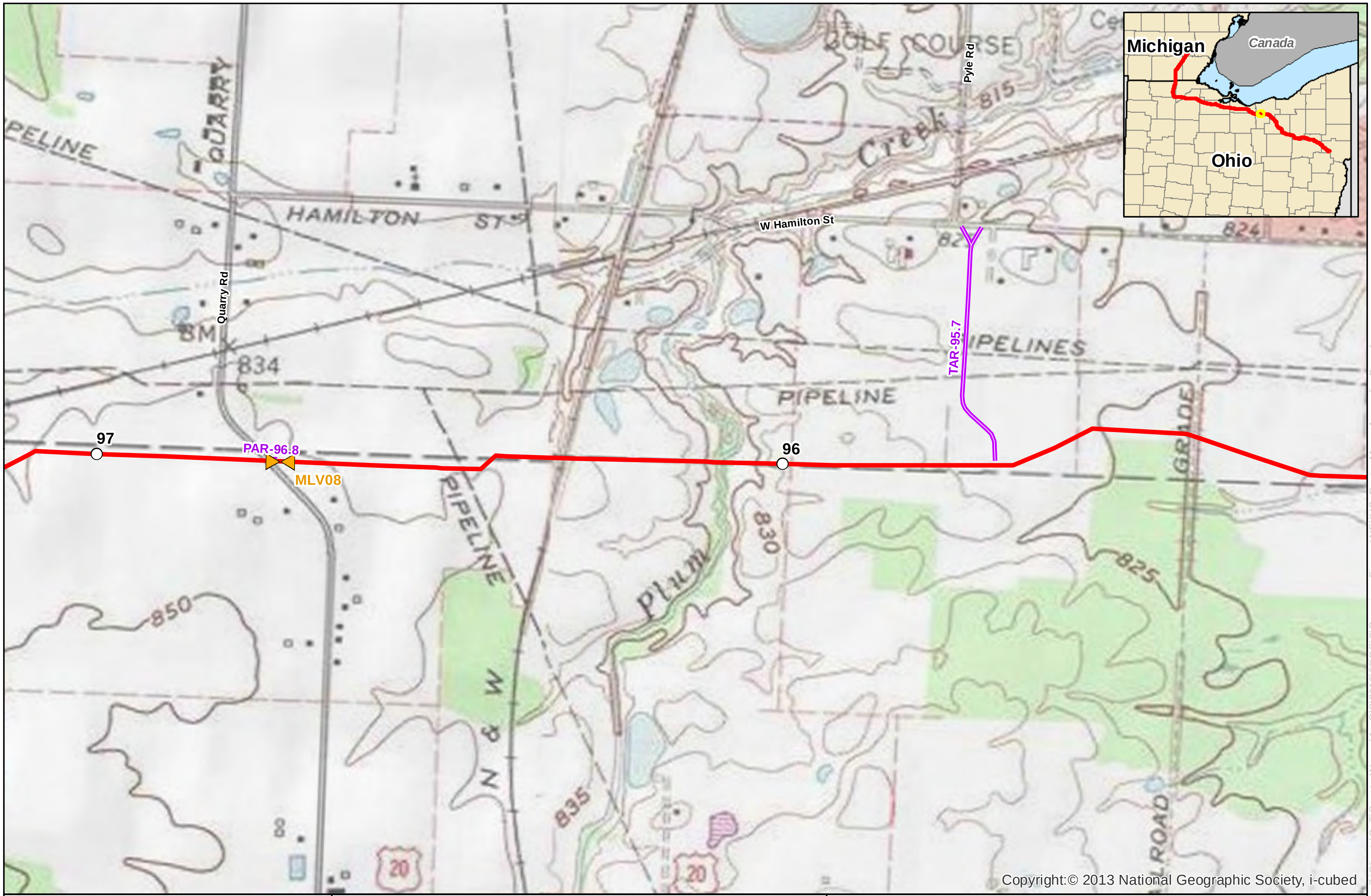

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Feet

1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⋈ Proposed Main Line Valve

— Proposed NEXUS Mainline Pipeline

- - - Proposed TEAL Connecting Pipeline

— Proposed TGP Interconnect

— Proposed Access Road

☐ Proposed Compressor Station

☐ Proposed Ware Yard

☐ M&R Station

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Appendix B-1

NGT Project

Route Map

○ Milepost
● Tee-Tap Location
⧓ Proposed Main Line Valve
— Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
— Proposed TGP Interconnect
— Proposed Access Road
☐ Proposed Compressor Station
☐ Proposed Ware Yard
☐ M&R Station

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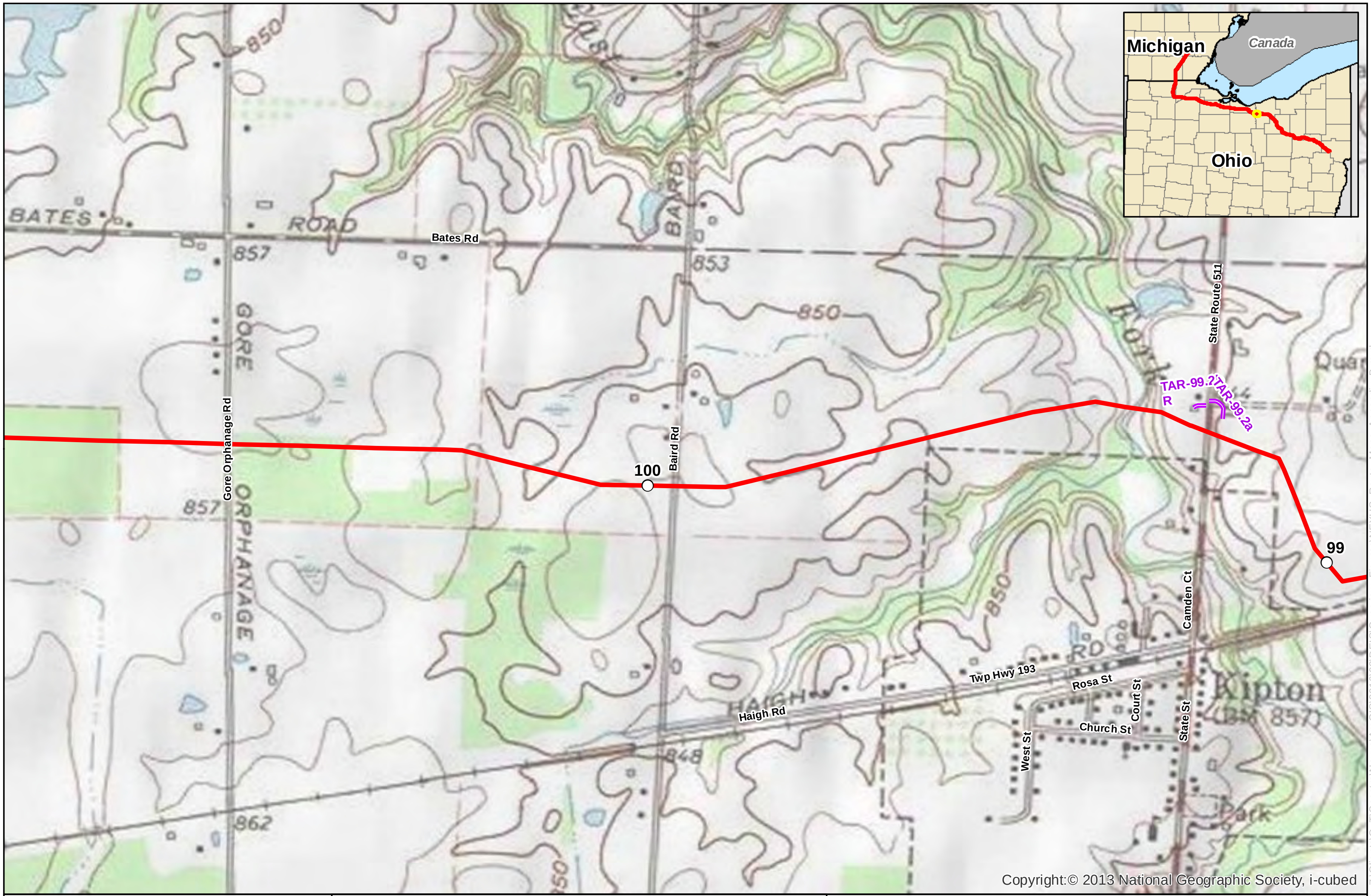

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Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⋈ Proposed Main Line Valve

▬ Proposed NEXUS Mainline Pipeline

▬ ▬ Proposed TEAL Connecting Pipeline

▬ Proposed TGP Interconnect

▬ Proposed Access Road

☐ Proposed Compressor Station

☐ Proposed Ware Yard

☐ M&R Station

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⧓ Proposed Main Line Valve
- — Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
- — Proposed TGP Interconnect
- — Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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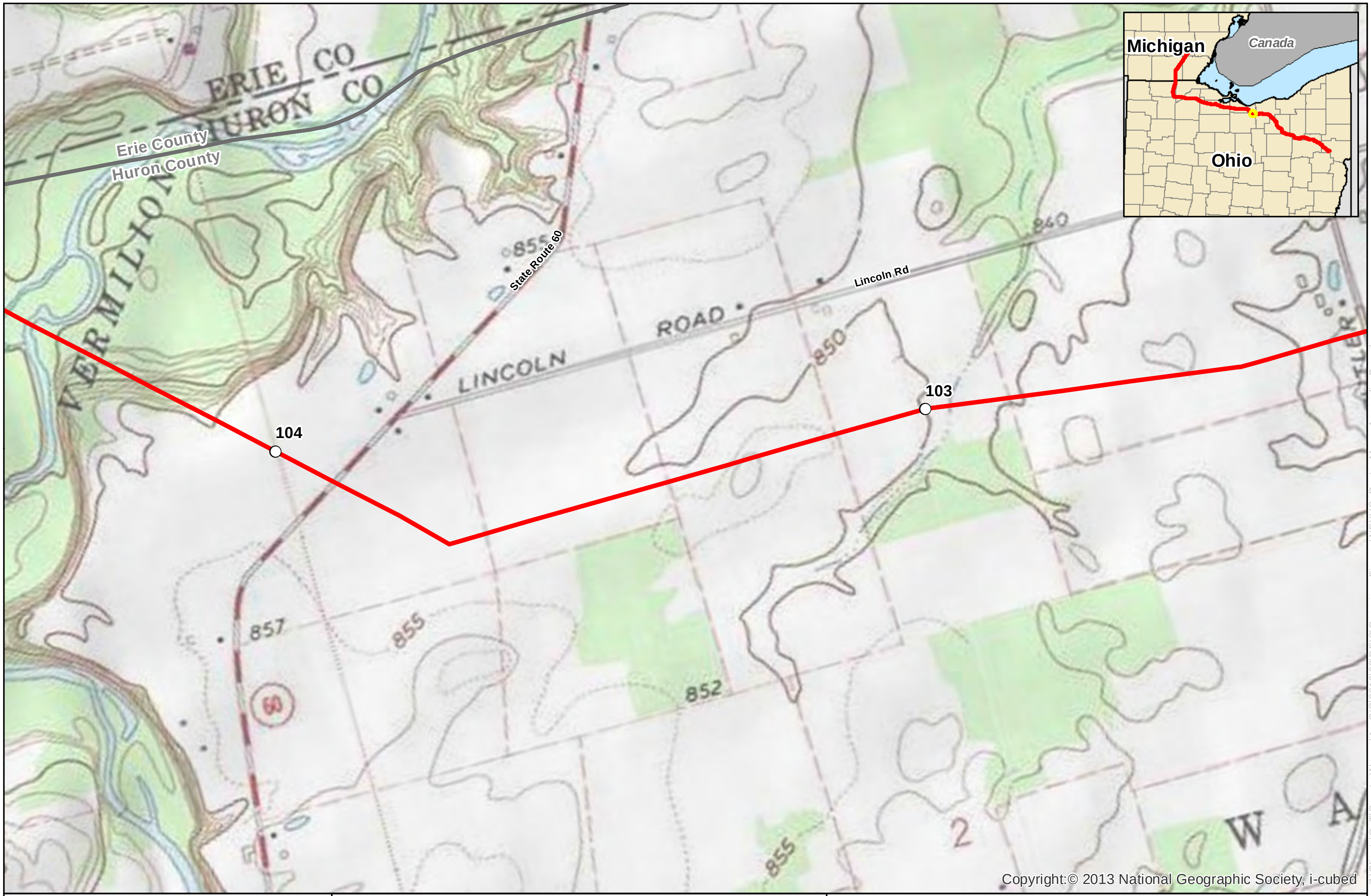

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Appendix B-1
NGT Project
Route Map

○ Milepost	Proposed TGP Interconnect
● Tee-Tap Location	Proposed Access Road
⋈ Proposed Main Line Valve	☐ Proposed Compressor Station
Proposed NEXUS Mainline Pipeline	☐ Proposed Ware Yard
Proposed TEAL Connecting Pipeline	☐ M&R Station

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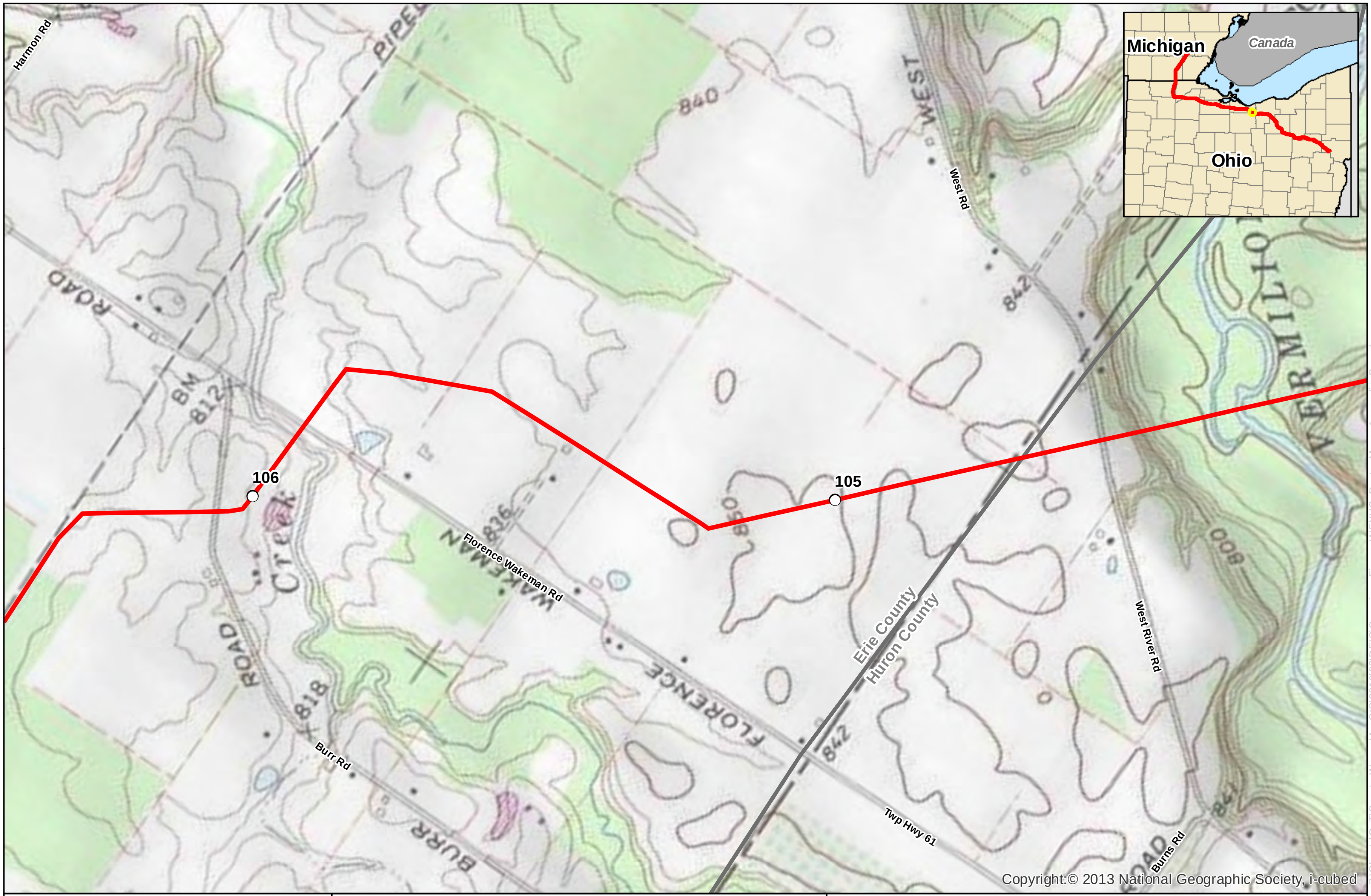

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1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⋈	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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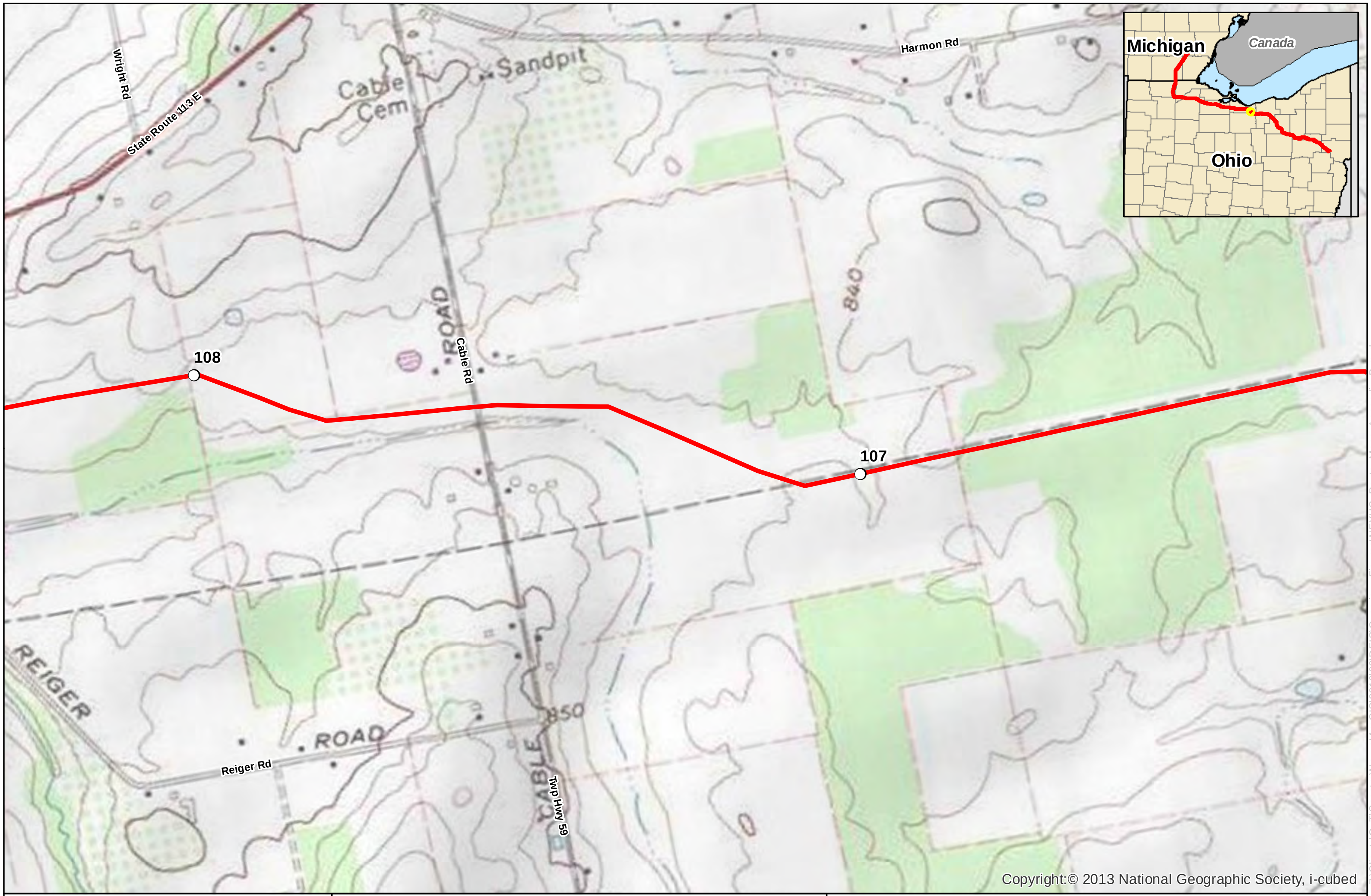

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⋈ Proposed Main Line Valve
- ━ Proposed NEXUS Mainline Pipeline
- ╍ Proposed TEAL Connecting Pipeline
- ━ Proposed TGP Interconnect
- ━ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

Source: Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\03\DEIS\Overview_Figures\NEXUS_Route_Maps_Appendix_B.mxd

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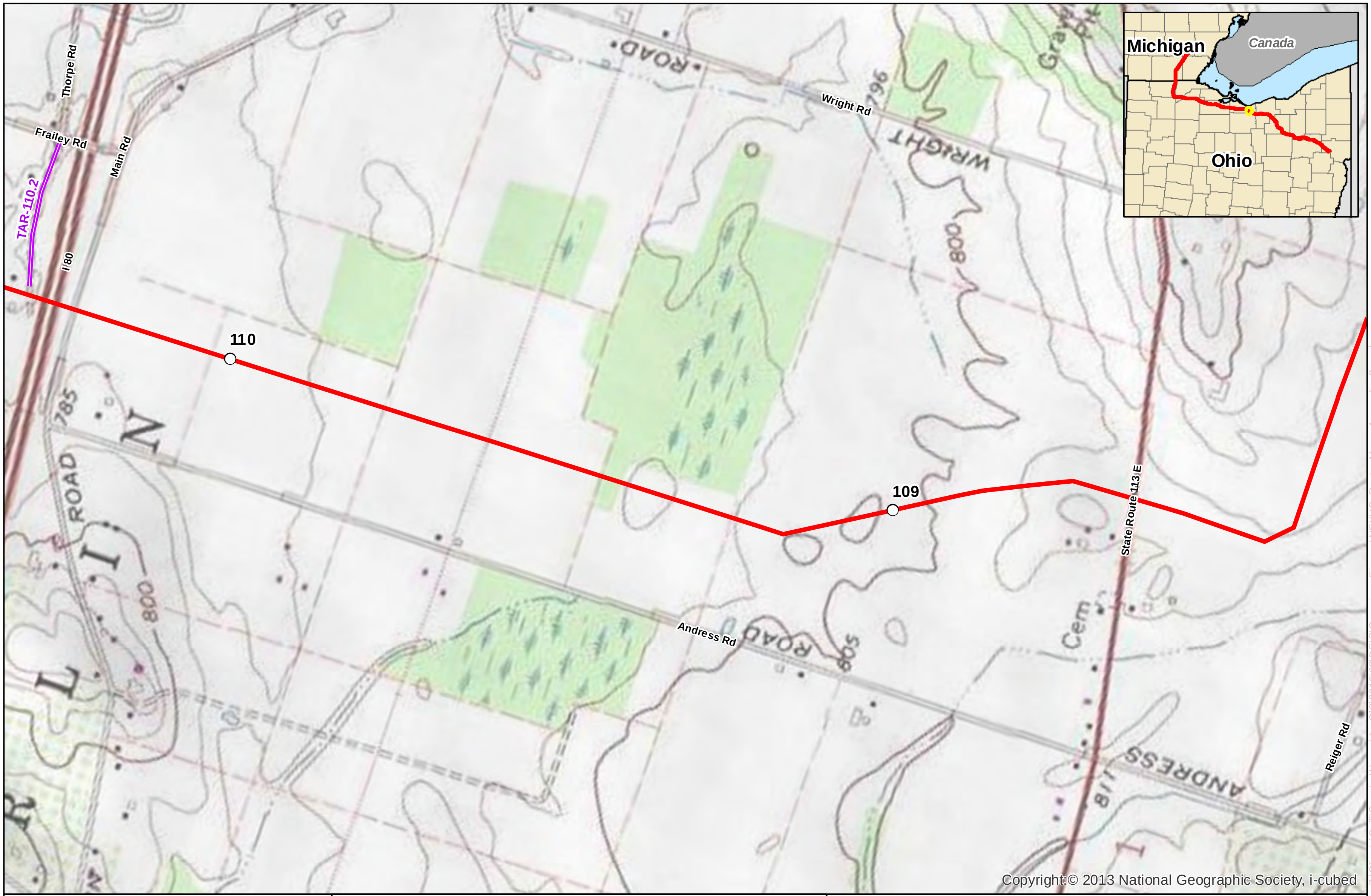

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⧓ Proposed Main Line Valve
- ━ Proposed NEXUS Mainline Pipeline
- ┅ Proposed TEAL Connecting Pipeline
- ━ Proposed TGP Interconnect
- ═ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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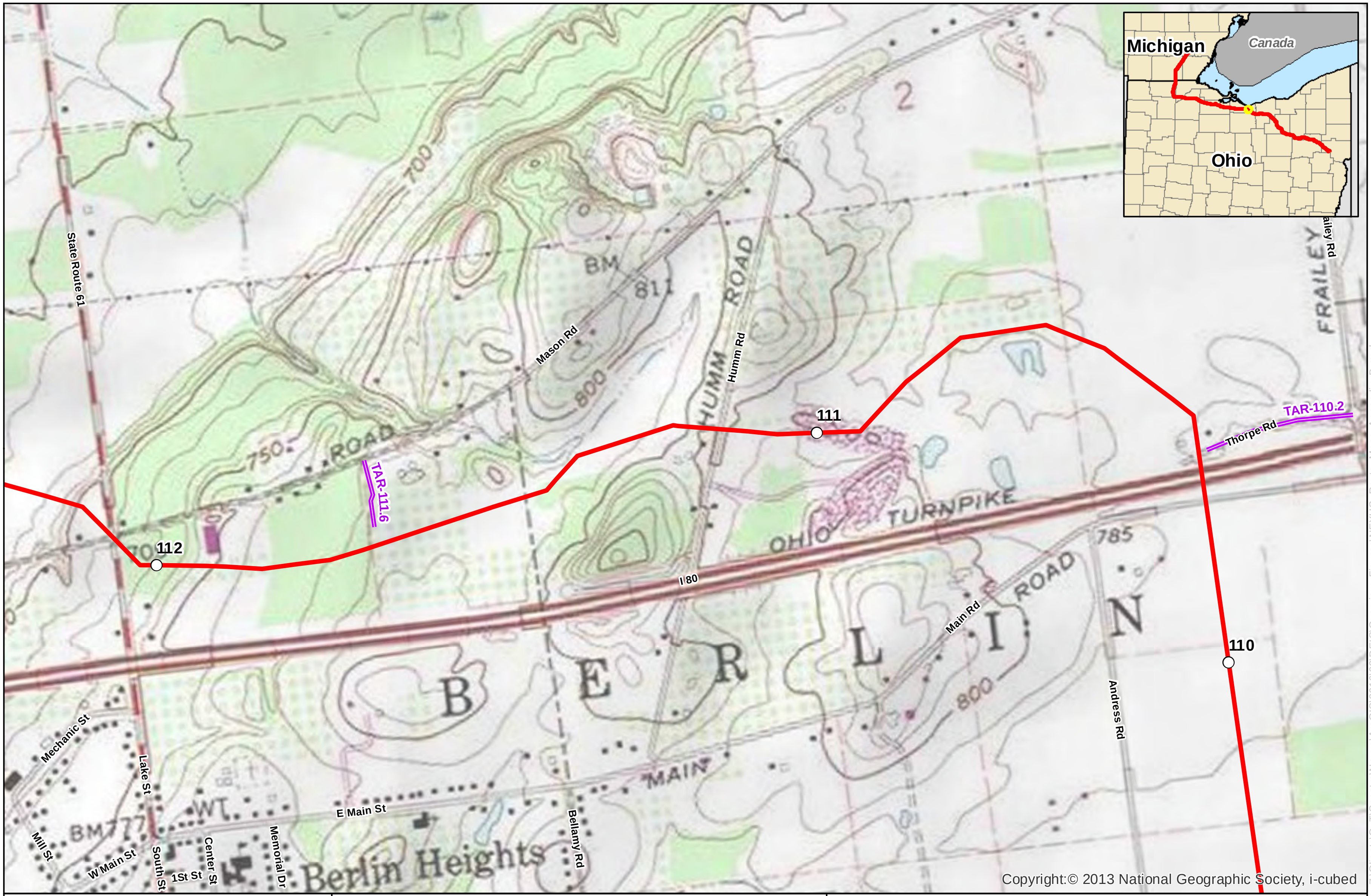

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Feet

1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⧓ Proposed Main Line Valve
▬ Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
▬ Proposed TGP Interconnect
═ Proposed Access Road
☐ Proposed Compressor Station
☐ Proposed Ware Yard
☐ M&R Station

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1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⋈ Proposed Main Line Valve
- ━ Proposed NEXUS Mainline Pipeline
- ╍ Proposed TEAL Connecting Pipeline
- ━ Proposed TGP Interconnect
- ━ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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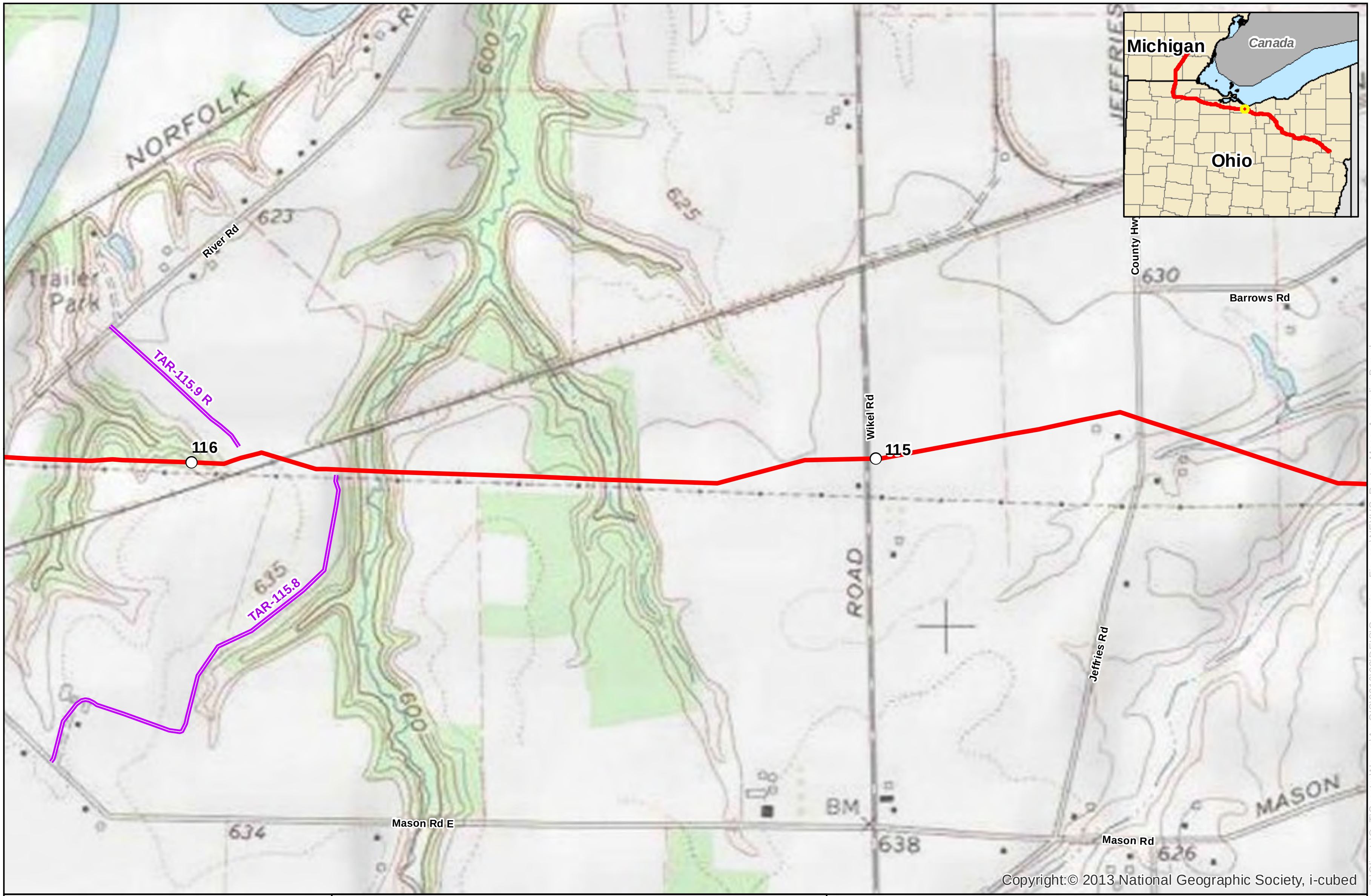

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Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⧓ Proposed Main Line Valve

— Proposed NEXUS Mainline Pipeline

- - - Proposed TEAL Connecting Pipeline

— Proposed TGP Interconnect

— Proposed Access Road

☐ Proposed Compressor Station

☐ Proposed Ware Yard

☐ M&R Station

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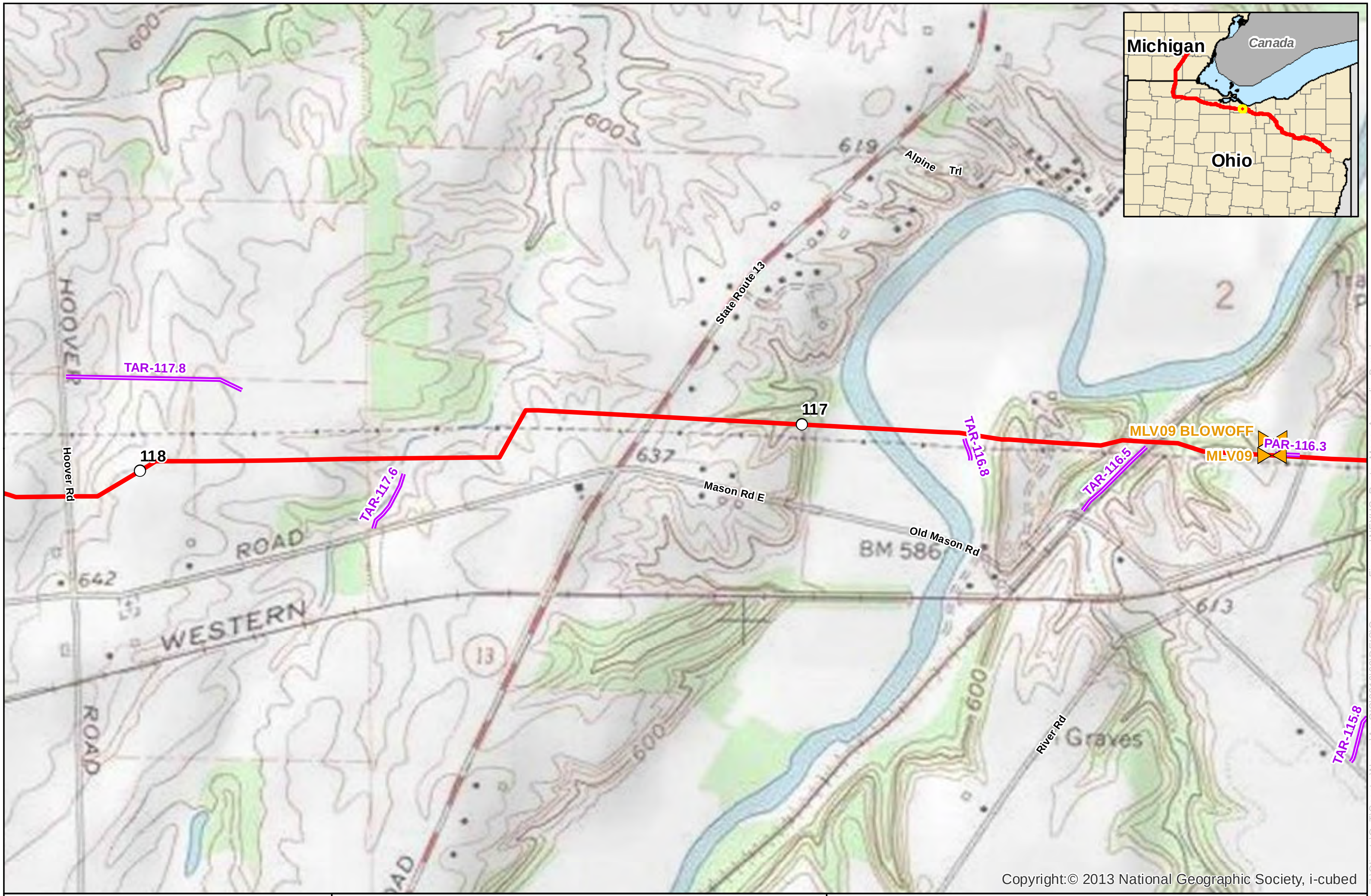

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1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⧖ Proposed Main Line Valve
— Proposed NEXUS Mainline Pipeline
- - Proposed TEAL Connecting Pipeline
— Proposed TGP Interconnect
— Proposed Access Road
☐ Proposed Compressor Station
☐ Proposed Ware Yard
☐ M&R Station

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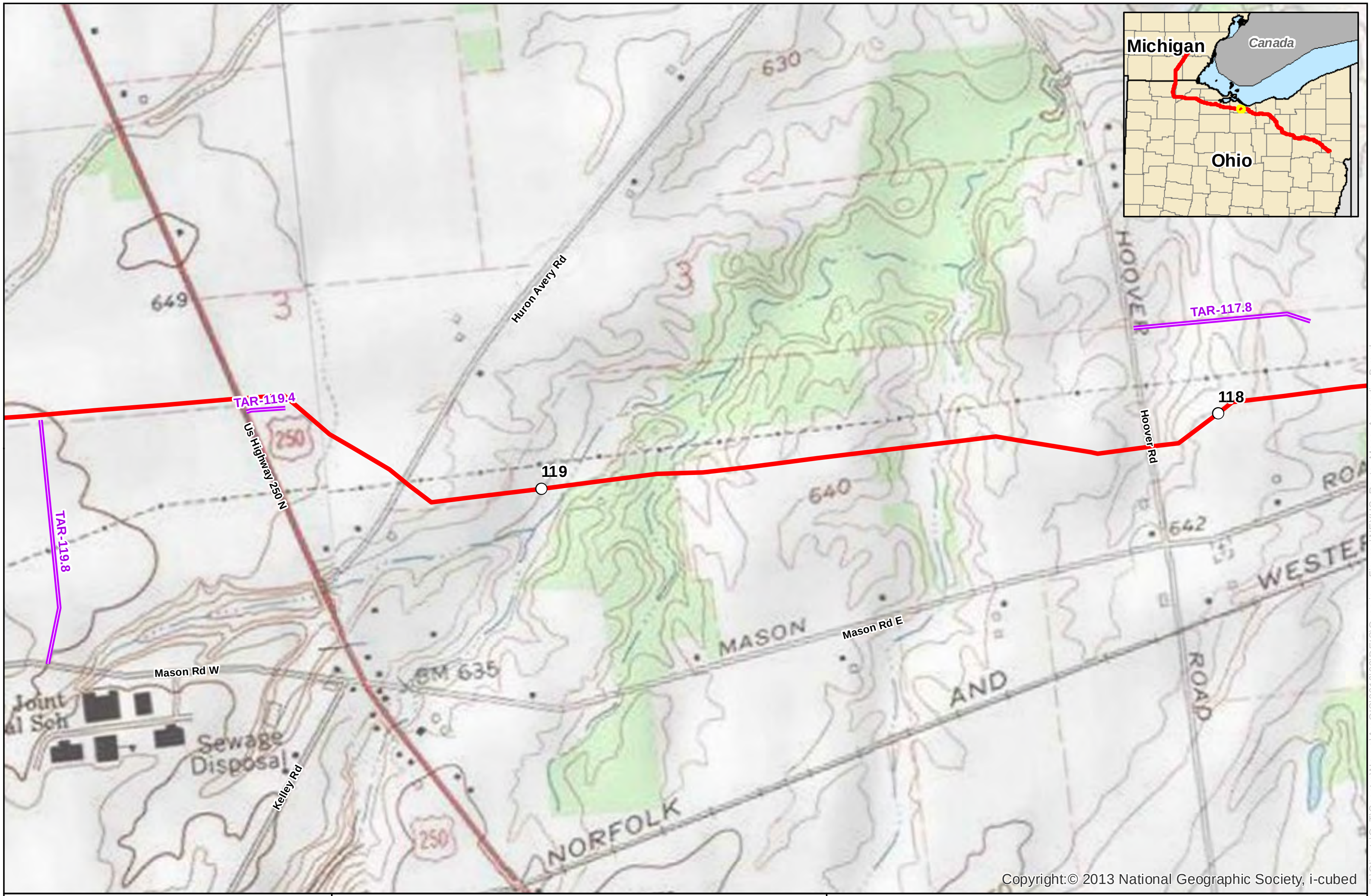

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Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⋈ Proposed Main Line Valve

━ Proposed NEXUS Mainline Pipeline

╍ Proposed TEAL Connecting Pipeline

━ Proposed TGP Interconnect

═ Proposed Access Road

▢ Proposed Compressor Station

▢ Proposed Ware Yard

▢ M&R Station

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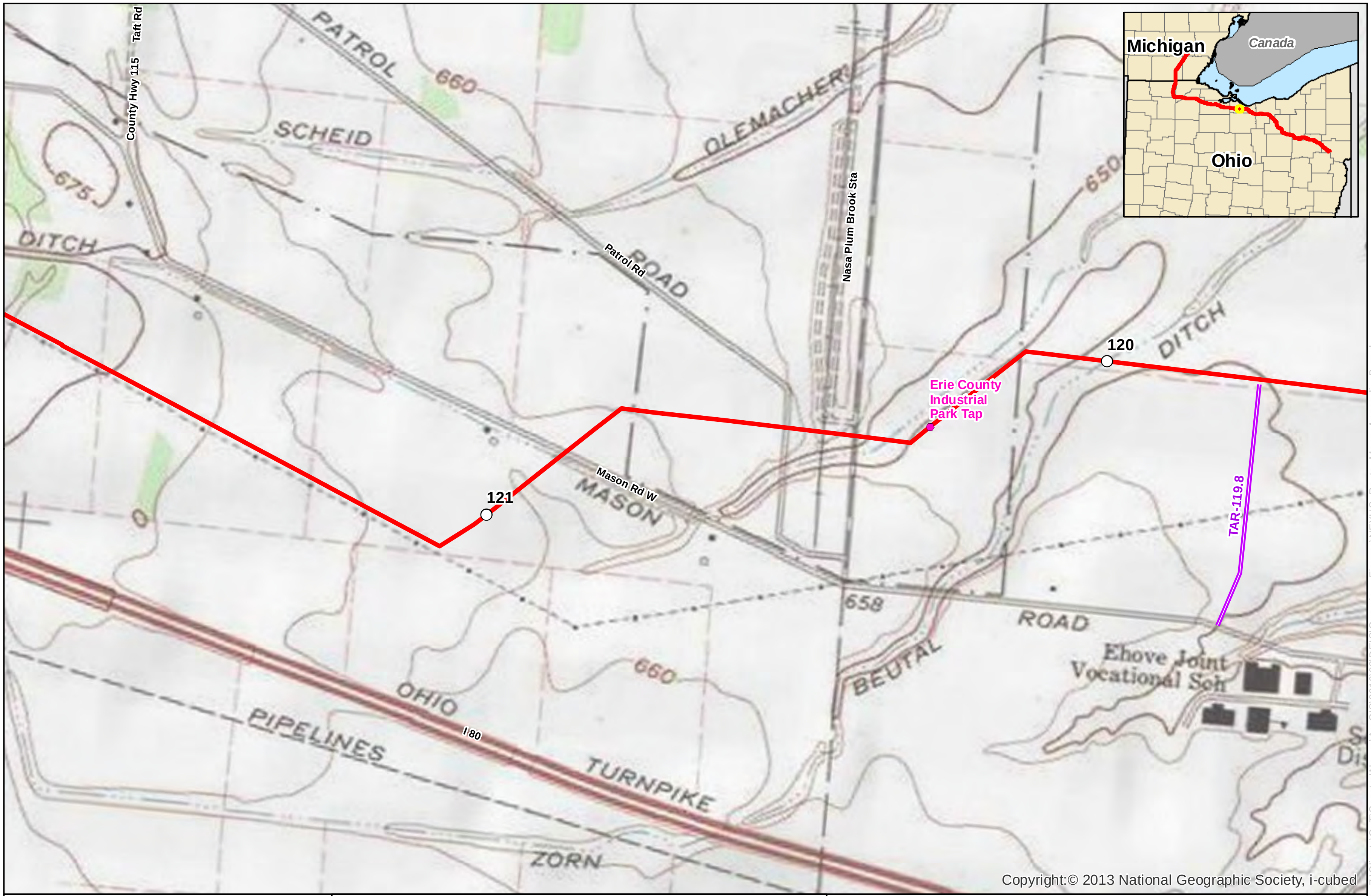

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Feet

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Appendix B-1
NGT Project
Route Map

○	Milepost		Proposed TGP Interconnect
●	Tee-Tap Location		Proposed Access Road
⋈	Proposed Main Line Valve	🟦	Proposed Compressor Station
	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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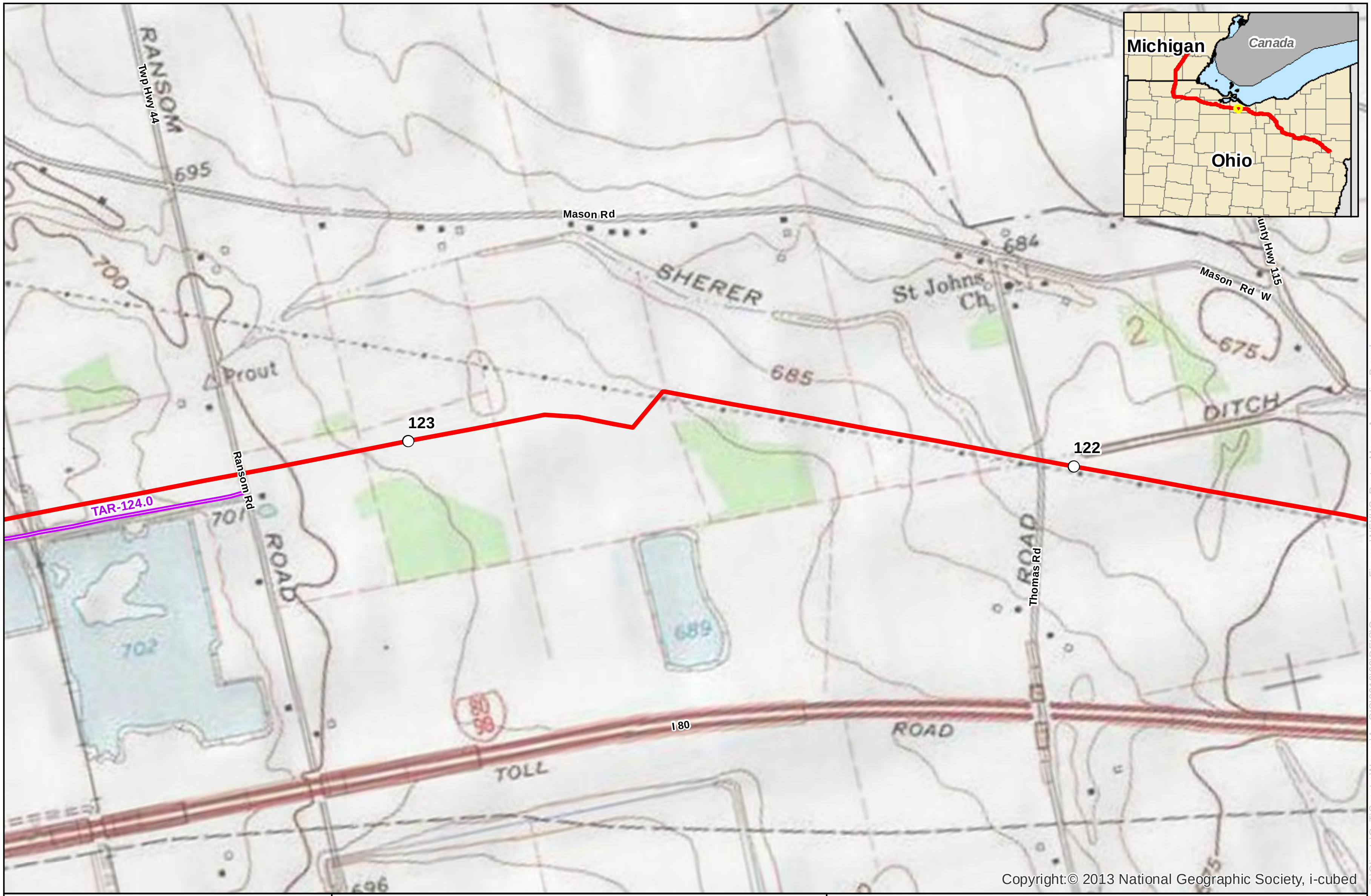

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1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⋈	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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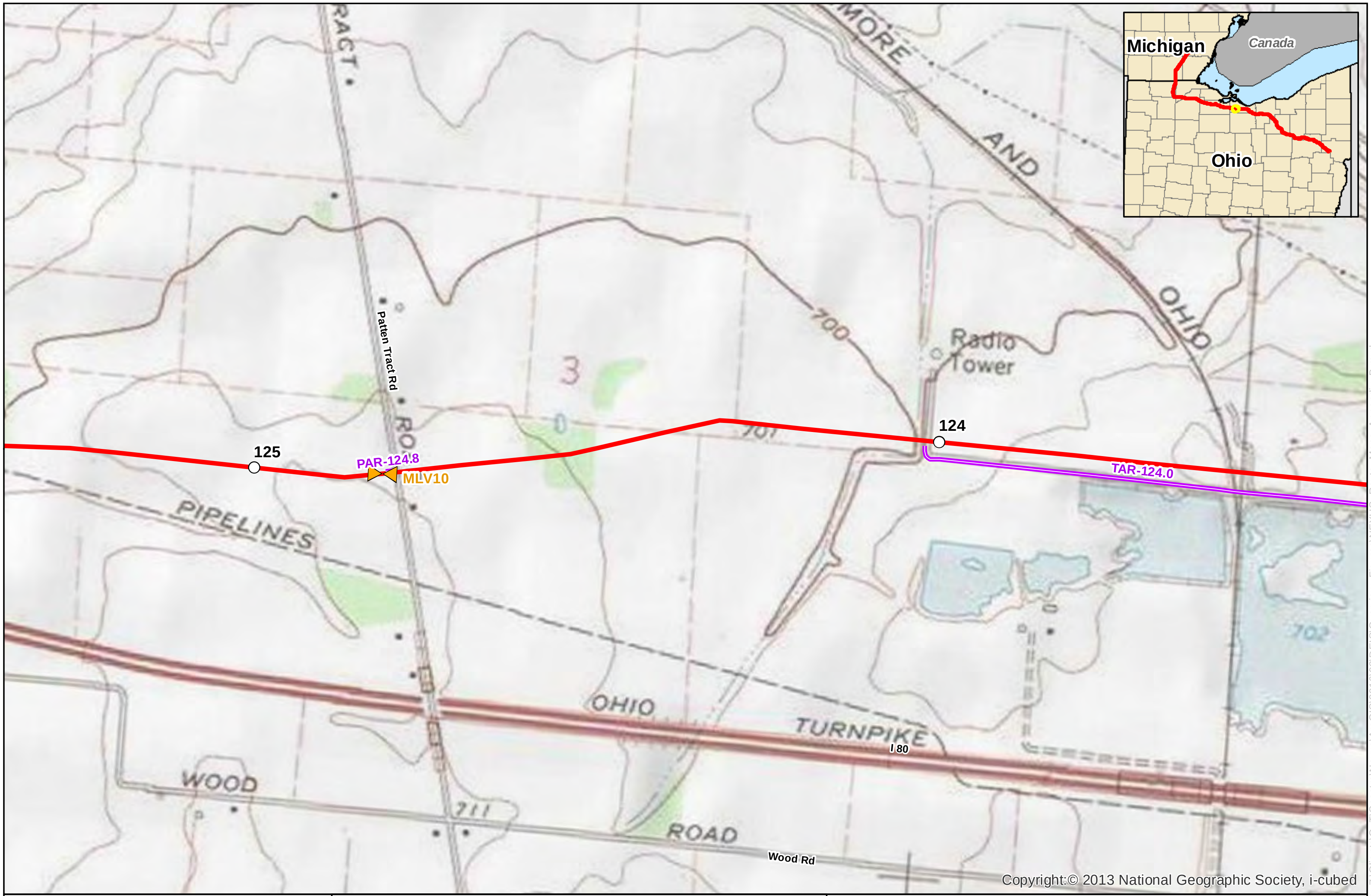

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1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⋈ Proposed Main Line Valve

— Proposed NEXUS Mainline Pipeline

- - - Proposed TEAL Connecting Pipeline

— Proposed TGP Interconnect

— Proposed Access Road

☐ Proposed Compressor Station

☐ Proposed Ware Yard

☐ M&R Station

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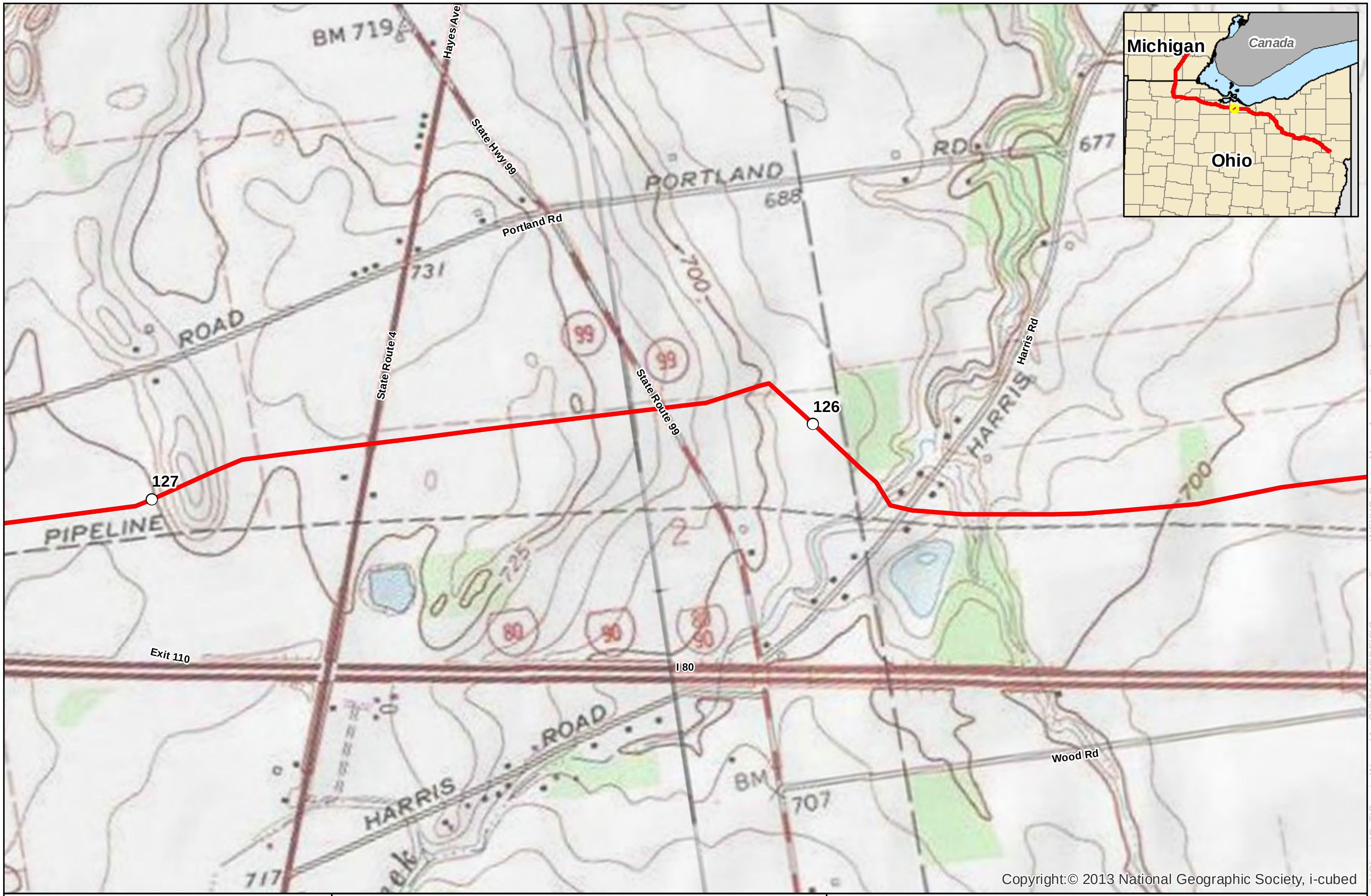

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1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⧓ Proposed Main Line Valve
- — Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
- — Proposed TGP Interconnect
- — Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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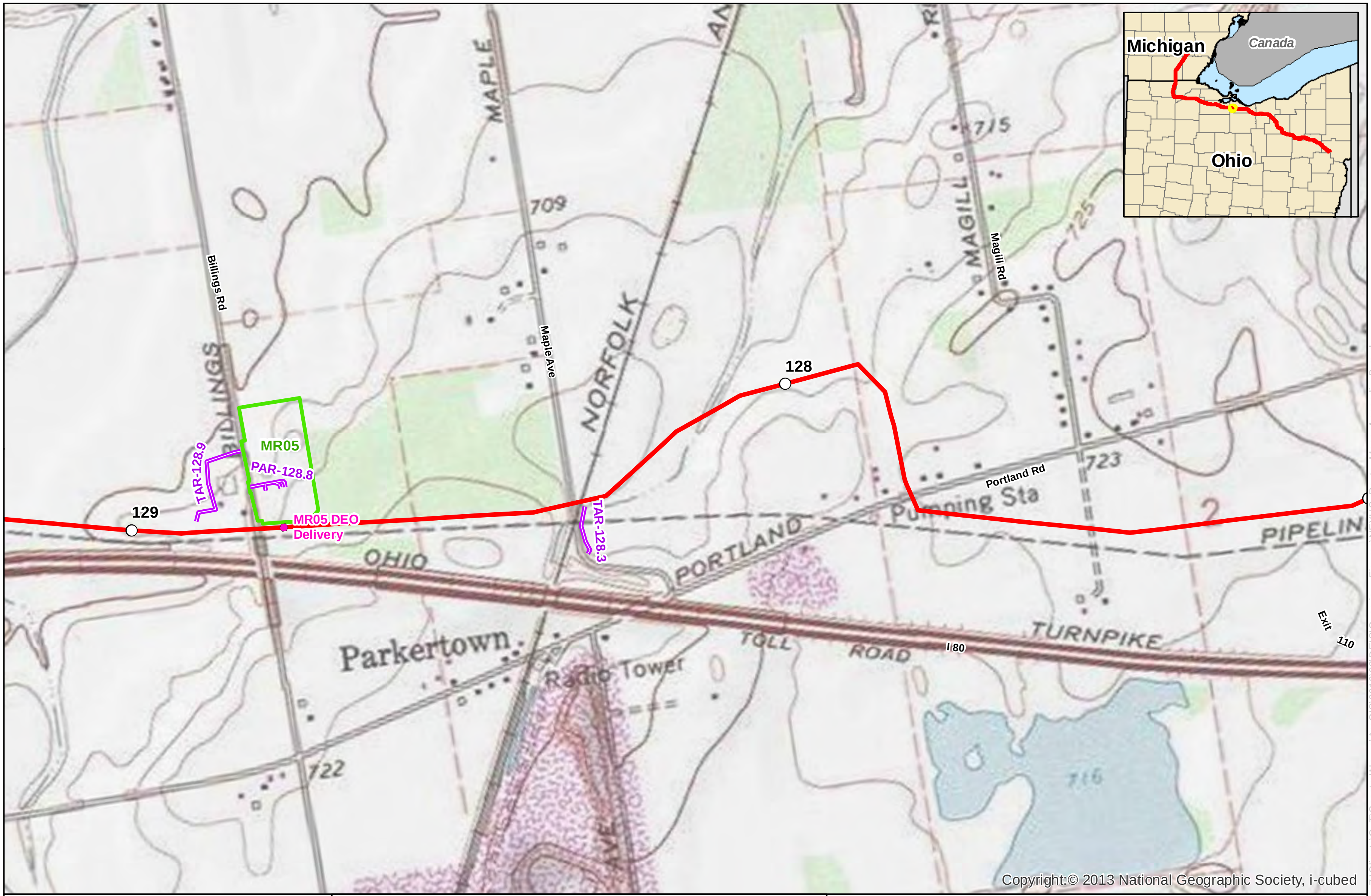

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Appendix B-1
NGT Project
Route Map

○	Milepost	▬	Proposed TGP Interconnect
●	Tee-Tap Location	▬	Proposed Access Road
⧓	Proposed Main Line Valve	☐	Proposed Compressor Station
▬	Proposed NEXUS Mainline Pipeline	☐	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	☐	M&R Station

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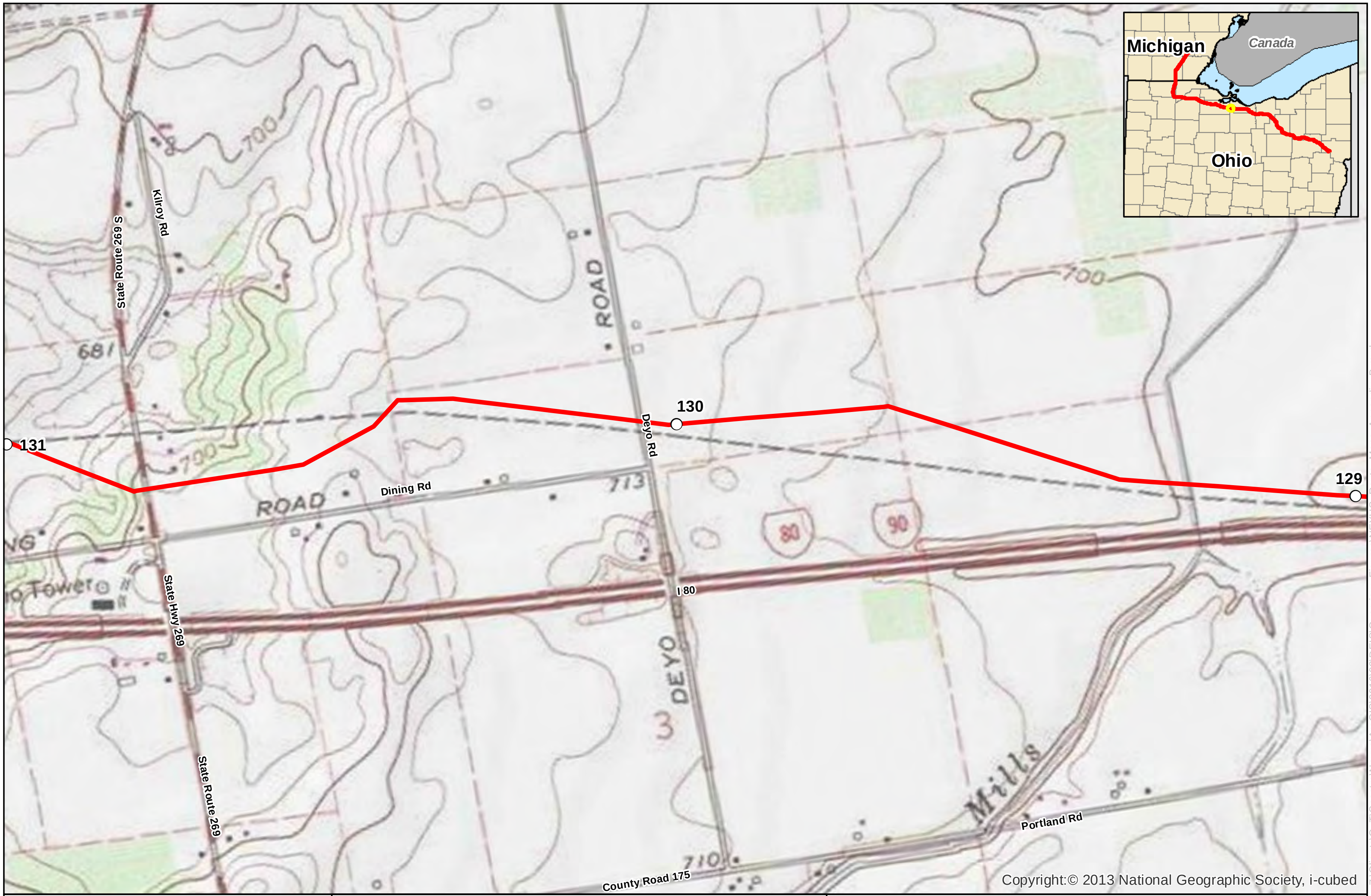

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⧓ Proposed Main Line Valve
- ━ Proposed NEXUS Mainline Pipeline
- ╍ Proposed TEAL Connecting Pipeline
- ━ Proposed TGP Interconnect
- ═ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⋈ Proposed Main Line Valve
━ Proposed NEXUS Mainline Pipeline
╍ Proposed TEAL Connecting Pipeline
━ Proposed TGP Interconnect
━ Proposed Access Road
▢ Proposed Compressor Station
▢ Proposed Ware Yard
▢ M&R Station

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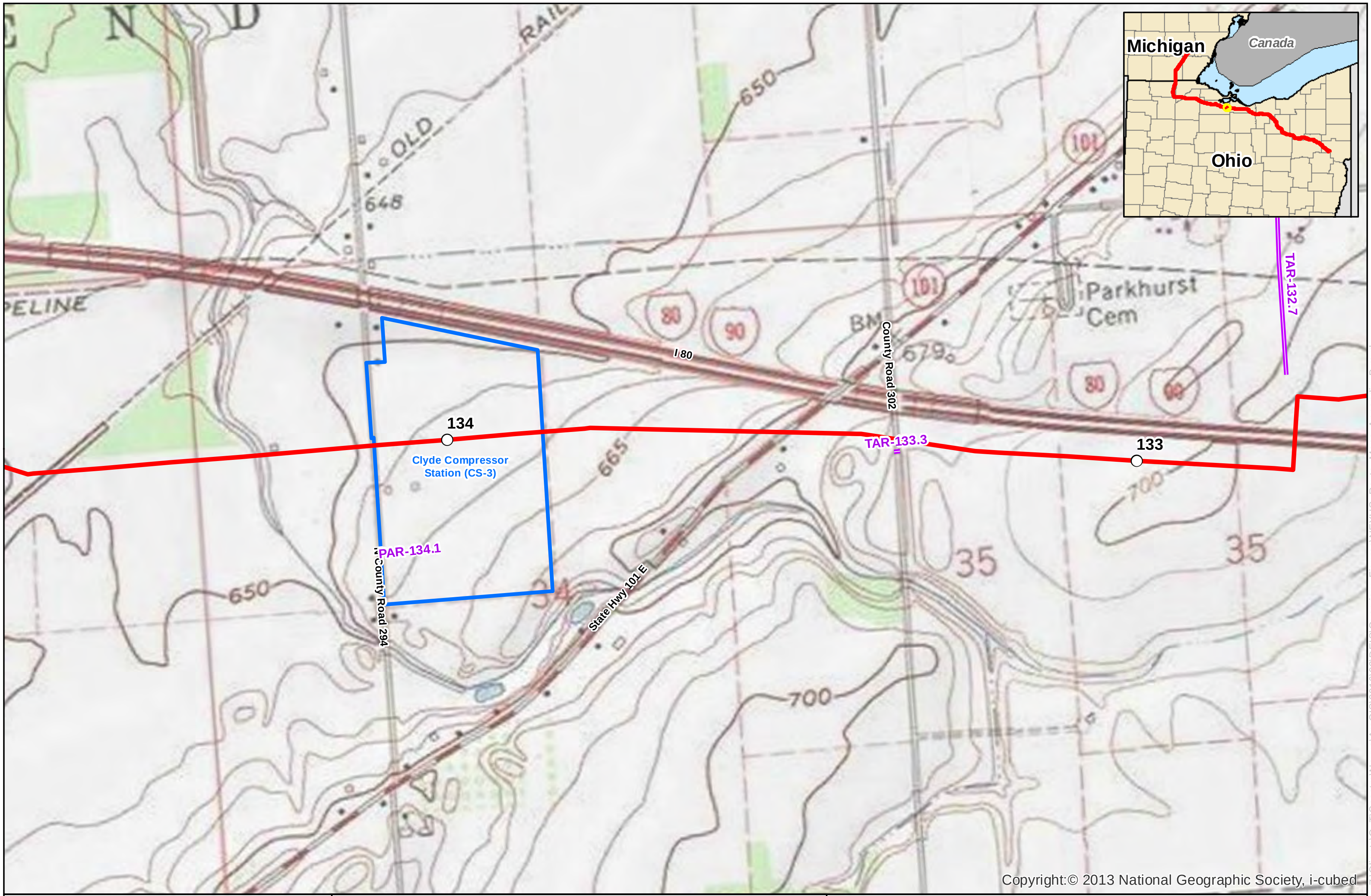

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1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ⬢ Tee-Tap Location
- ⋈ Proposed Main Line Valve
- ▬ Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
- ▬ Proposed TGP Interconnect
- ═ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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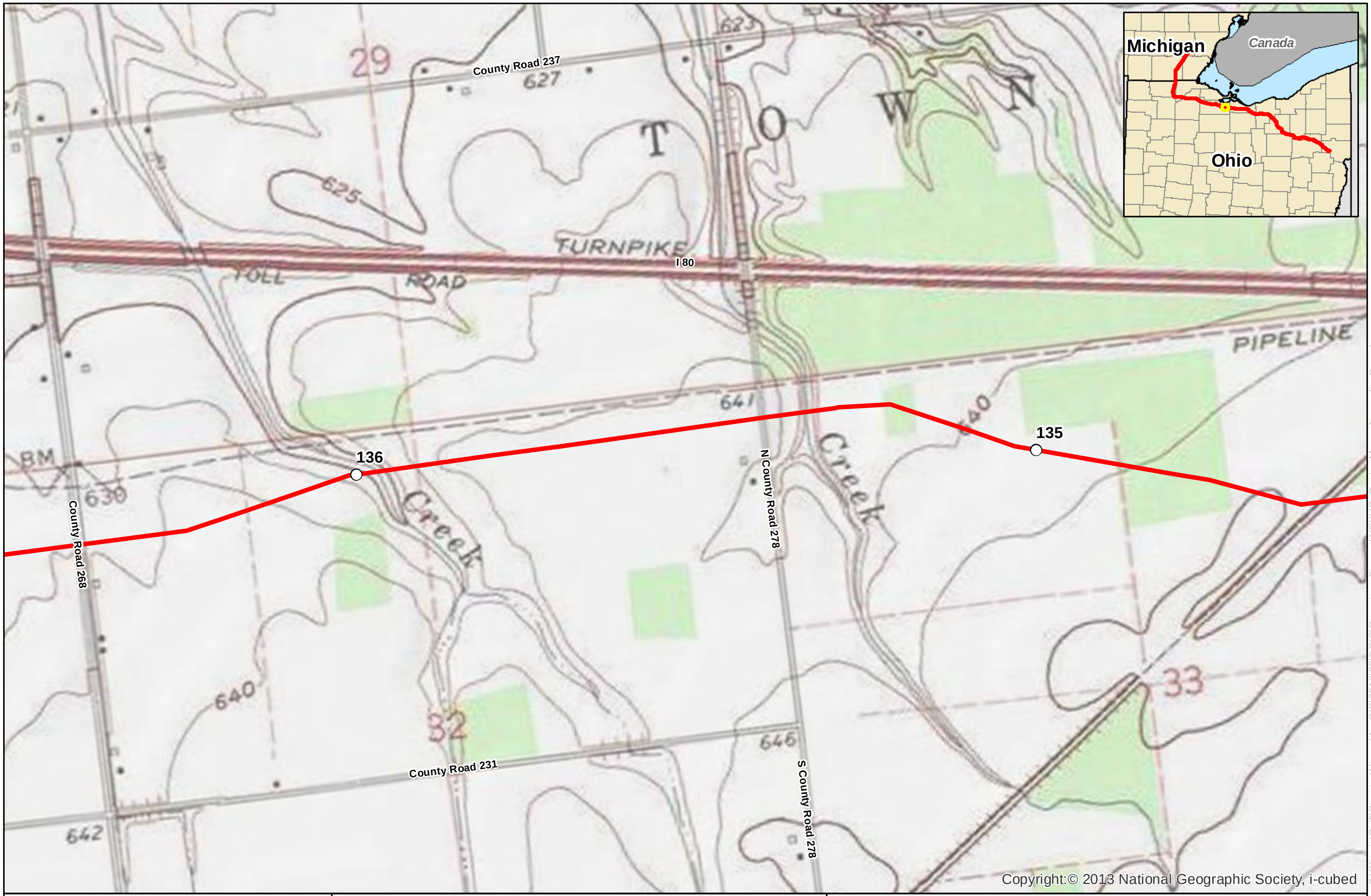

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
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- ═ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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Feet

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⧓ Proposed Main Line Valve
- — Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
- — Proposed TGP Interconnect
- — Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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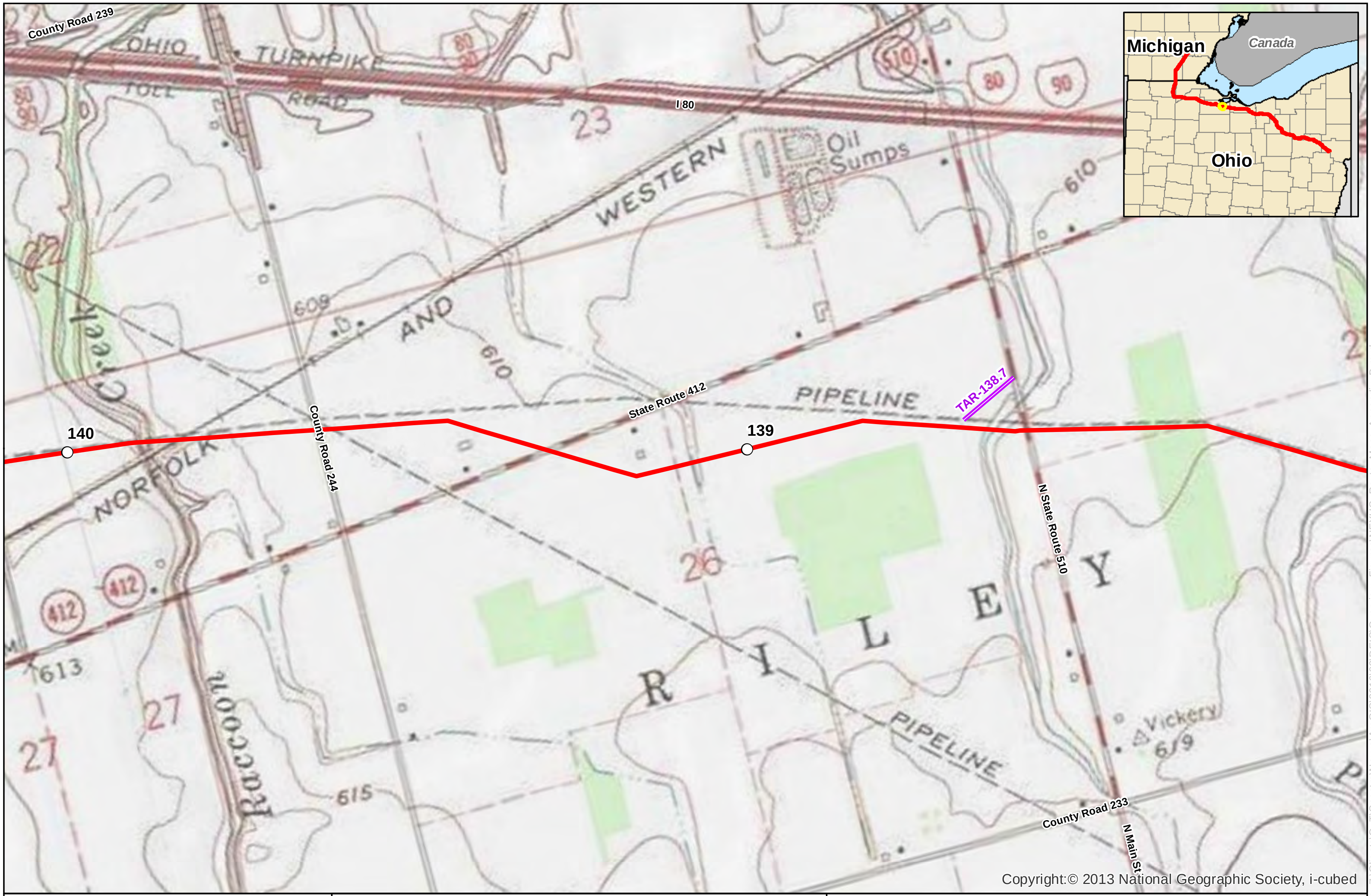

0 500 1,000
Feet

1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⧓ Proposed Main Line Valve
━ Proposed NEXUS Mainline Pipeline
┅ Proposed TEAL Connecting Pipeline
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═ Proposed Access Road
▢ Proposed Compressor Station
▢ Proposed Ware Yard
▢ M&R Station

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0 500 1,000 Feet

1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⋈ Proposed Main Line Valve
- — Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
- — Proposed TGP Interconnect
- — Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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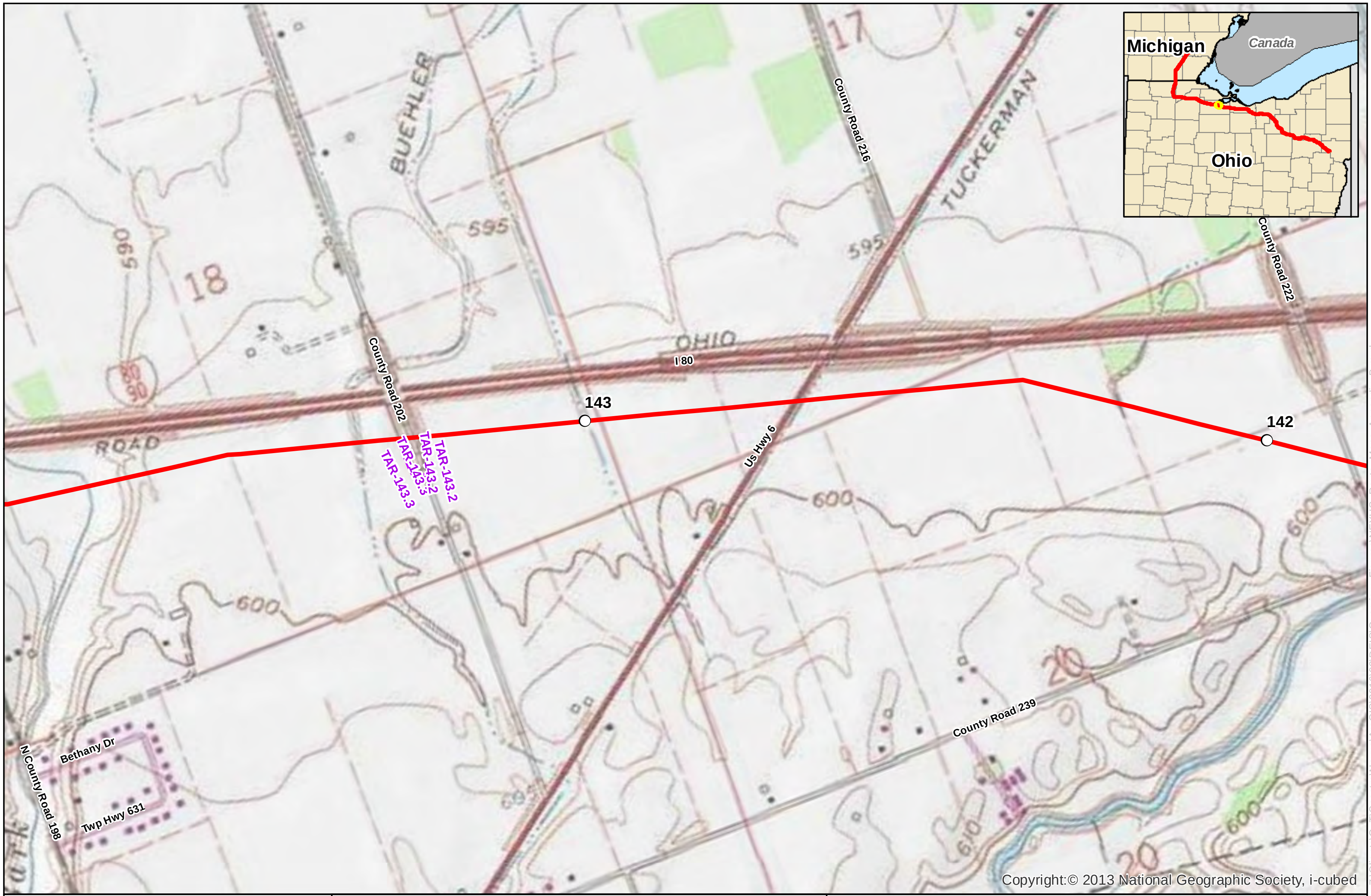

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1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○	Milepost
●	Tee-Tap Location
⧓	Proposed Main Line Valve
—	Proposed NEXUS Mainline Pipeline
- - -	Proposed TEAL Connecting Pipeline
—	Proposed TGP Interconnect
—	Proposed Access Road
▢	Proposed Compressor Station
▢	Proposed Ware Yard
▢	M&R Station

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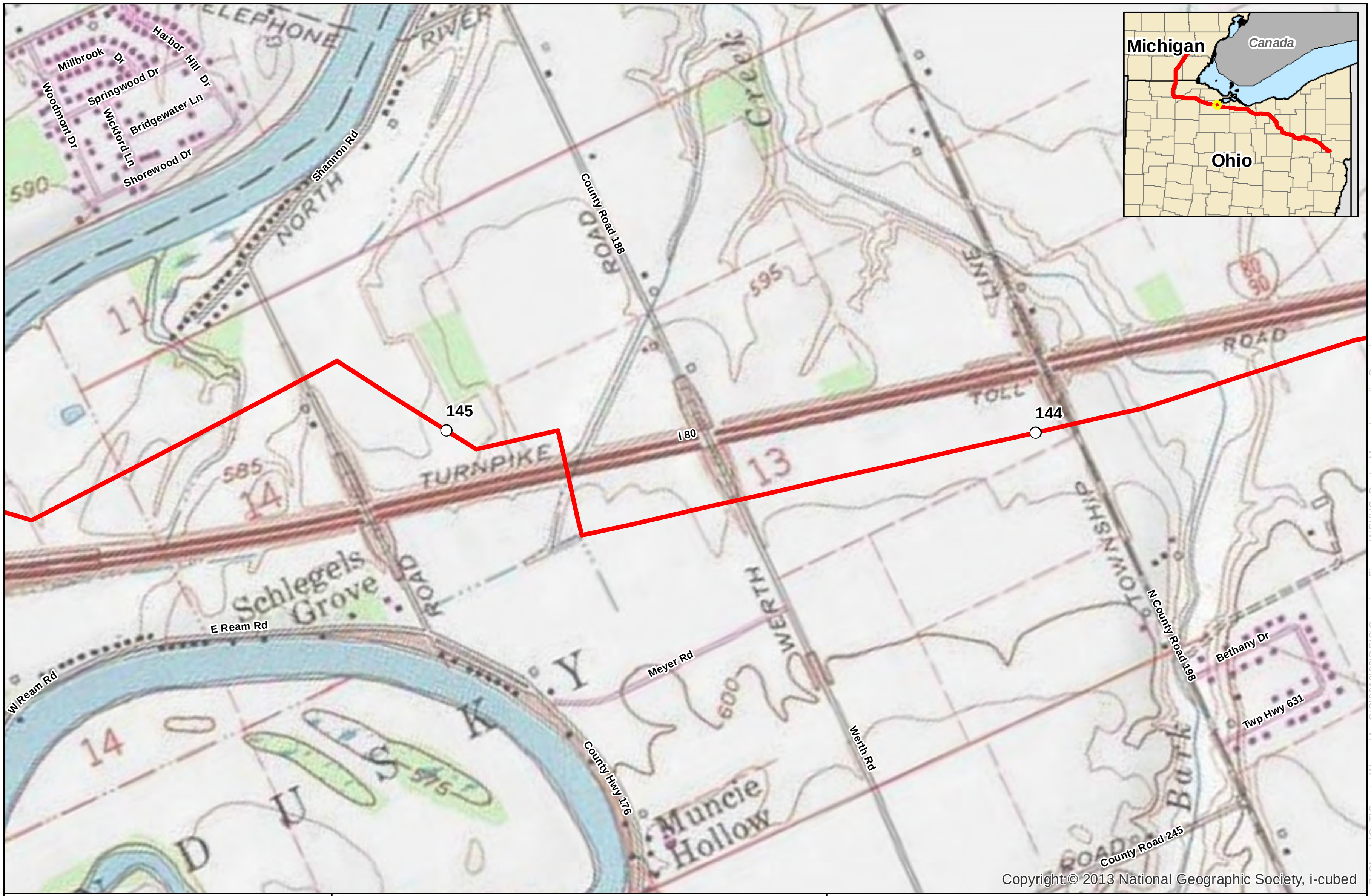

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1 inch = 1,000 feet

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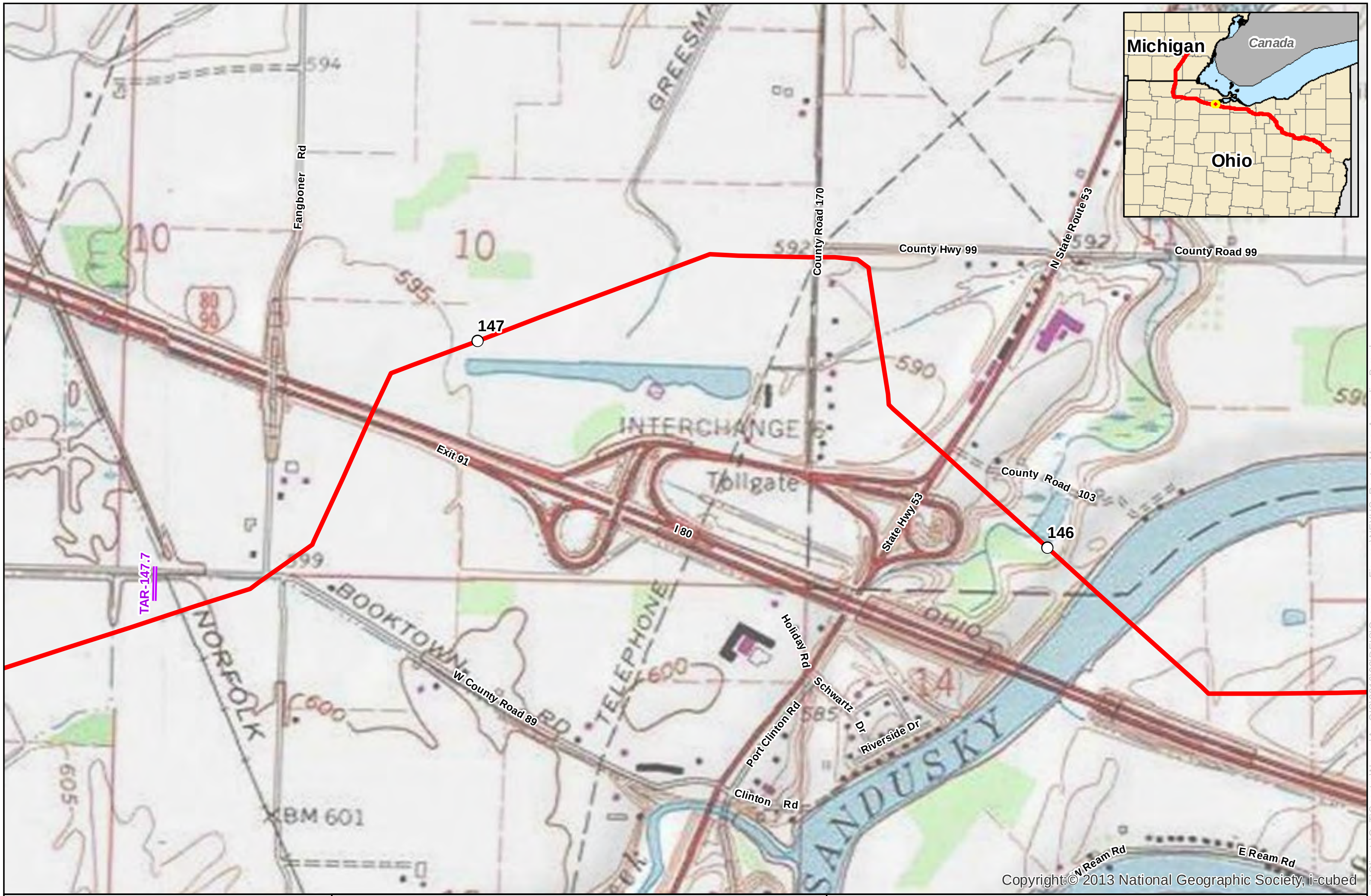
Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
🟥	Proposed TEAL Connecting Pipeline	🟩	M&R Station

Date: (6/20/2016) Source: Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\03\DEIS\Overview_Figures\NEXUS_Route_Maps_Appendix_B.mxd



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1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	═	Proposed Access Road
⋈	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

Source: Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\03\DEIS\Overview_Figures\NEXUS_Route_Maps_Appendix_B.mxd

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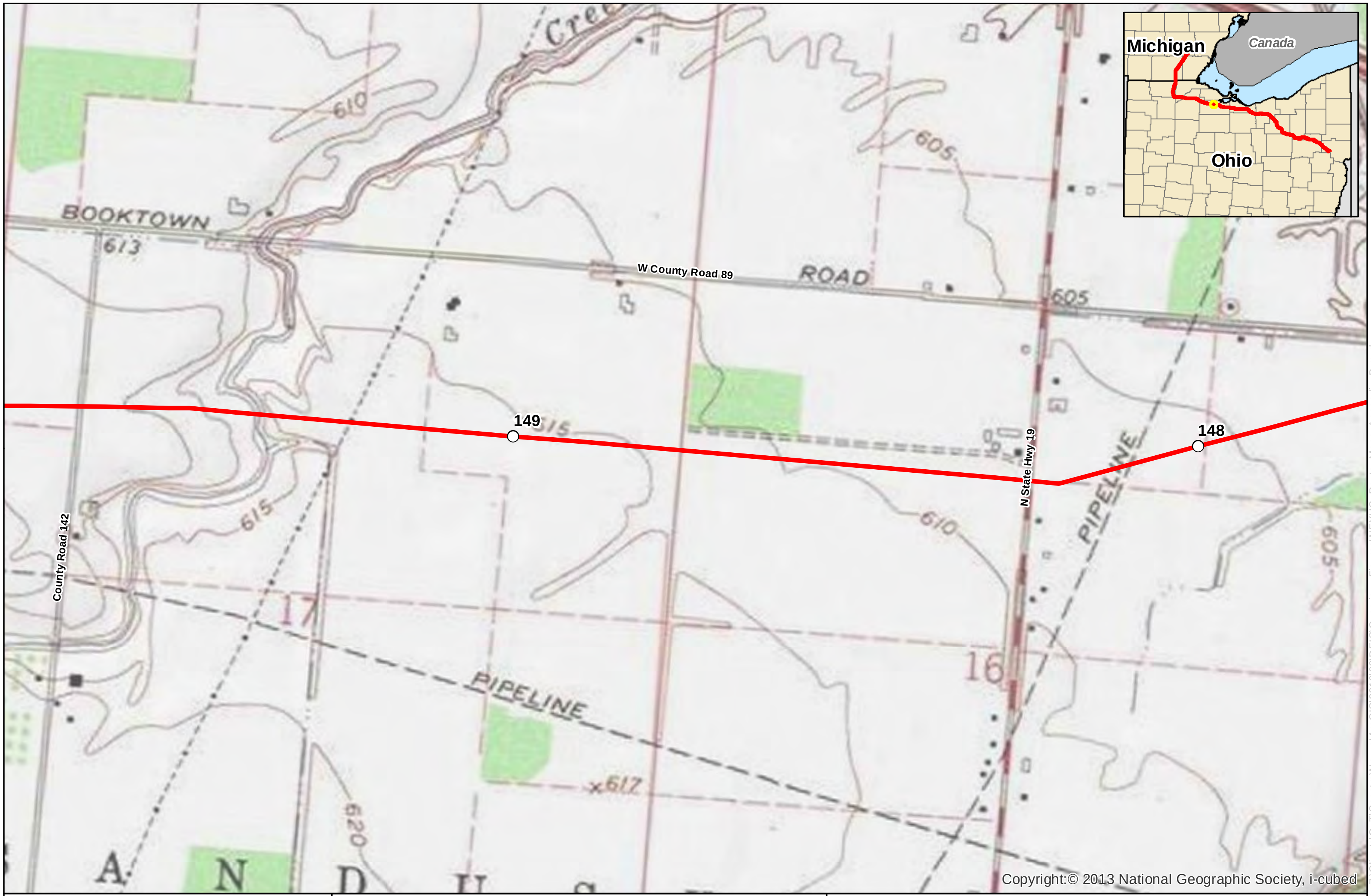

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1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○	Milepost	▬	Proposed TGP Interconnect
●	Tee-Tap Location	▬	Proposed Access Road
⋈	Proposed Main Line Valve	☐	Proposed Compressor Station
▬	Proposed NEXUS Mainline Pipeline	☐	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	☐	M&R Station

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1 inch = 1,000 feet

Appendix B-1

NGT Project

Route Map

○ Milepost

● Tee-Tap Location

⋈ Proposed Main Line Valve

— Proposed NEXUS Mainline Pipeline

- - - Proposed TEAL Connecting Pipeline

— Proposed TGP Interconnect

— Proposed Access Road

☐ Proposed Compressor Station

☐ Proposed Ware Yard

☐ M&R Station

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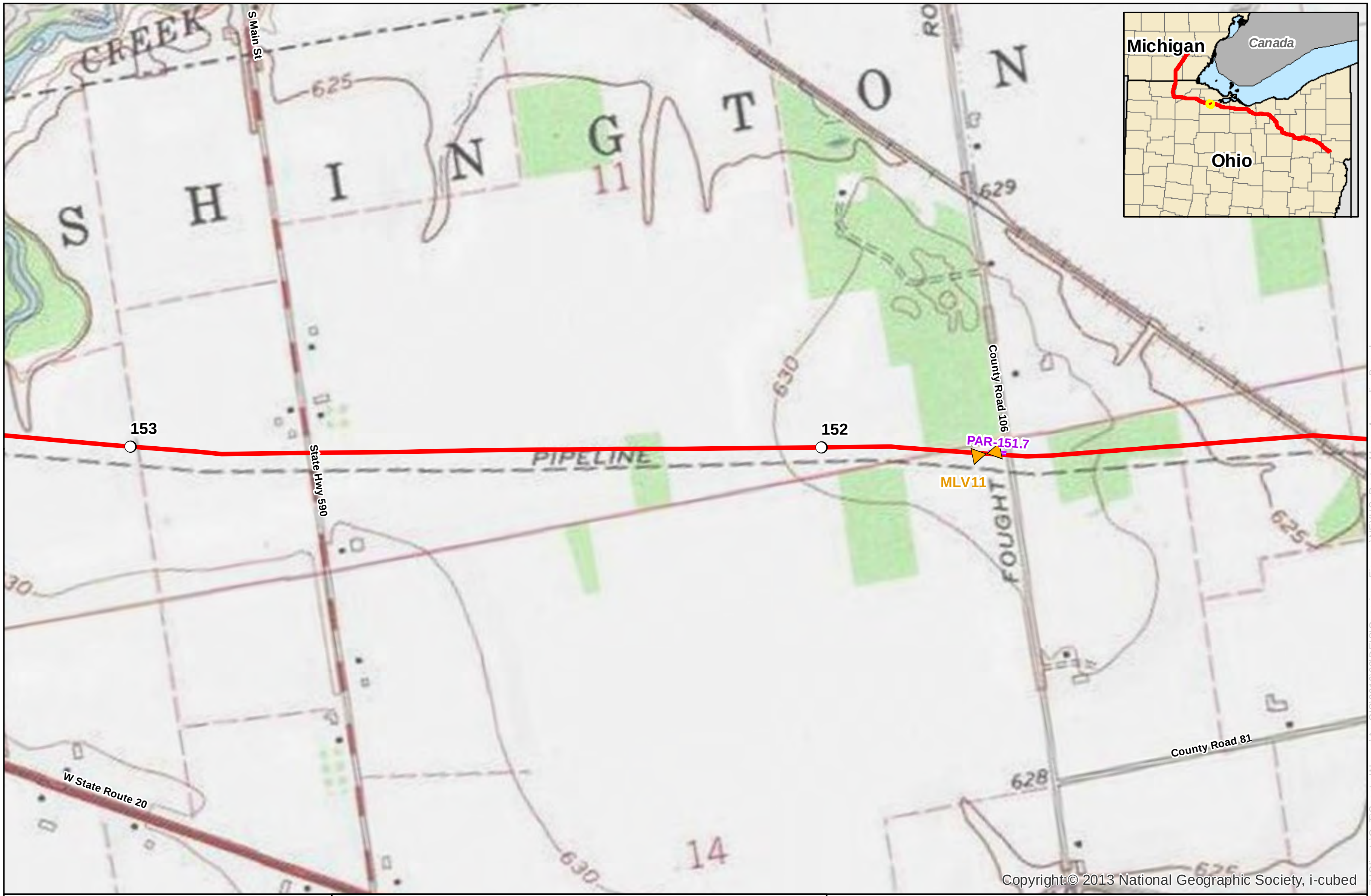

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	☐	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	☐	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	☐	M&R Station

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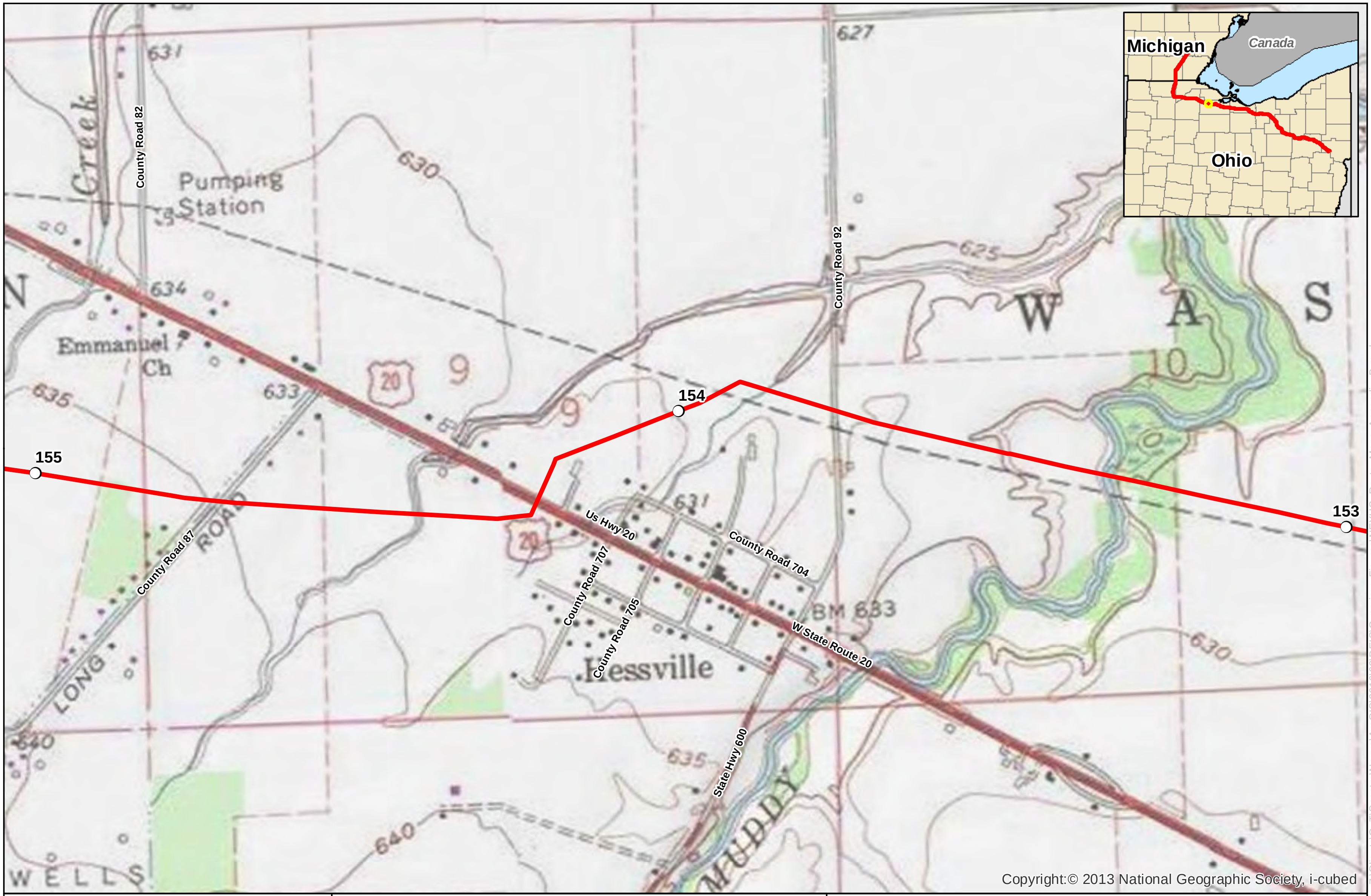

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Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⧓ Proposed Main Line Valve

— Proposed NEXUS Mainline Pipeline

- - - Proposed TEAL Connecting Pipeline

— Proposed TGP Interconnect

— Proposed Access Road

☐ Proposed Compressor Station

☐ Proposed Ware Yard

☐ M&R Station

Source: Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\03\DEIS\Overview_Figures\NEXUS_Route_Maps_Appendix_B.mxd

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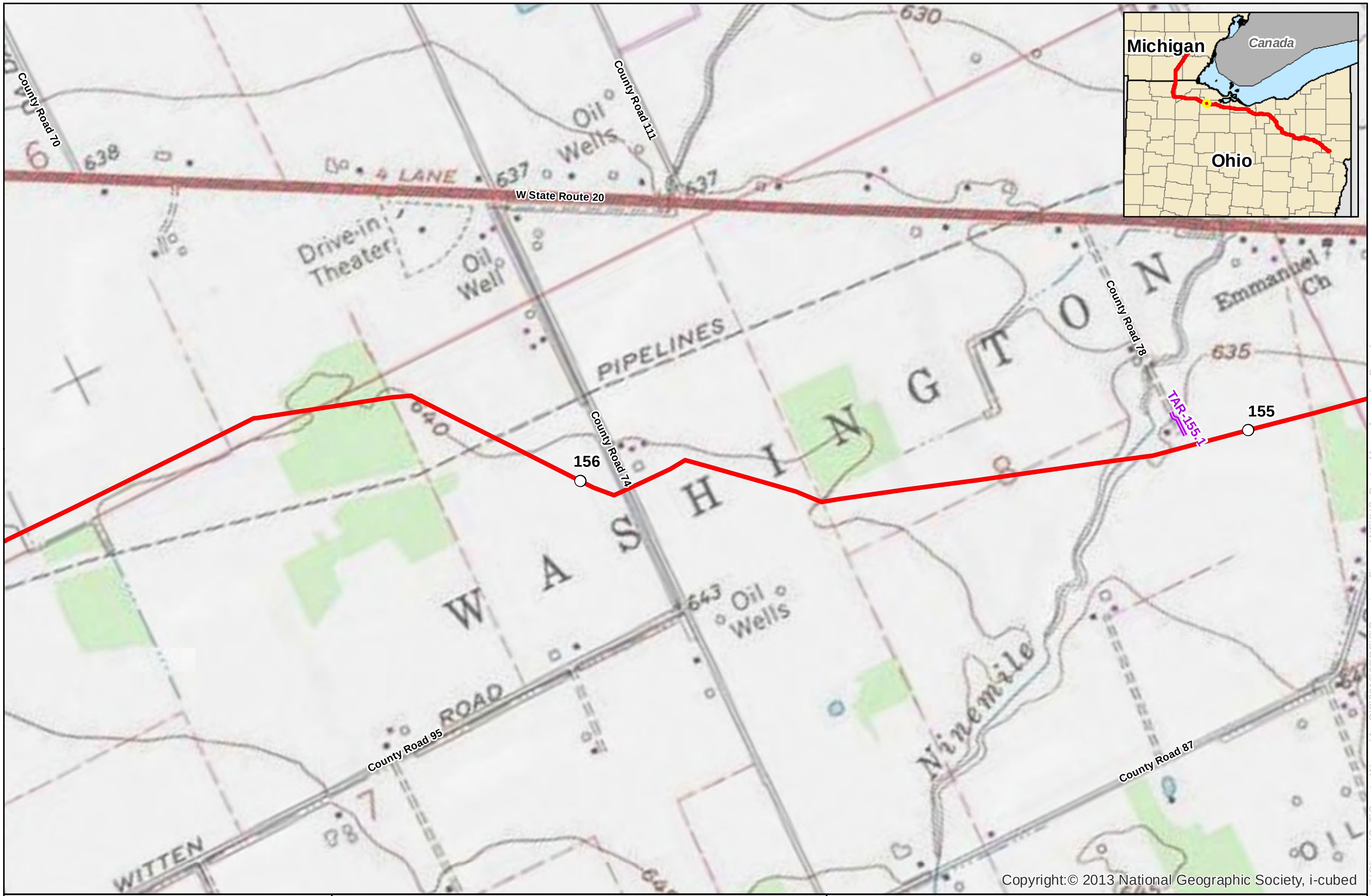

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1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	▢	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	▢	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	▢	M&R Station

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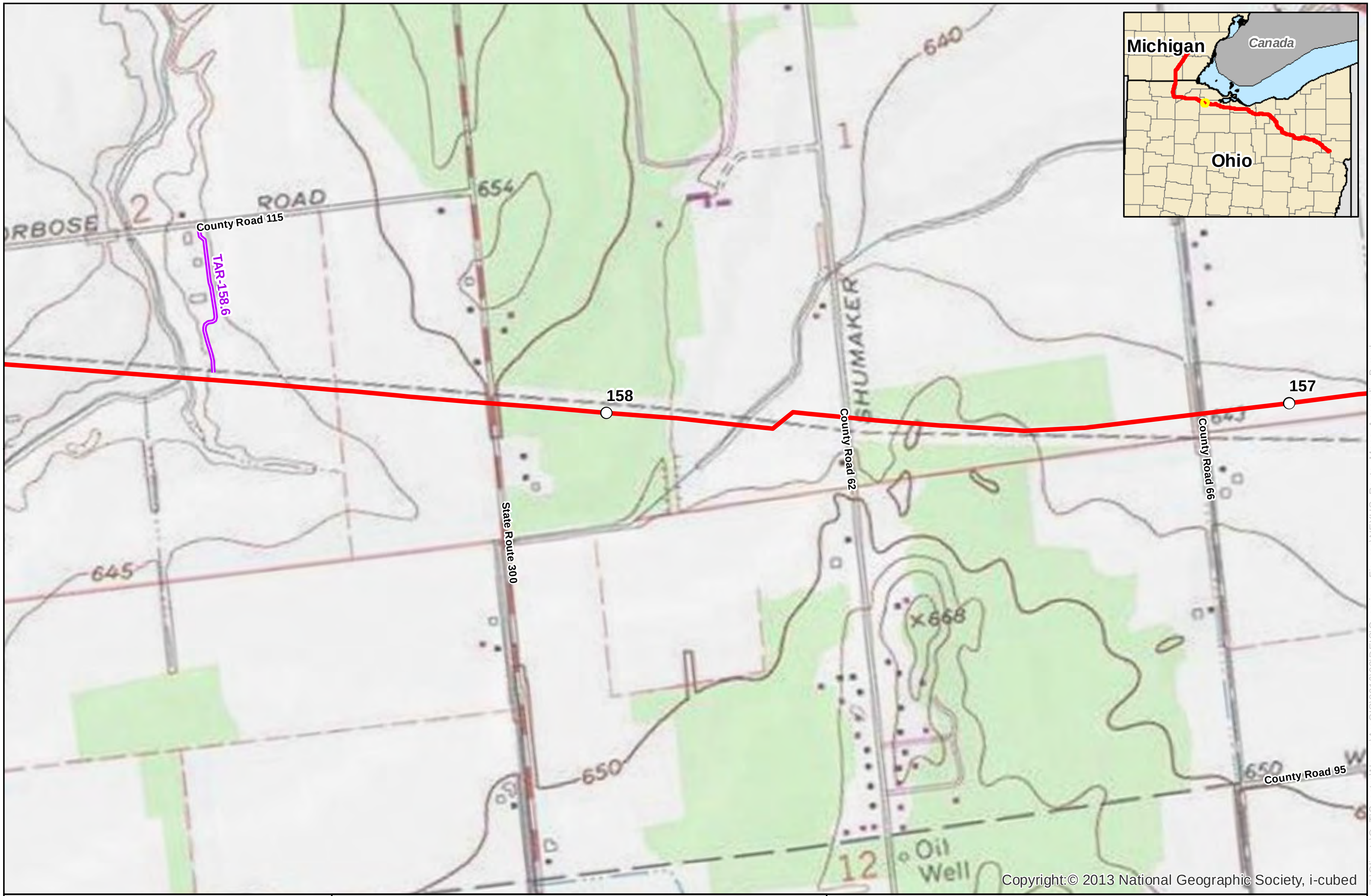

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⋈ Proposed Main Line Valve
- ━ Proposed NEXUS Mainline Pipeline
- ╍ Proposed TEAL Connecting Pipeline
- ━ Proposed TGP Interconnect
- ━ Proposed Access Road
- ▢ Proposed Compressor Station
- ▢ Proposed Ware Yard
- ▢ M&R Station

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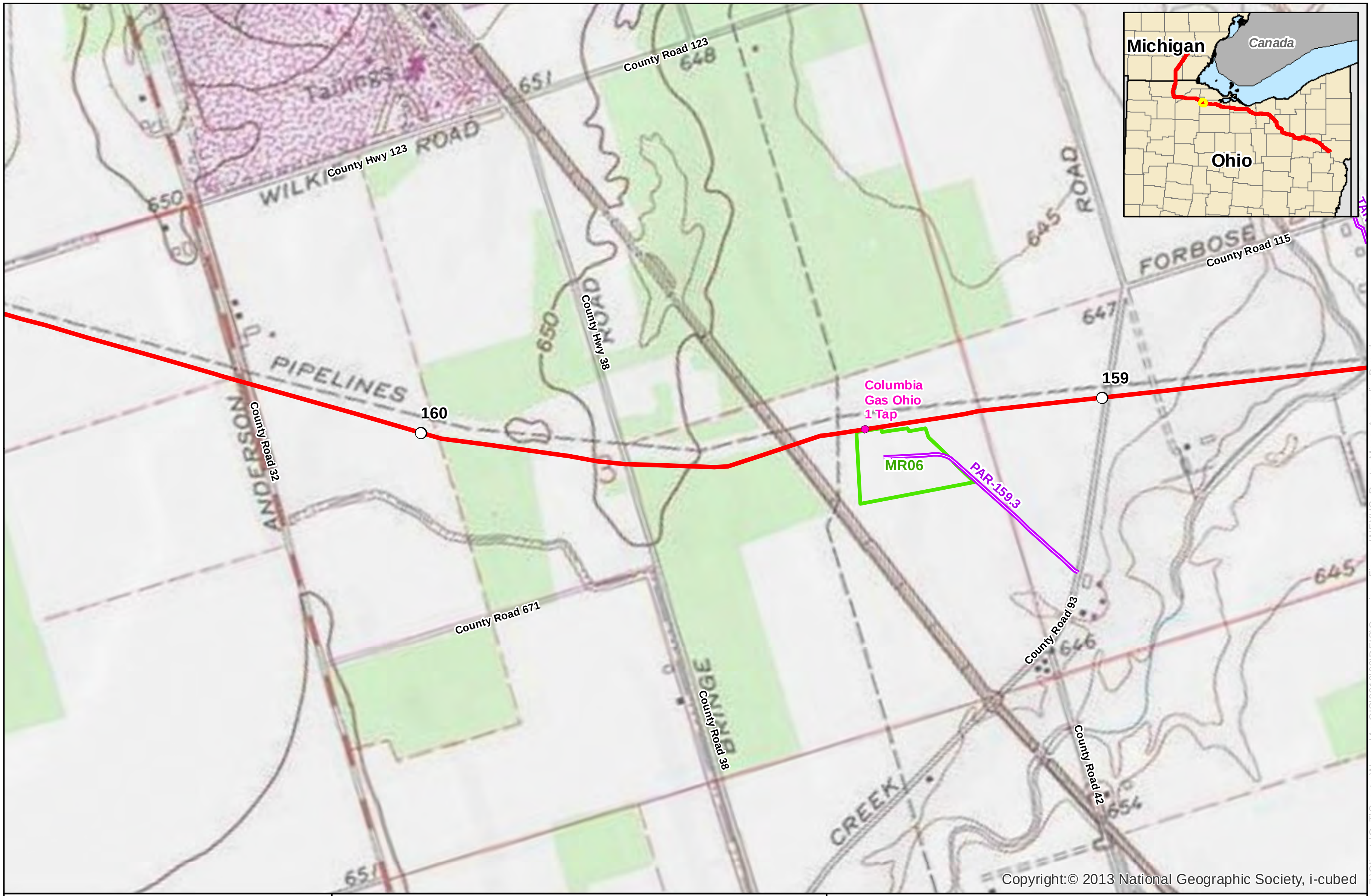

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⧓ Proposed Main Line Valve
━ Proposed NEXUS Mainline Pipeline
╍ Proposed TEAL Connecting Pipeline
━ Proposed TGP Interconnect
═ Proposed Access Road
☐ Proposed Compressor Station
☐ Proposed Ware Yard
☐ M&R Station

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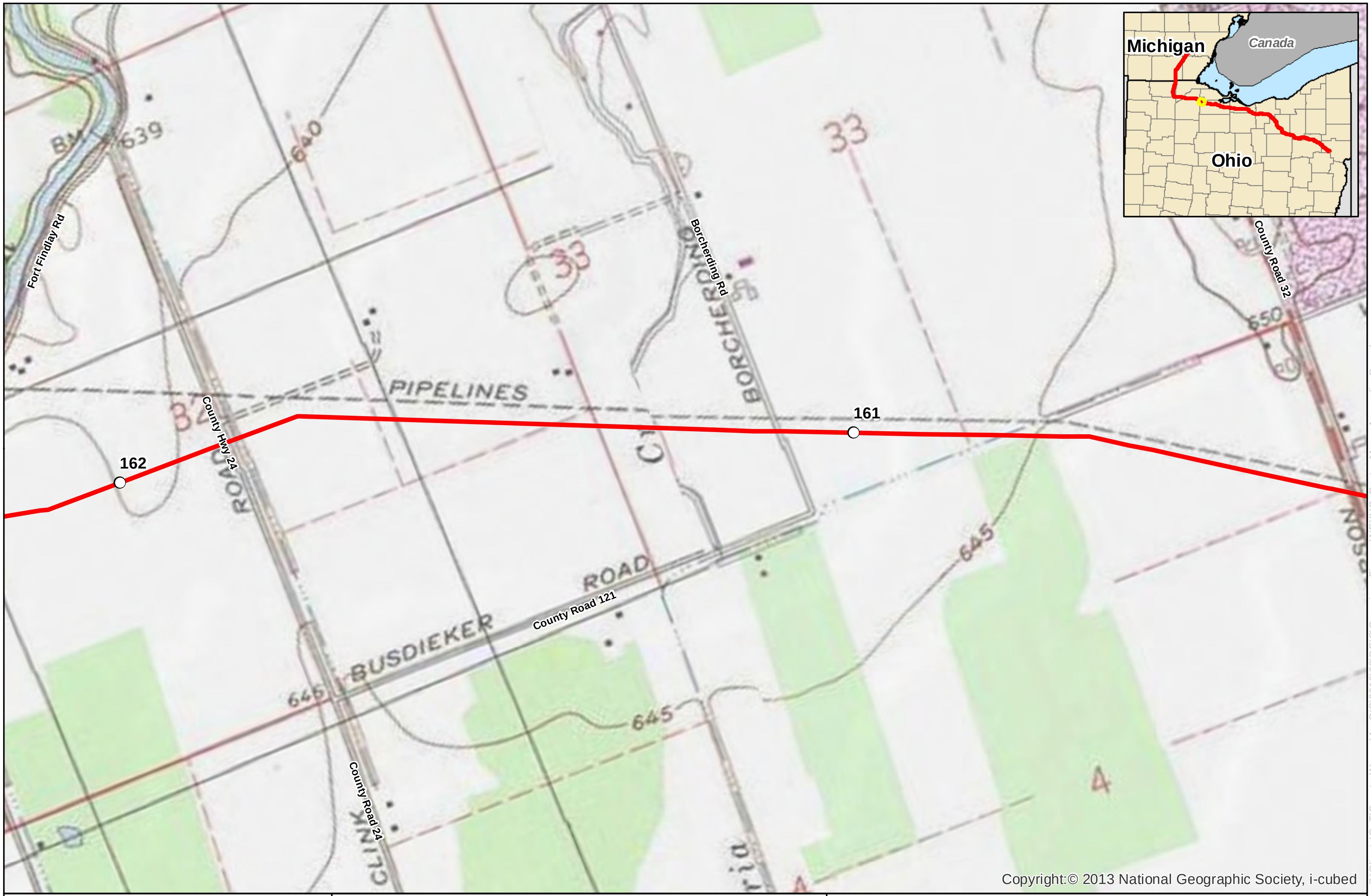

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Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⧓ Proposed Main Line Valve

— Proposed NEXUS Mainline Pipeline

- - - Proposed TEAL Connecting Pipeline

— Proposed TGP Interconnect

— Proposed Access Road

☐ Proposed Compressor Station

☐ Proposed Ware Yard

☐ M&R Station

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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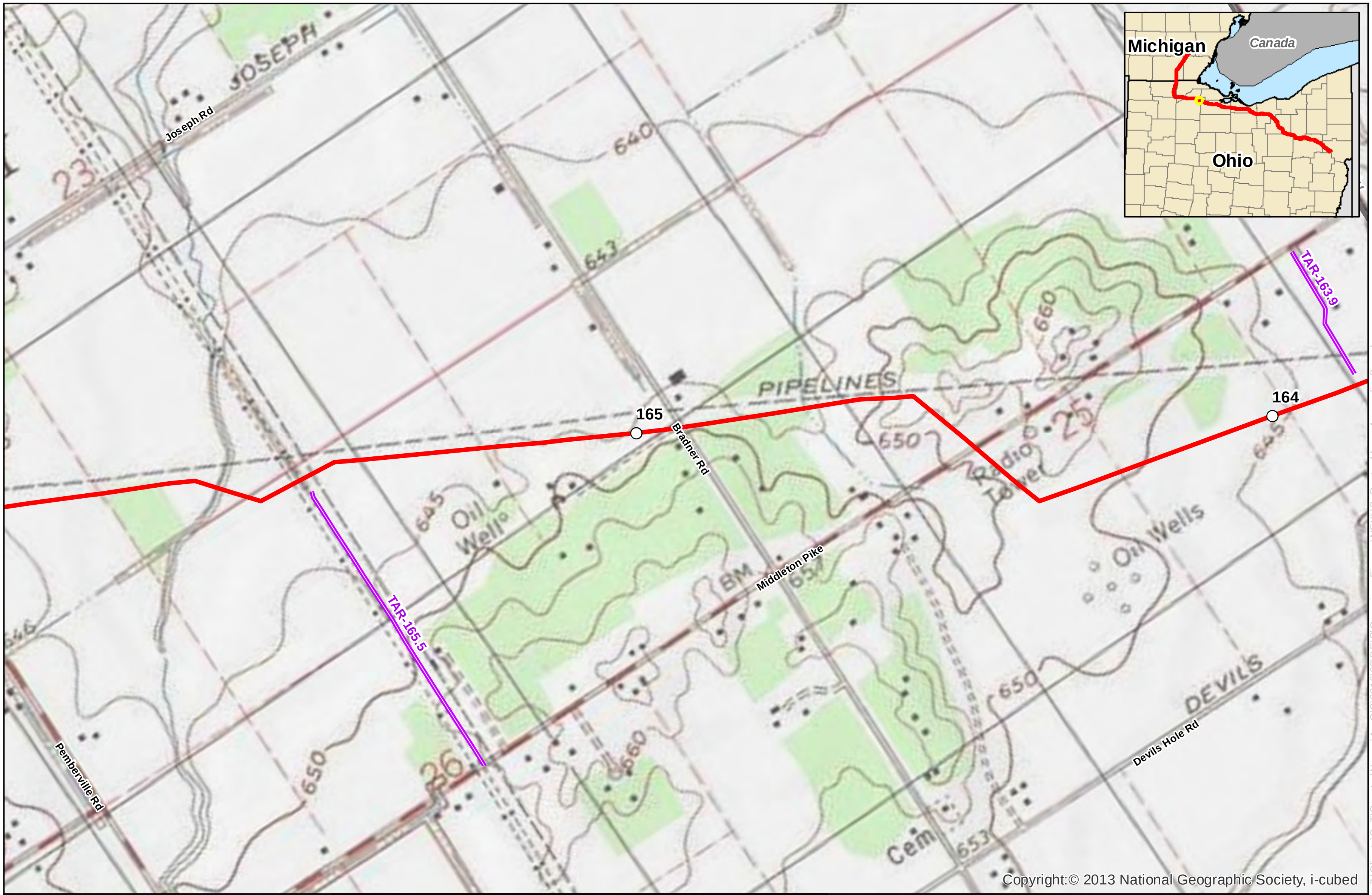

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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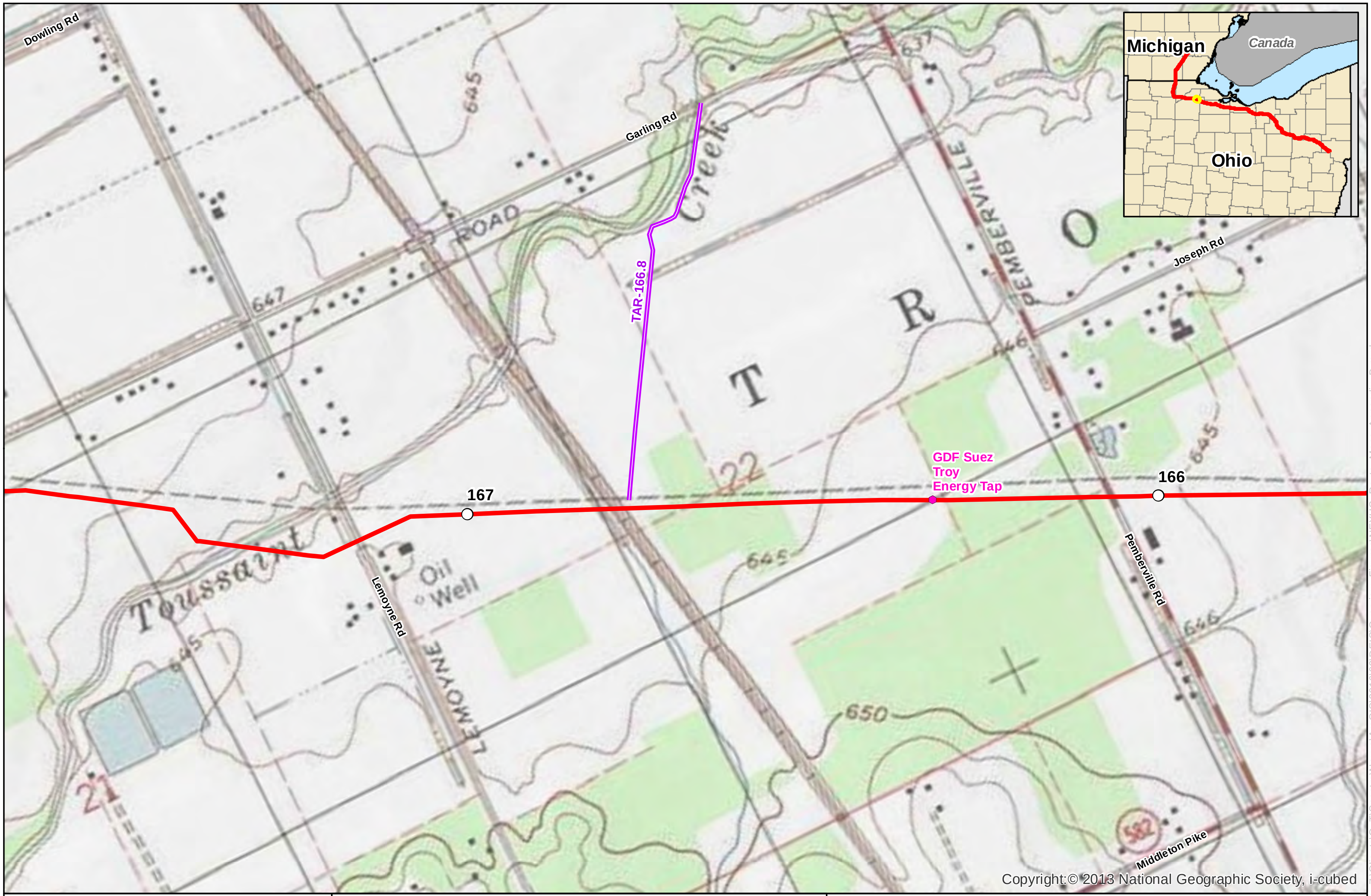

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1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

○ Milepost	Proposed TGP Interconnect
● Tee-Tap Location	Proposed Access Road
Proposed Main Line Valve	Proposed Compressor Station
Proposed NEXUS Mainline Pipeline	Proposed Ware Yard
Proposed TEAL Connecting Pipeline	M&R Station

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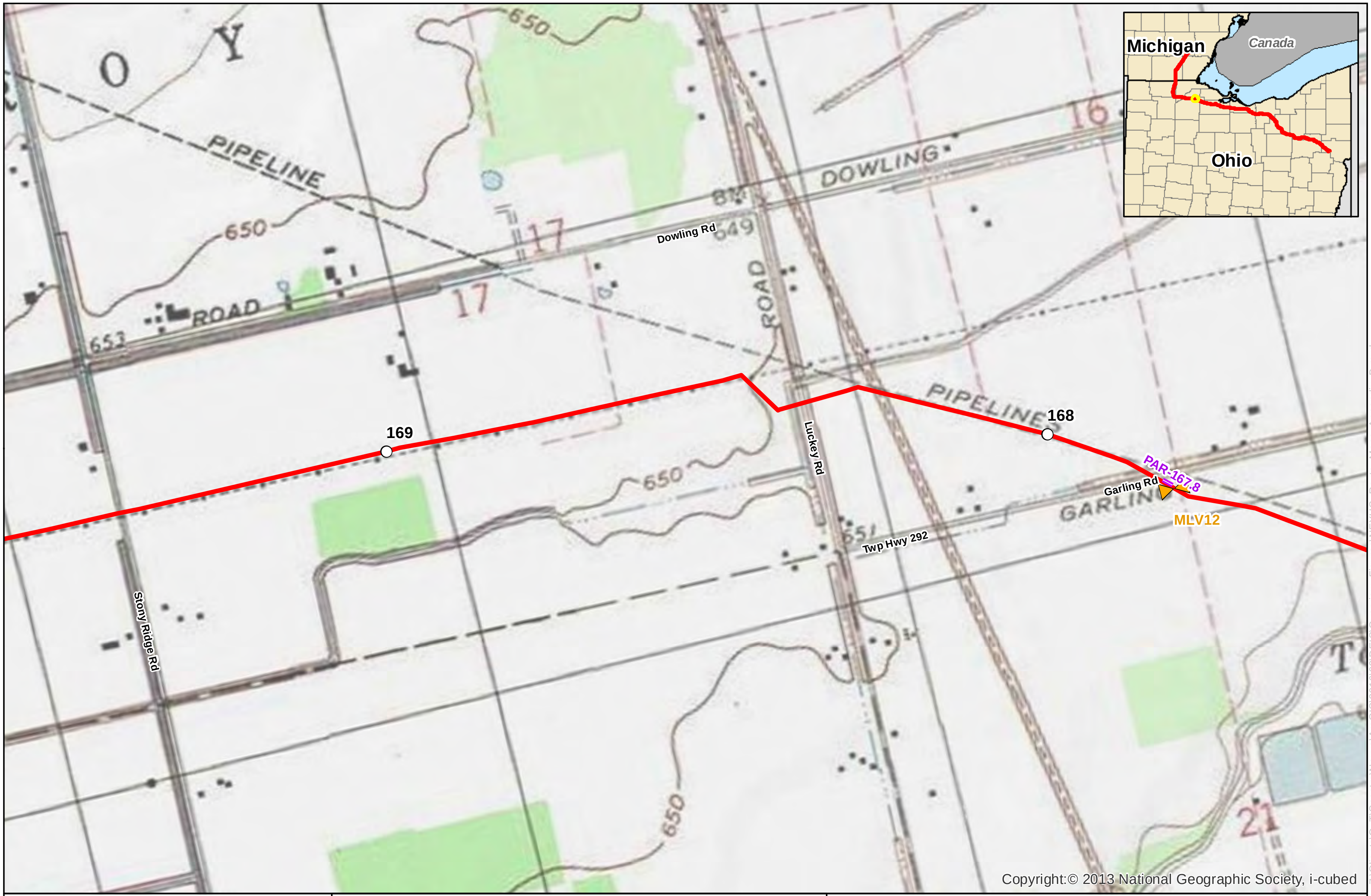

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⧓ Proposed Main Line Valve
— Proposed NEXUS Mainline Pipeline
- - Proposed TEAL Connecting Pipeline
— Proposed TGP Interconnect
— Proposed Access Road
☐ Proposed Compressor Station
☐ Proposed Ware Yard
☐ M&R Station

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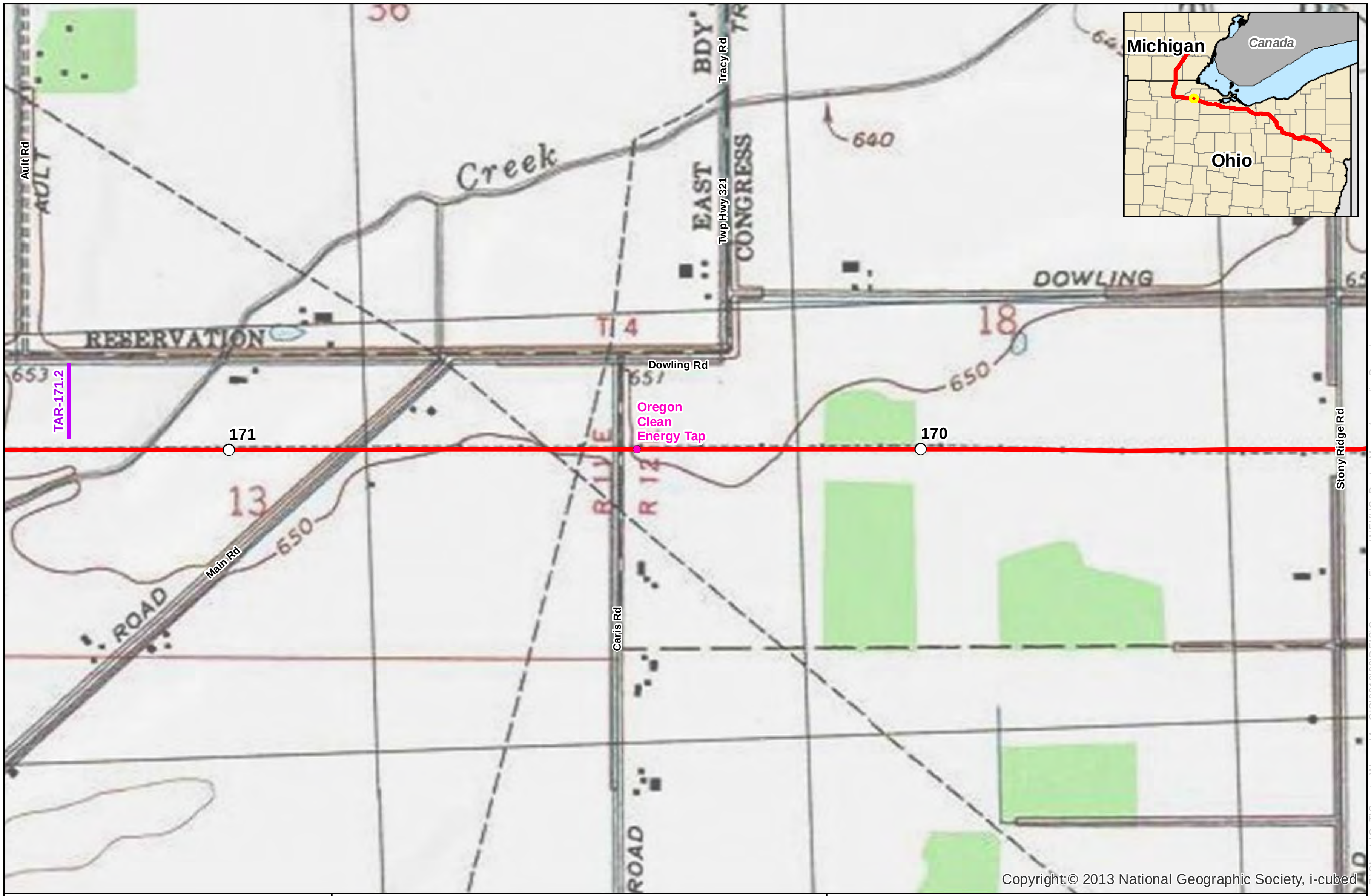

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⋈ Proposed Main Line Valve
━ Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
━ Proposed TGP Interconnect
═ Proposed Access Road
▭ Proposed Compressor Station
▭ Proposed Ware Yard
▭ M&R Station

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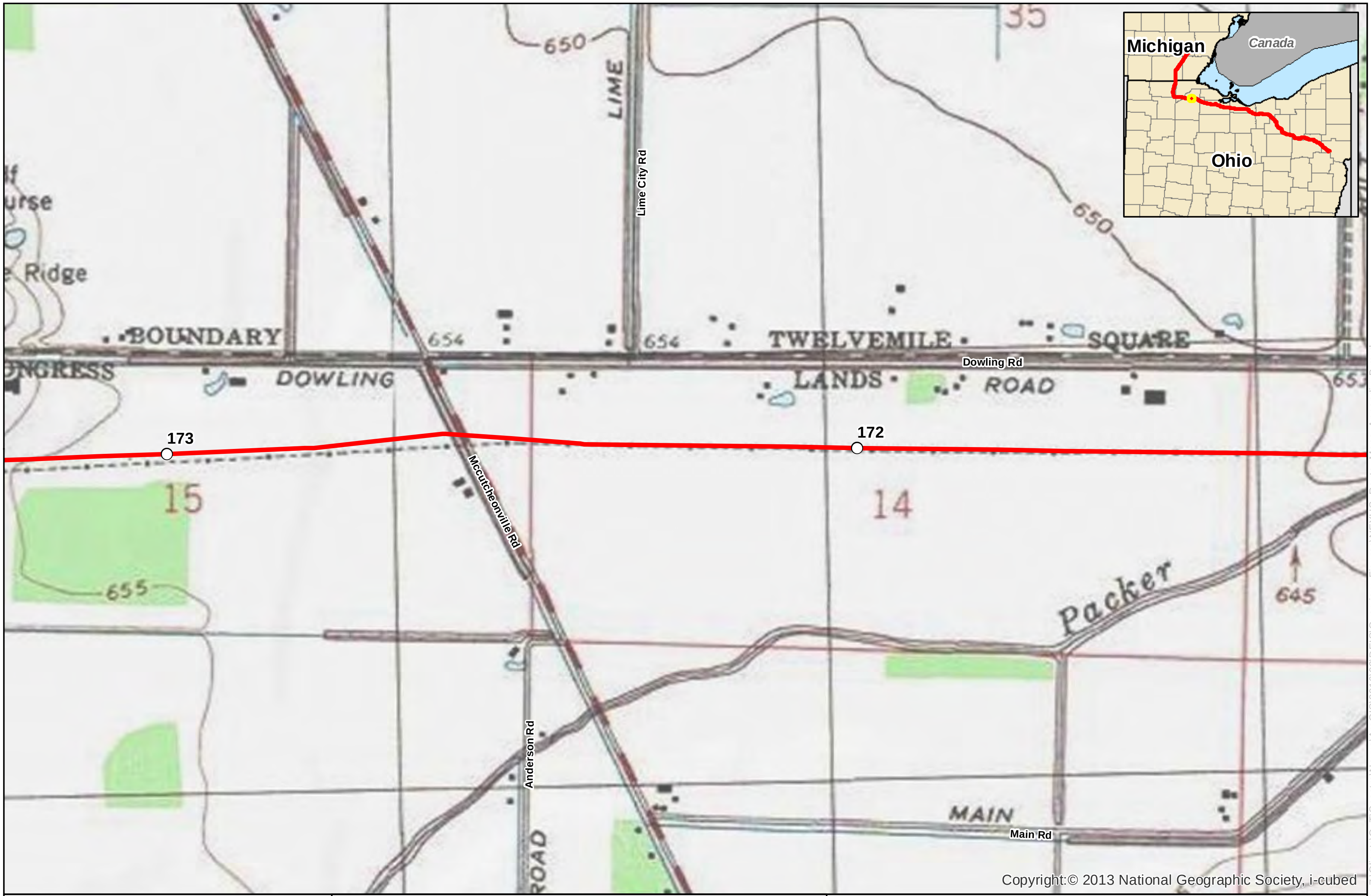

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⧓ Proposed Main Line Valve
- ━ Proposed NEXUS Mainline Pipeline
- ┅ Proposed TEAL Connecting Pipeline
- ━ Proposed TGP Interconnect
- ━ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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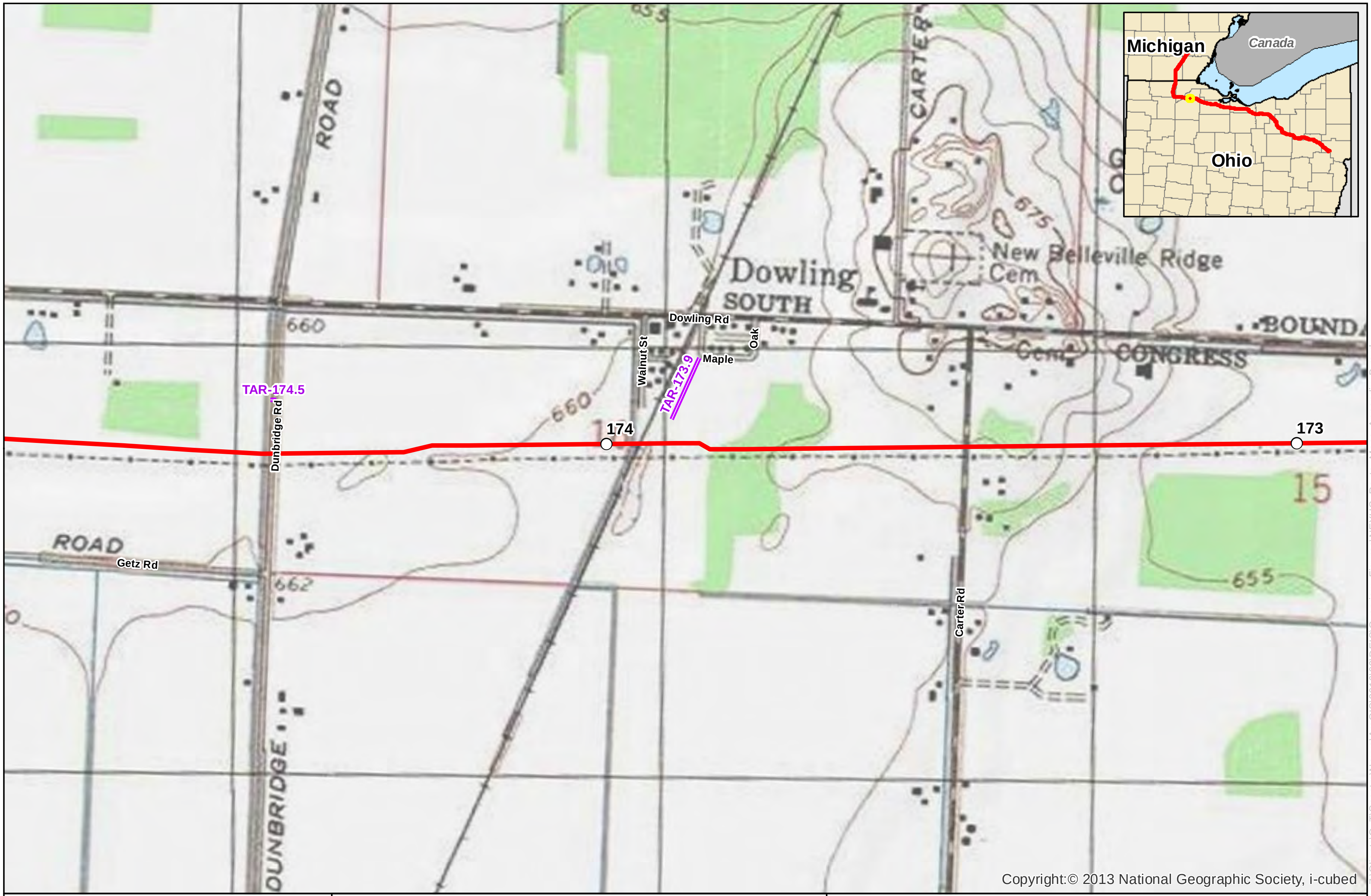

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Appendix B-1
NGT Project
Route Map

○ Milepost	Proposed TGP Interconnect
● Tee-Tap Location	Proposed Access Road
⋈ Proposed Main Line Valve	☐ Proposed Compressor Station
Proposed NEXUS Mainline Pipeline	☐ Proposed Ware Yard
Proposed TEAL Connecting Pipeline	☐ M&R Station

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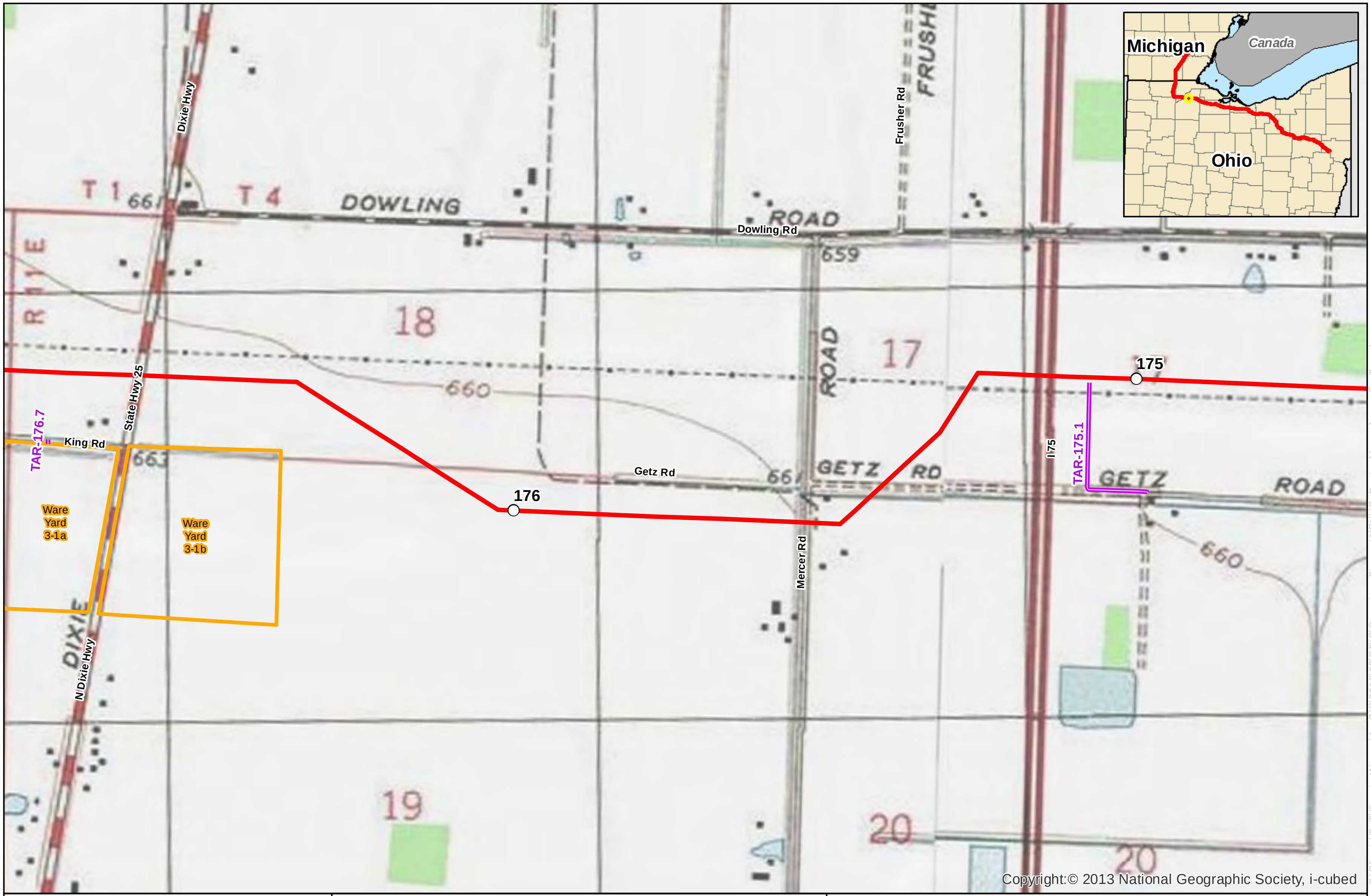

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⋈ Proposed Main Line Valve
━ Proposed NEXUS Mainline Pipeline
┅ Proposed TEAL Connecting Pipeline
━ Proposed TGP Interconnect
━ Proposed Access Road
☐ Proposed Compressor Station
☐ Proposed Ware Yard
☐ M&R Station

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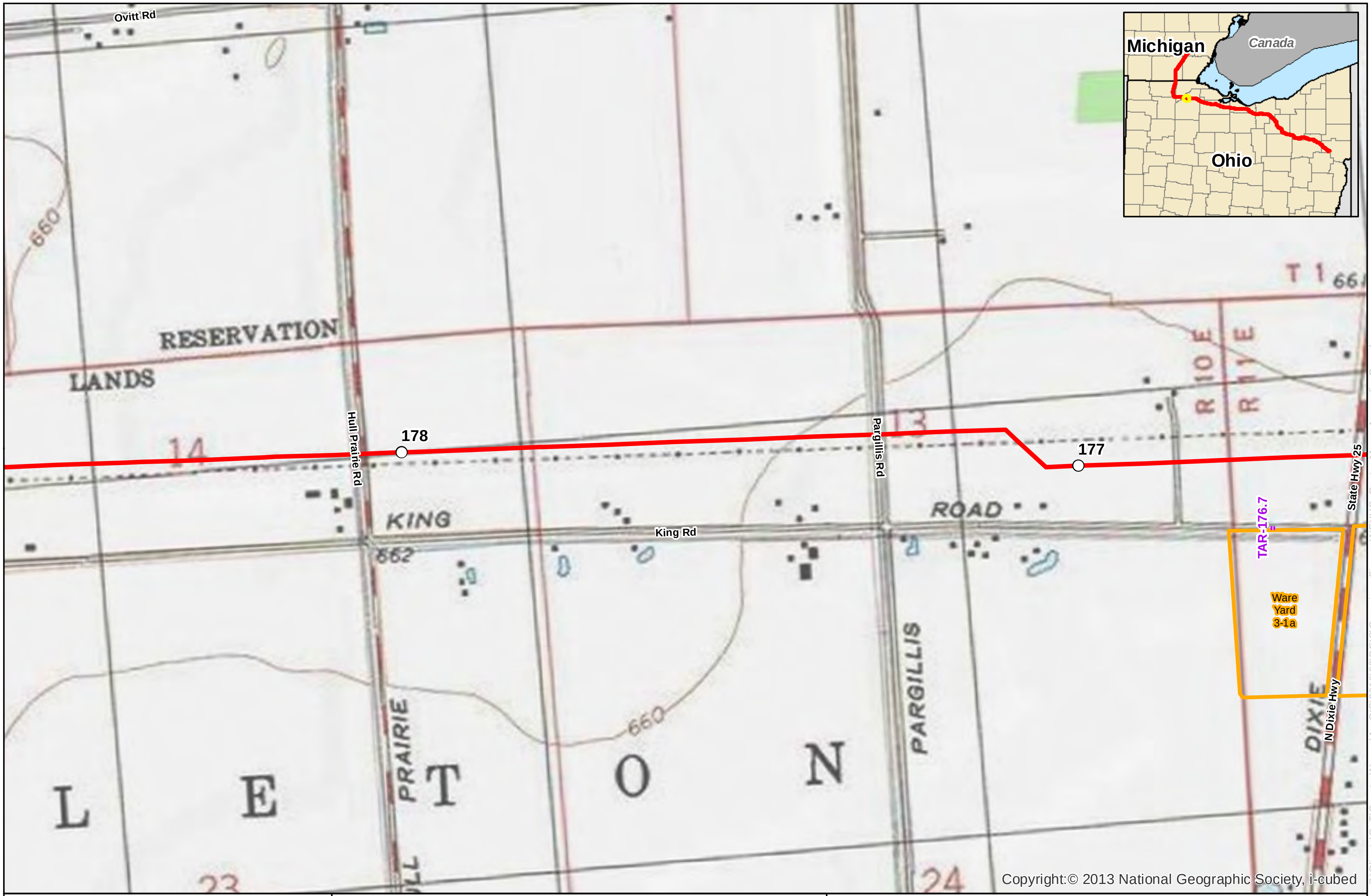

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⋈ Proposed Main Line Valve
- 🟥 Proposed NEXUS Mainline Pipeline
- 🟥 Proposed TEAL Connecting Pipeline
- 🟨 Proposed TGP Interconnect
- 🟪 Proposed Access Road
- 🟦 Proposed Compressor Station
- 🟧 Proposed Ware Yard
- 🟩 M&R Station

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Appendix B-1
NGT Project
Route Map

○ Milepost	Proposed TGP Interconnect
● Tee-Tap Location	Proposed Access Road
⧓ Proposed Main Line Valve	☐ Proposed Compressor Station
Proposed NEXUS Mainline Pipeline	☐ Proposed Ware Yard
Proposed TEAL Connecting Pipeline	☐ M&R Station

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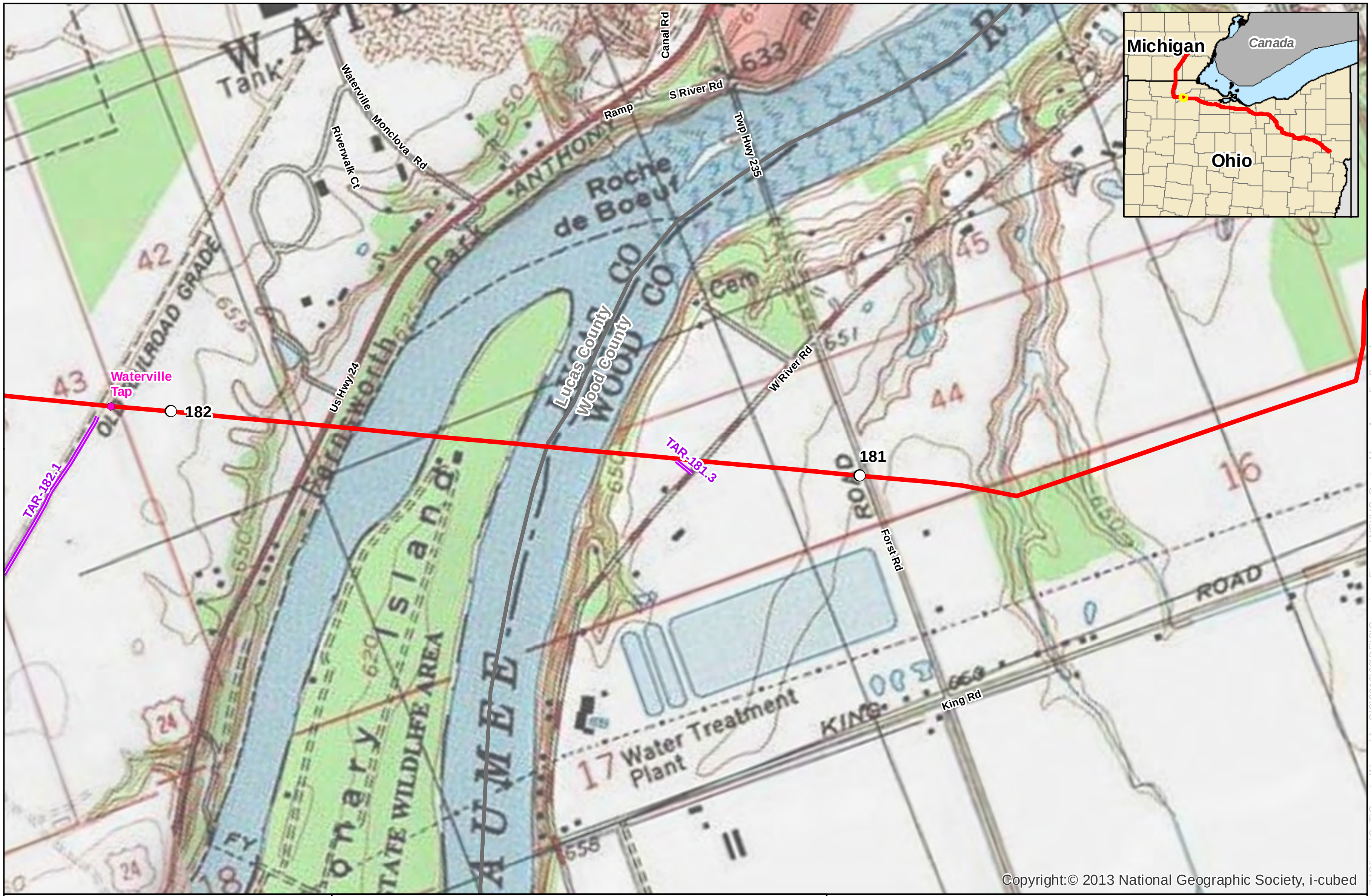

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
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— Proposed TGP Interconnect
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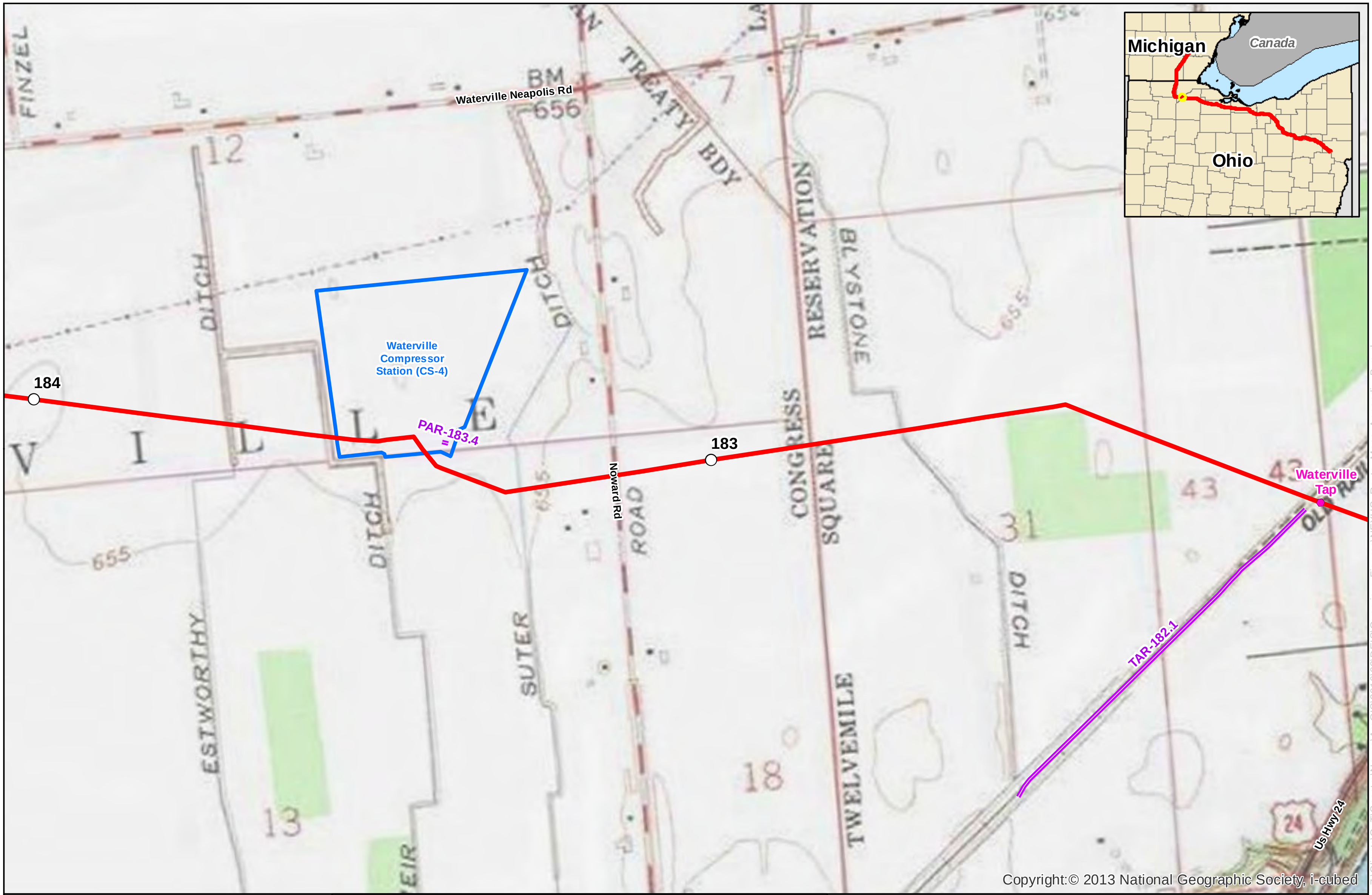

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
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- ☐ Proposed Compressor Station
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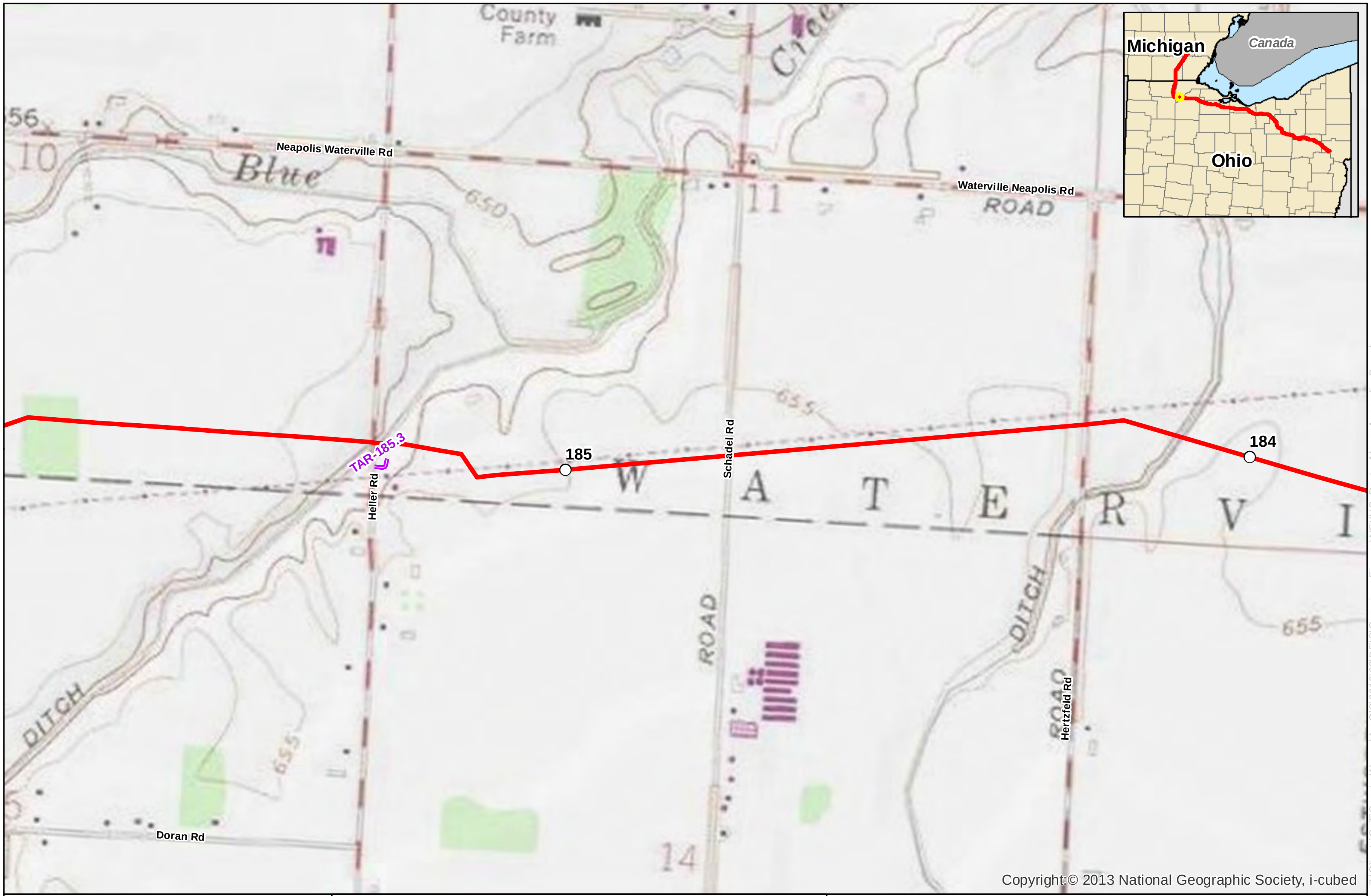

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
▬ ▬	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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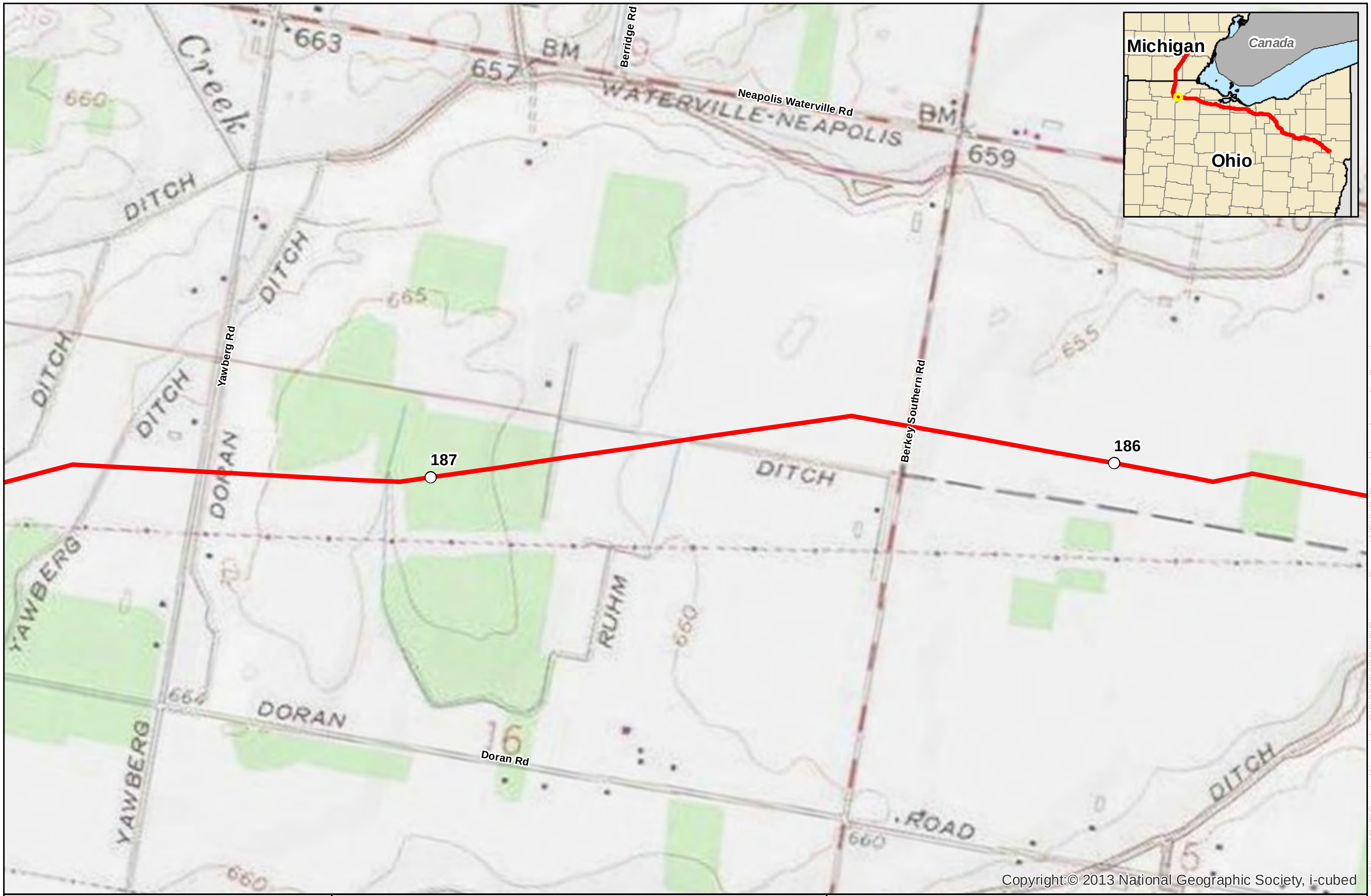

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Appendix B-1

NGT Project

Route Map

○ Milepost

● Tee-Tap Location

⋈ Proposed Main Line Valve

━ Proposed NEXUS Mainline Pipeline

┅ Proposed TEAL Connecting Pipeline

━ Proposed TGP Interconnect

═ Proposed Access Road

▢ Proposed Compressor Station

▢ Proposed Ware Yard

▢ M&R Station

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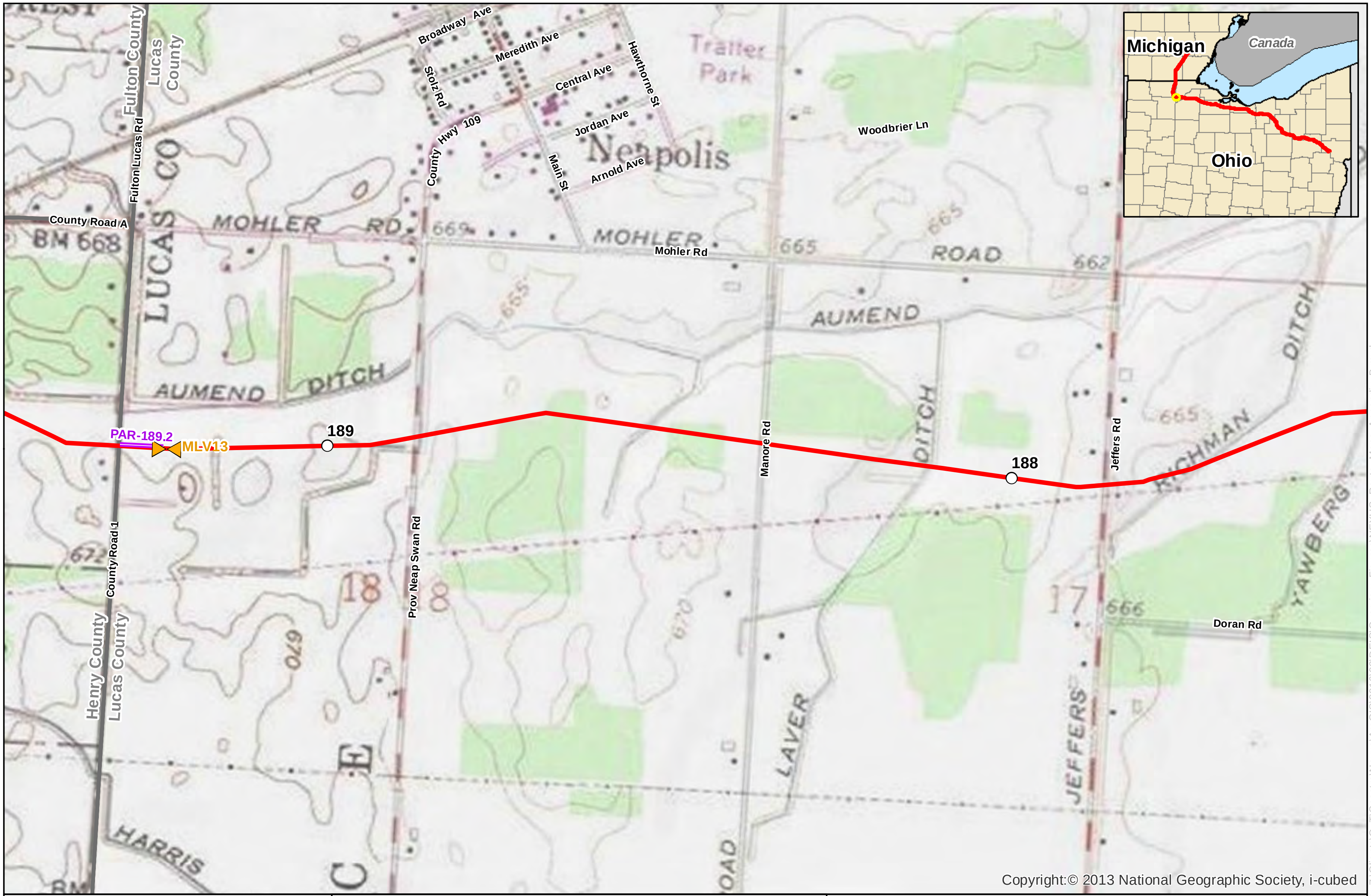

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
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- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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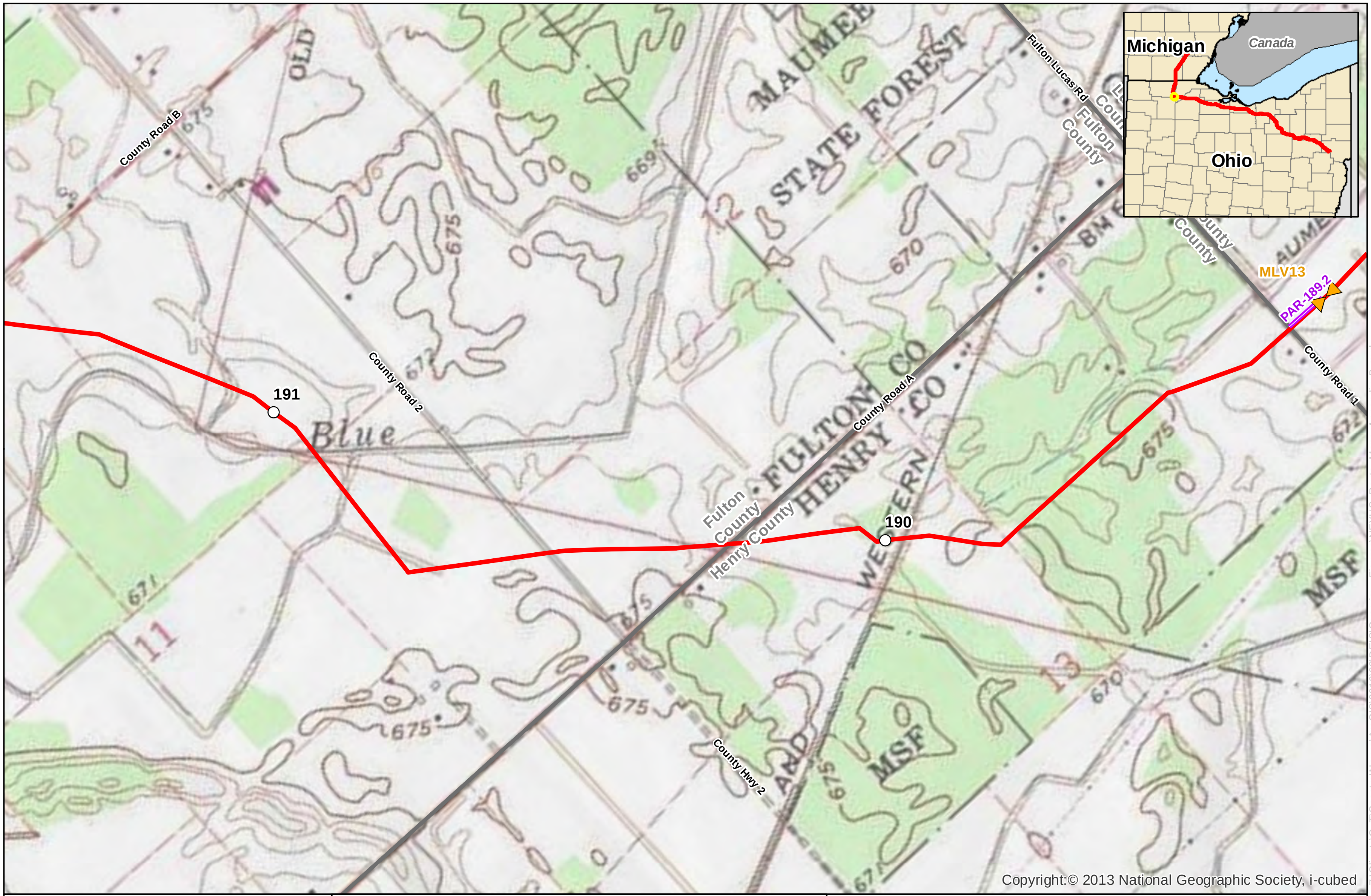

0 500 1,000
Feet

1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⋈ Proposed Main Line Valve
— Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
— Proposed TGP Interconnect
— Proposed Access Road
▢ Proposed Compressor Station
▢ Proposed Ware Yard
▢ M&R Station

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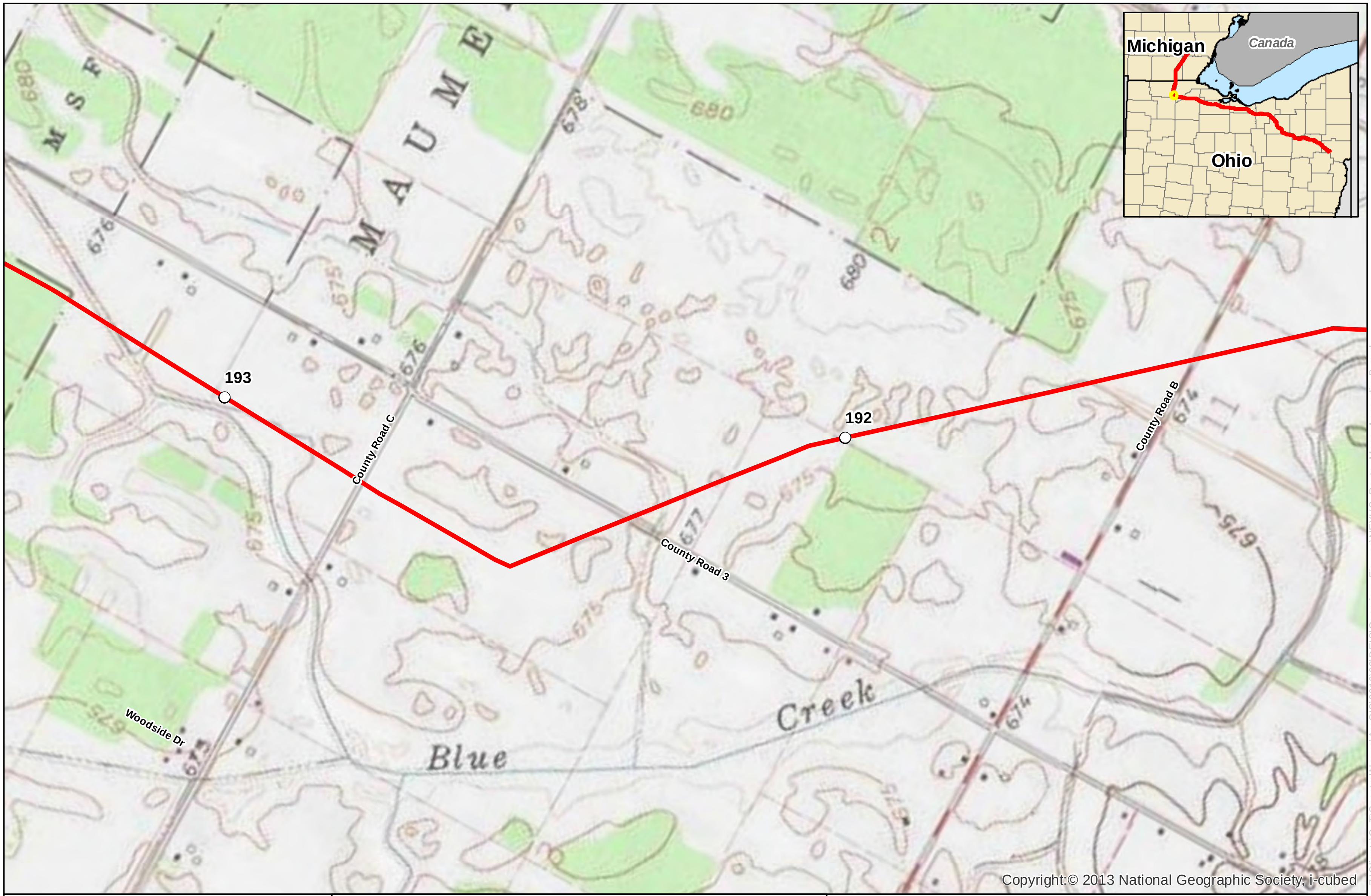

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1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⧓ Proposed Main Line Valve
━ Proposed NEXUS Mainline Pipeline
┅ Proposed TEAL Connecting Pipeline
━ Proposed TGP Interconnect
═ Proposed Access Road
☐ Proposed Compressor Station
☐ Proposed Ware Yard
☐ M&R Station

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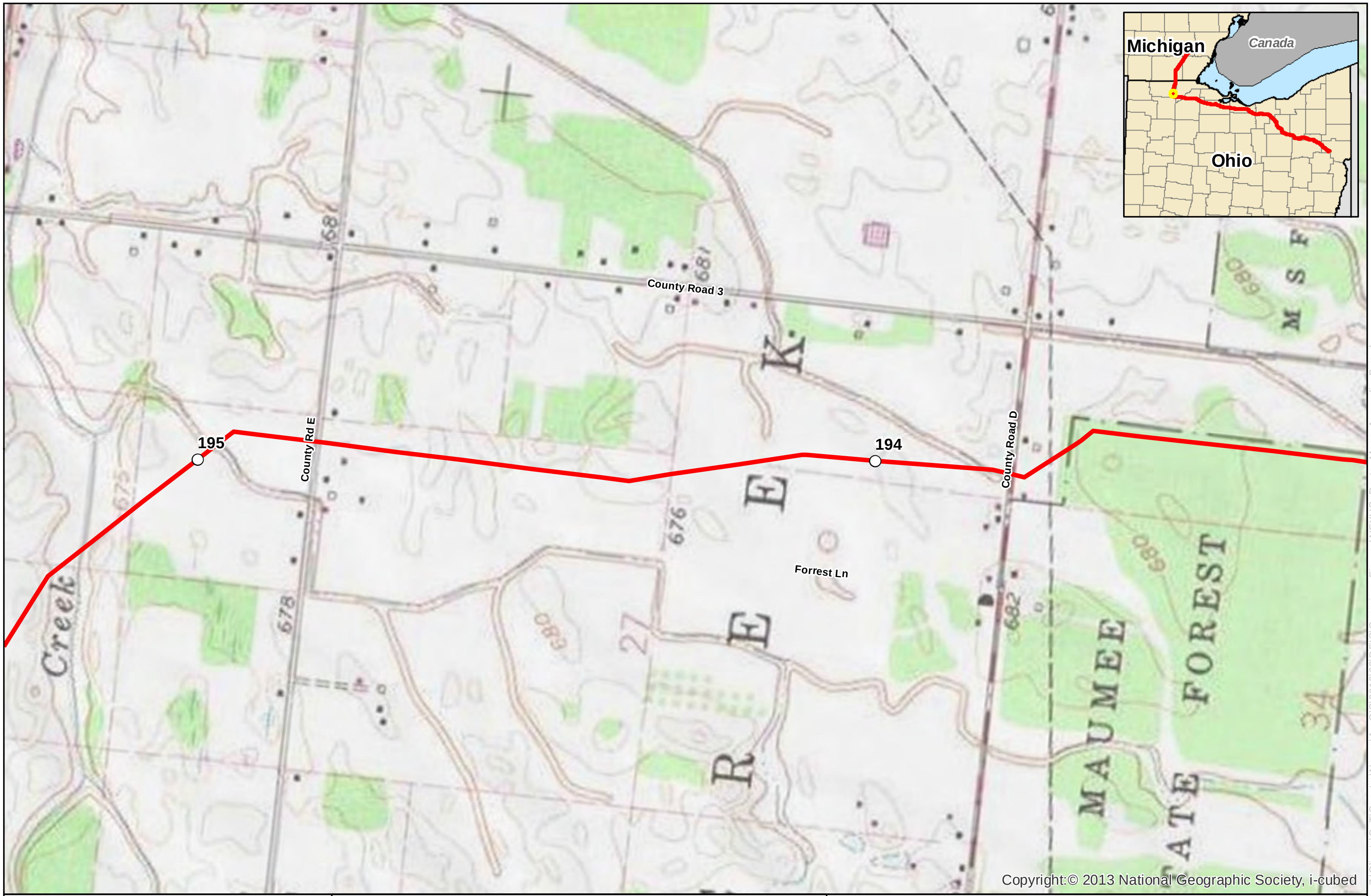

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Feet

1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⧓ Proposed Main Line Valve
- ━ Proposed NEXUS Mainline Pipeline
- ╍ Proposed TEAL Connecting Pipeline
- ━ Proposed TGP Interconnect
- ━ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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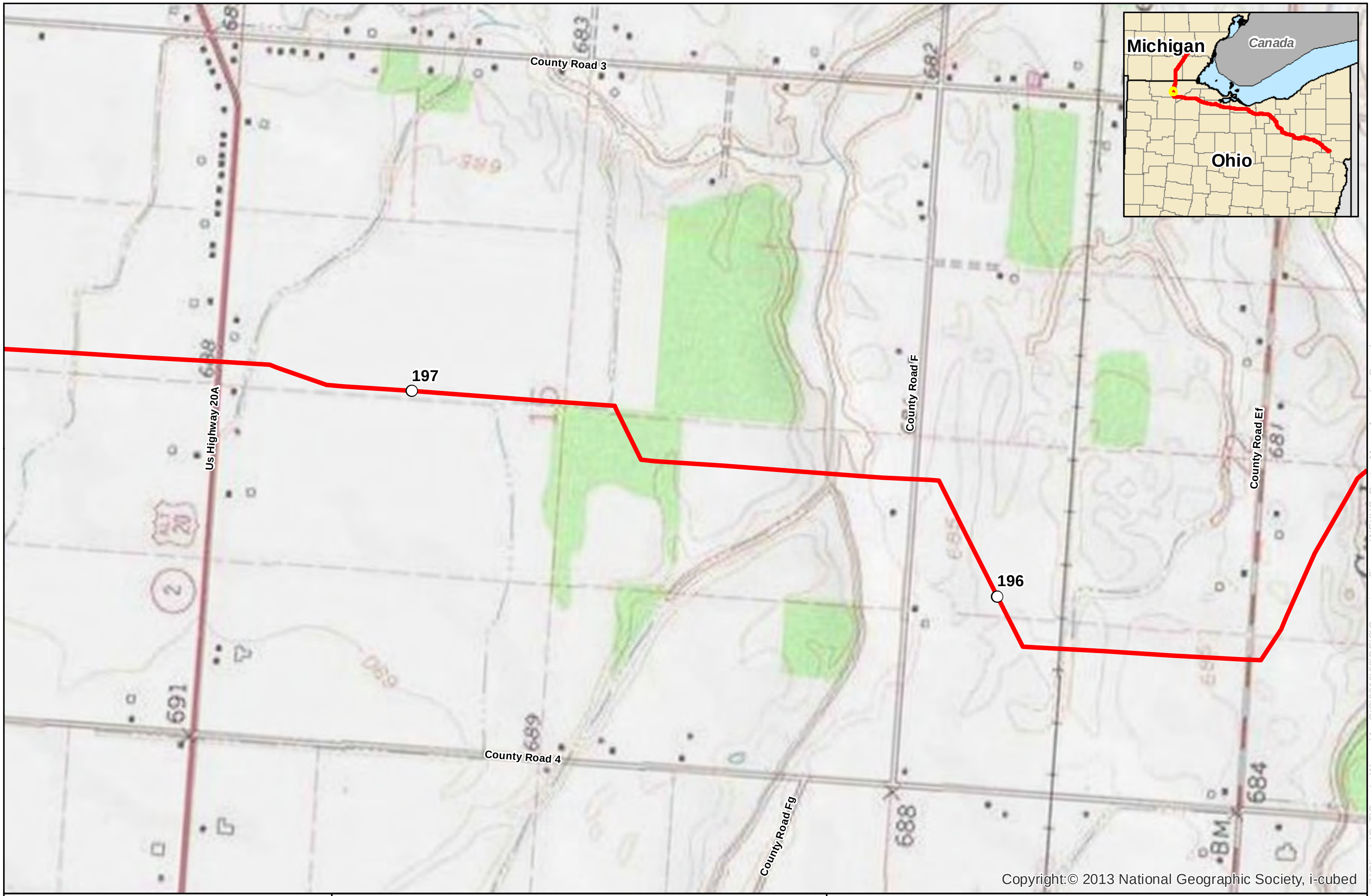

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1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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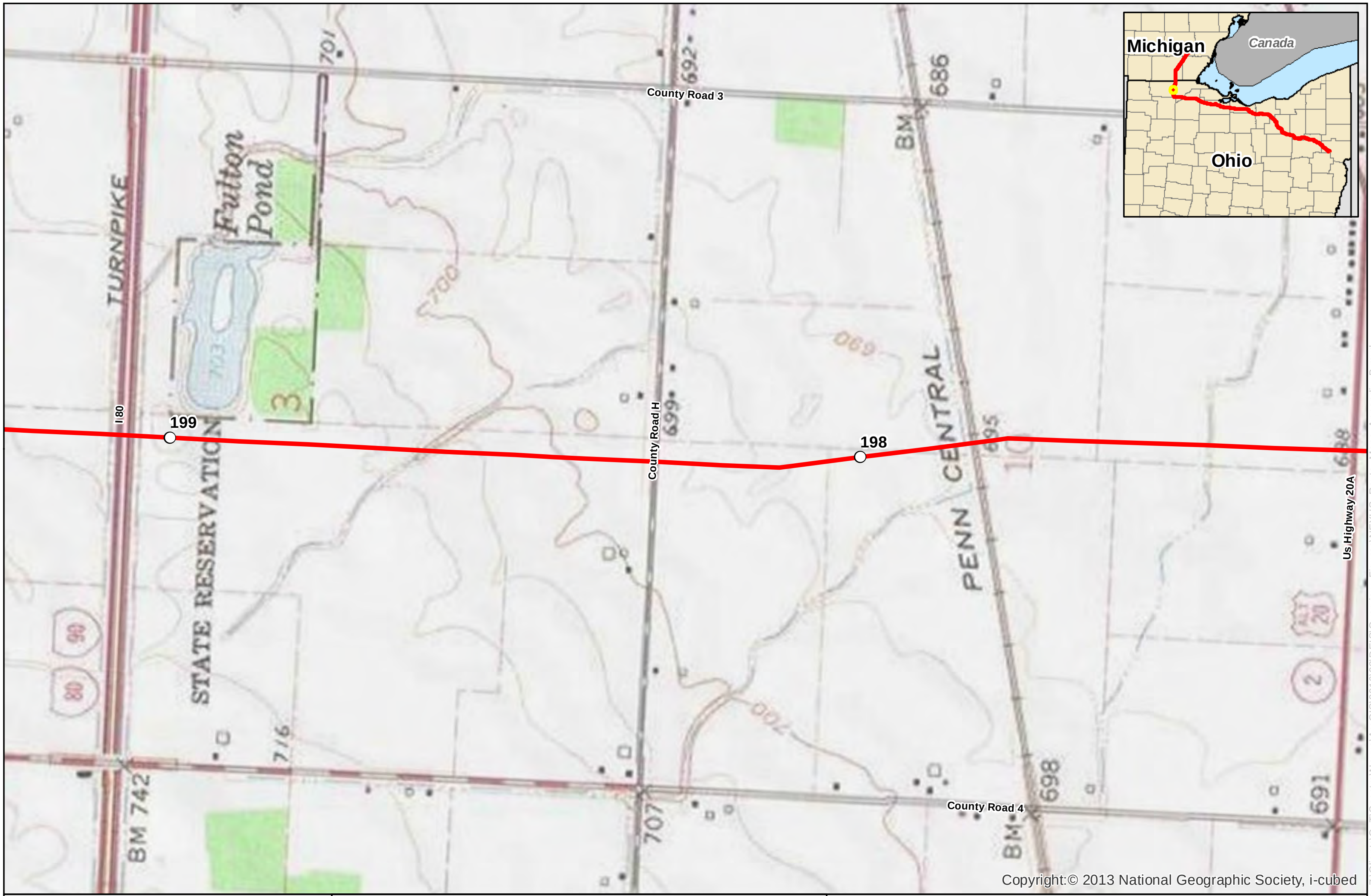

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
▬ ▬	Proposed TEAL Connecting Pipeline	🟩	M&R Station

Source: Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\03\DEIS\Overview_Figures\NEXUS_Route_Maps_Appendix_B.mxd

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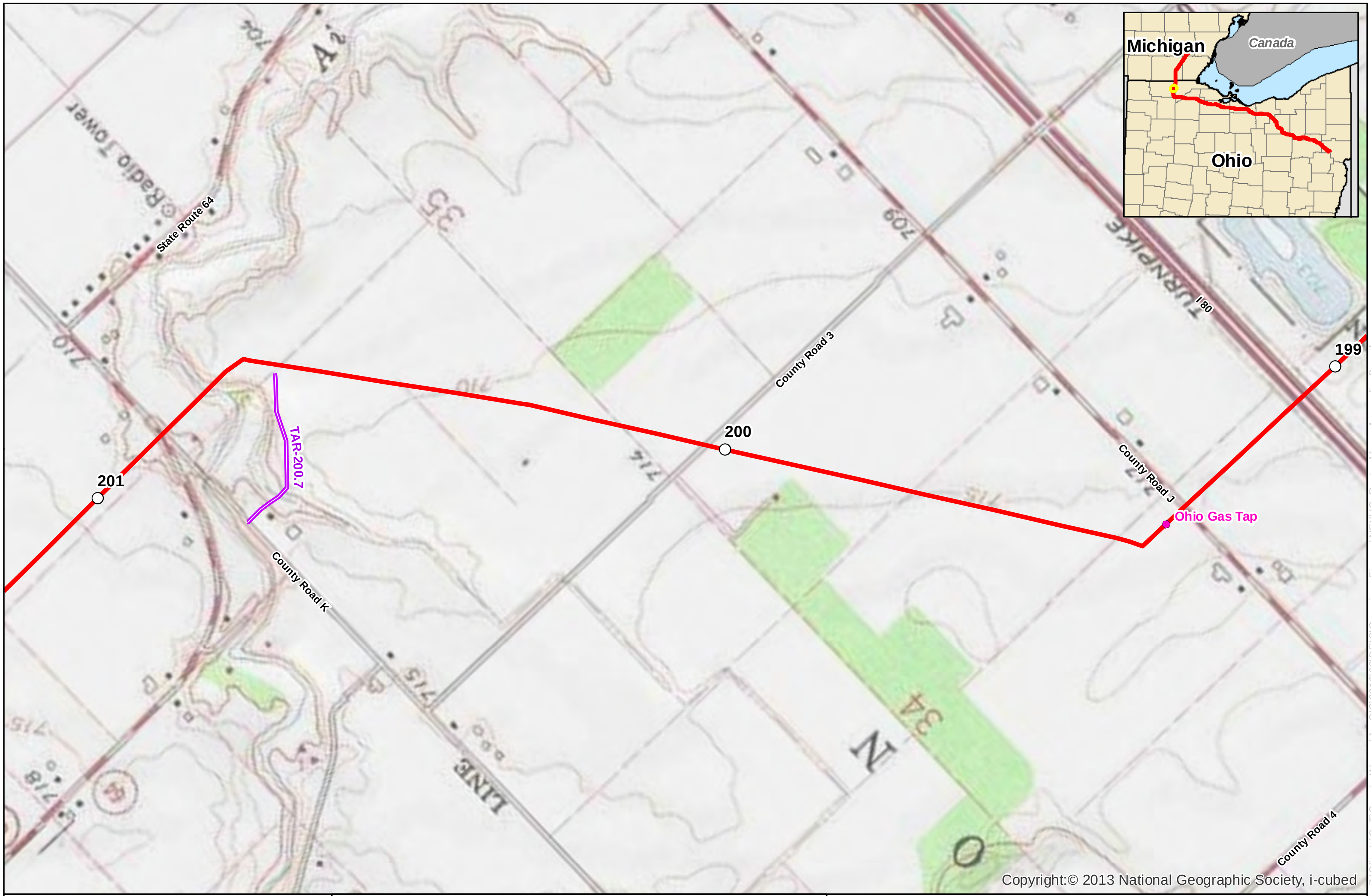

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⋈ Proposed Main Line Valve
━ Proposed NEXUS Mainline Pipeline
┅ Proposed TEAL Connecting Pipeline
━ Proposed TGP Interconnect
═ Proposed Access Road
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▢ M&R Station

Source: Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\03\DEIS\Overview_Figures\NEXUS_Route_Maps_Appendix_B.mxd

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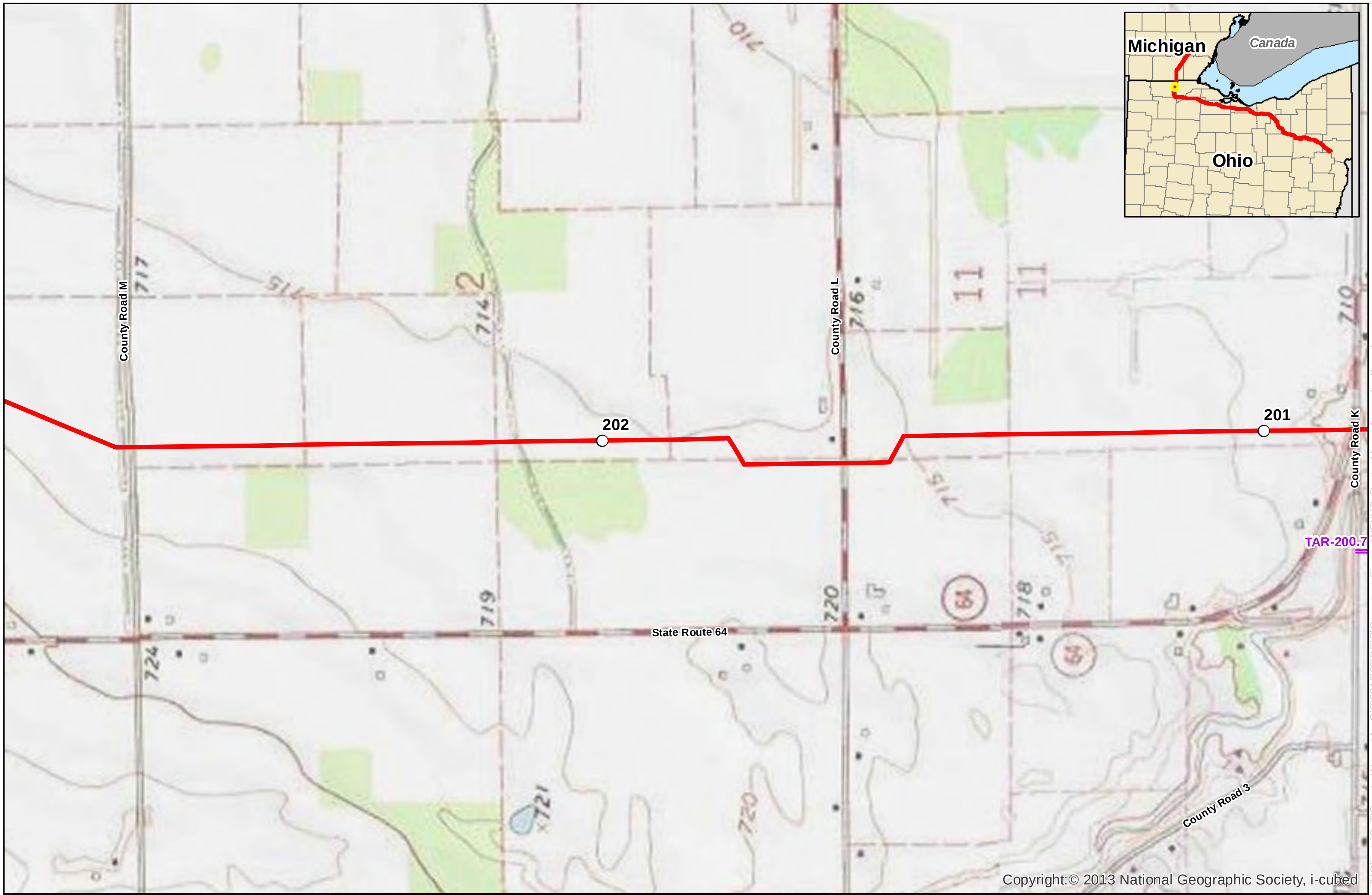

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⋈ Proposed Main Line Valve
- — Proposed NEXUS Mainline Pipeline
- - - - Proposed TEAL Connecting Pipeline
- — Proposed TGP Interconnect
- ═ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

Source: Z:\Clients\Q_T\SpectraNexus\ArcGIS\2016\03\DEIS\Overview_Figures\NEXUS_Route_Maps_Appendix_B.mxd

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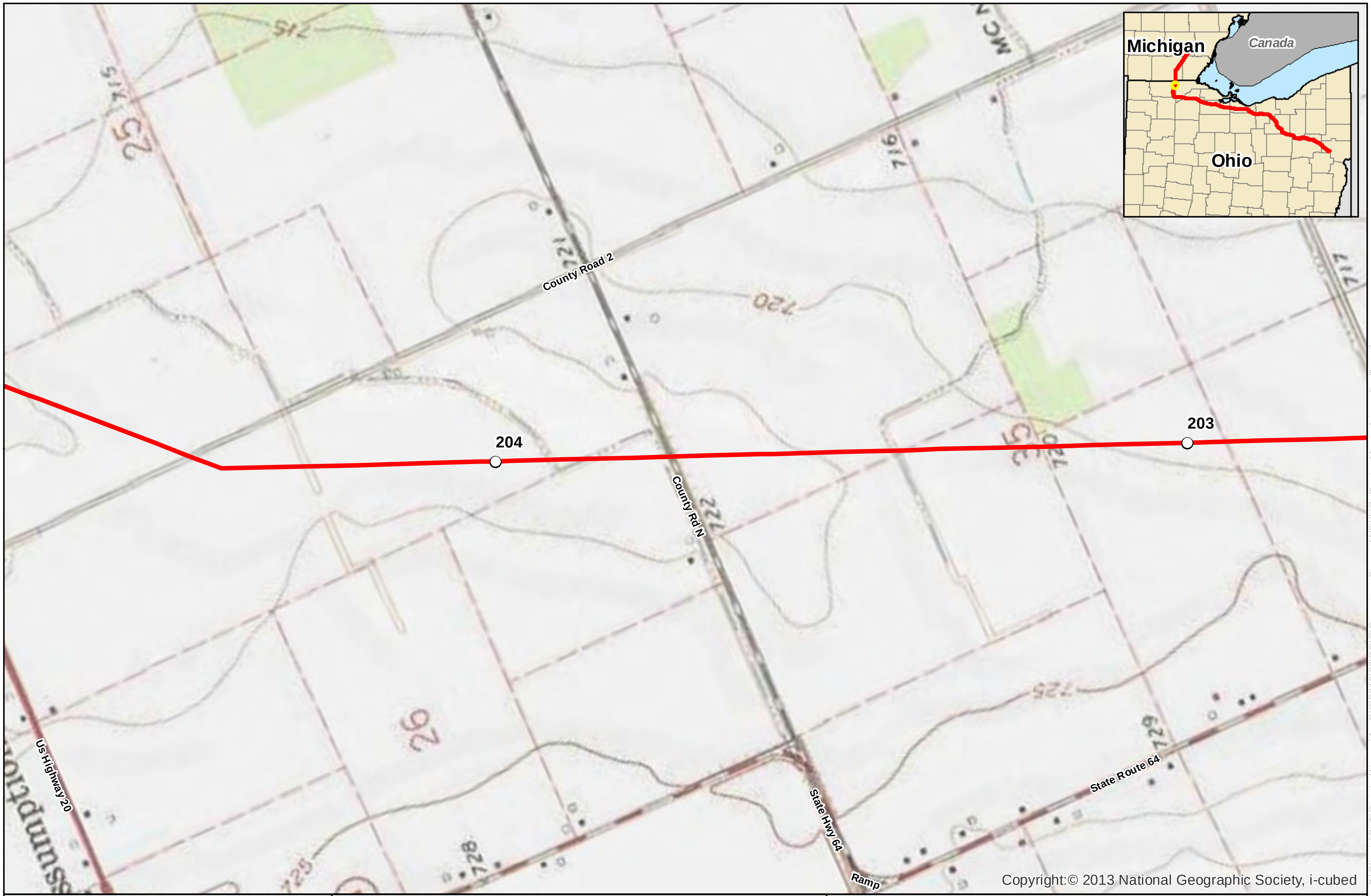

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⋈	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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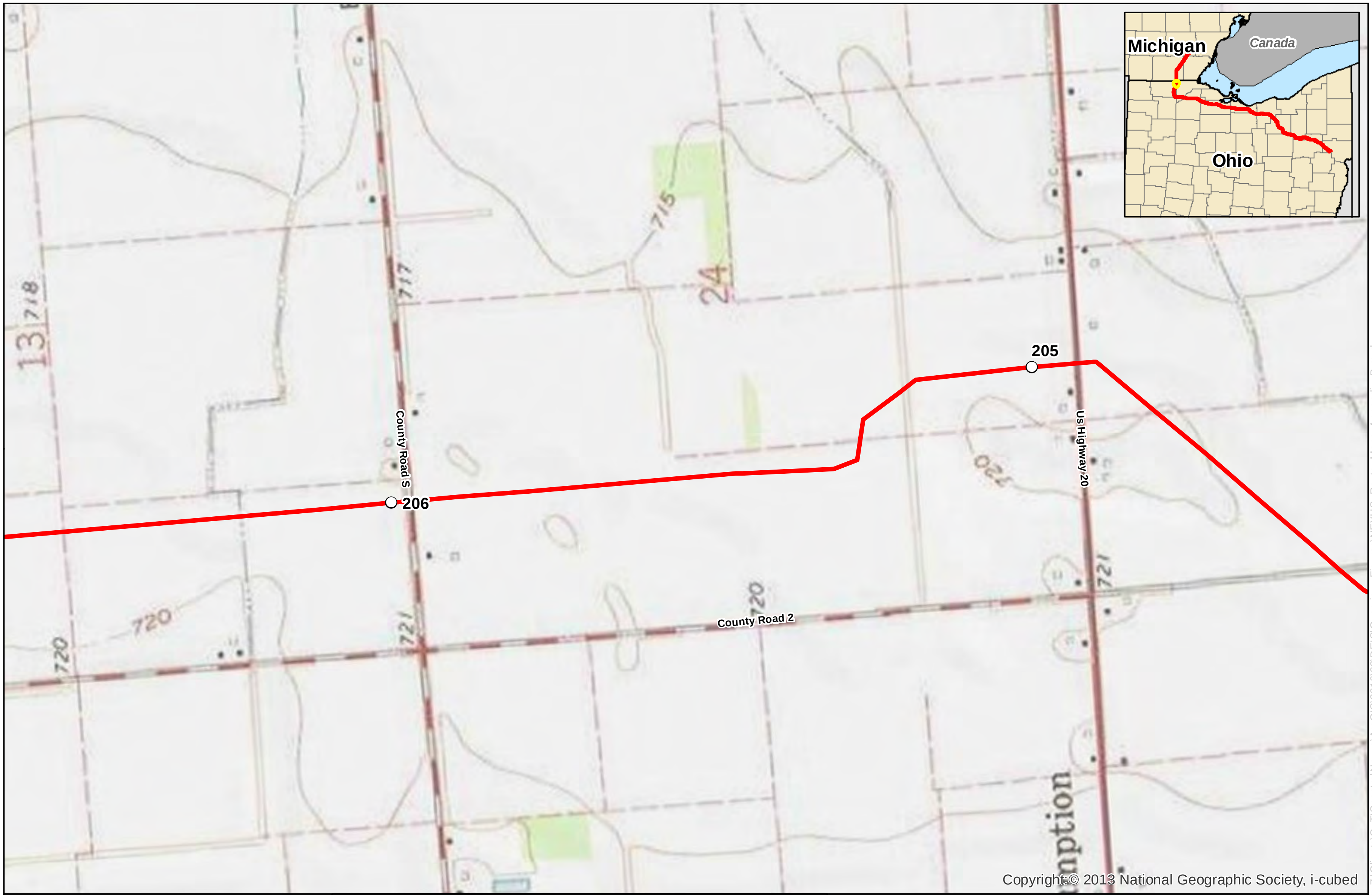

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1 inch = 1,000 feet

Appendix B-1

NGT Project

Route Map

○ Milepost	Proposed TGP Interconnect
● Tee-Tap Location	Proposed Access Road
⧓ Proposed Main Line Valve	▭ Proposed Compressor Station
Proposed NEXUS Mainline Pipeline	▭ Proposed Ware Yard
- - - Proposed TEAL Connecting Pipeline	▭ M&R Station

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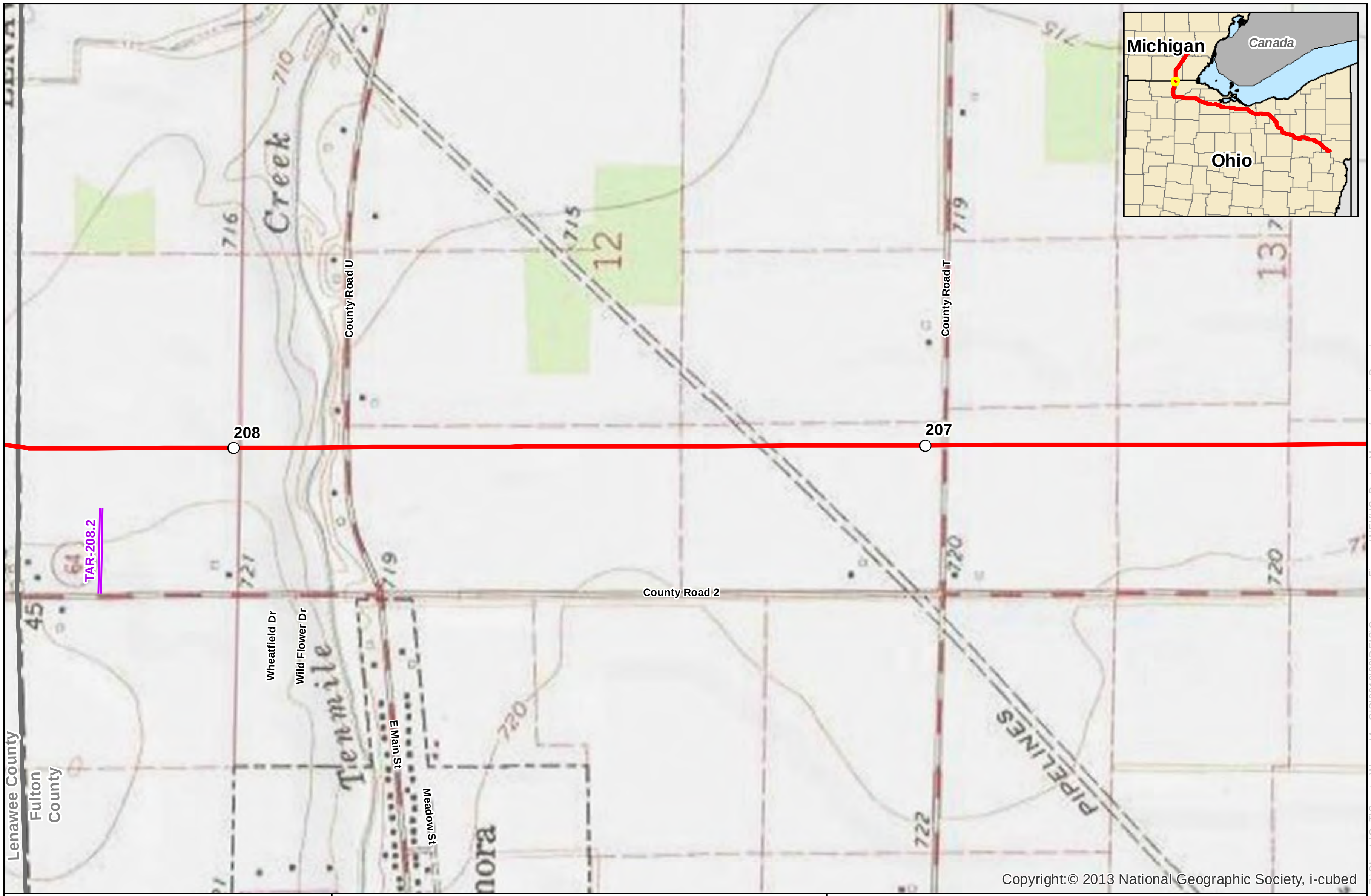

1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⧓ Proposed Main Line Valve

🟥 Proposed NEXUS Mainline Pipeline

- - - Proposed TEAL Connecting Pipeline

🟨 Proposed TGP Interconnect

🟪 Proposed Access Road

🟦 Proposed Compressor Station

🟧 Proposed Ware Yard

🟩 M&R Station

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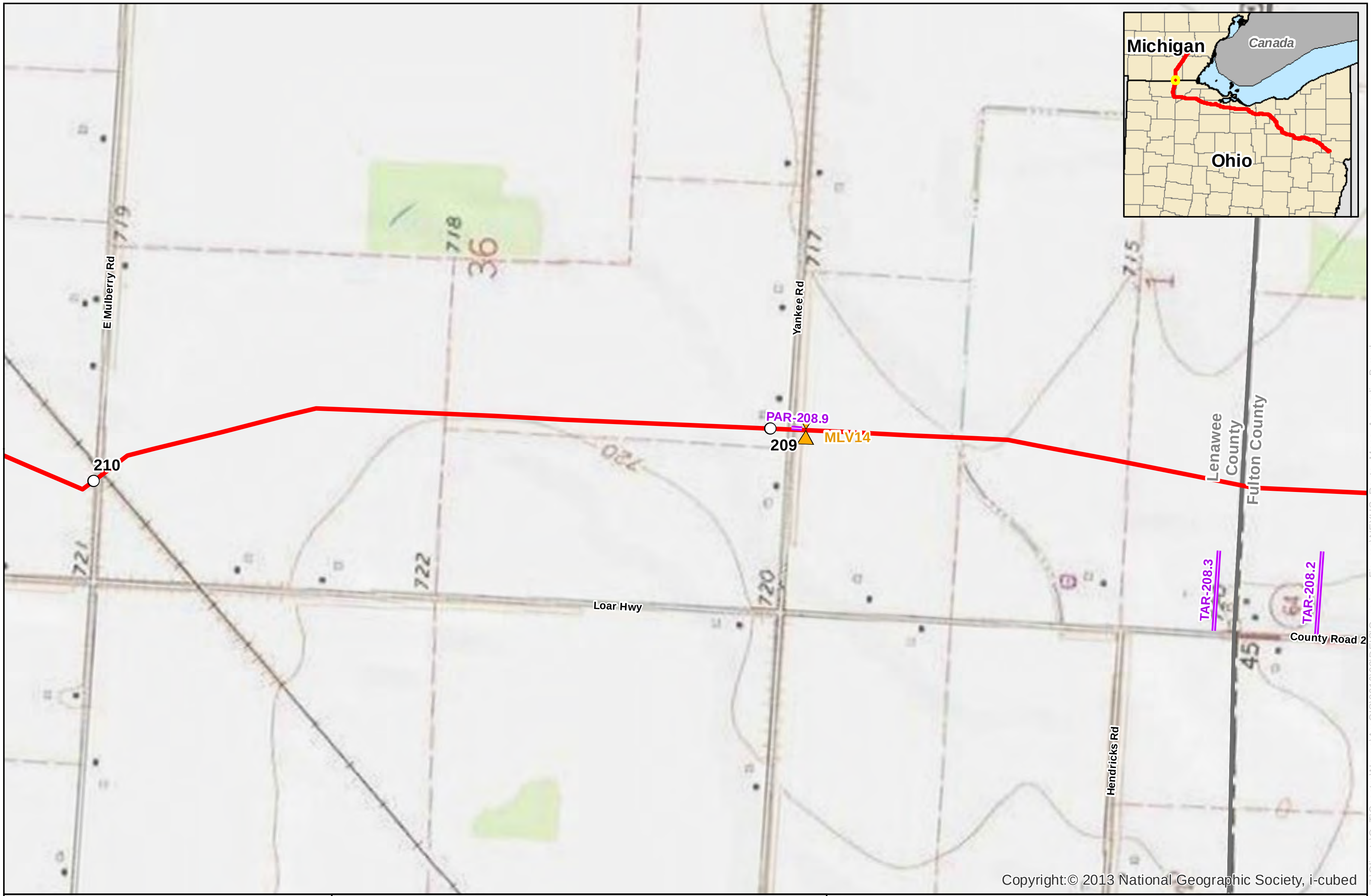

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1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⋈ Proposed Main Line Valve

— Proposed NEXUS Mainline Pipeline

- - - Proposed TEAL Connecting Pipeline

— Proposed TGP Interconnect

═ Proposed Access Road

▢ Proposed Compressor Station

▢ Proposed Ware Yard

▢ M&R Station

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Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⋈ Proposed Main Line Valve

— Proposed NEXUS Mainline Pipeline

- - - Proposed TEAL Connecting Pipeline

— Proposed TGP Interconnect

— Proposed Access Road

☐ Proposed Compressor Station

☐ Proposed Ware Yard

☐ M&R Station

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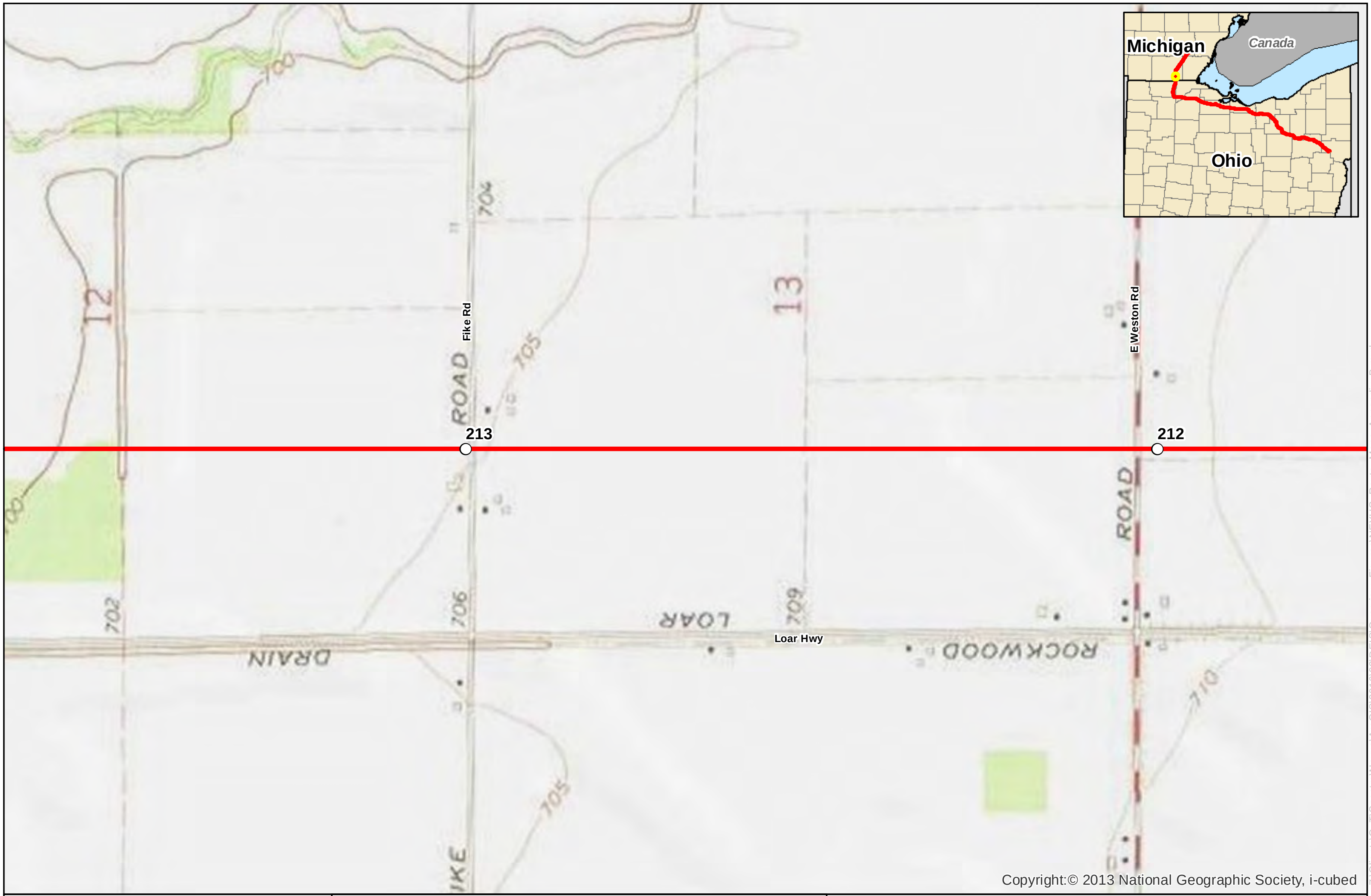

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⋈ Proposed Main Line Valve
― Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
― Proposed TGP Interconnect
― Proposed Access Road
☐ Proposed Compressor Station
☐ Proposed Ware Yard
☐ M&R Station

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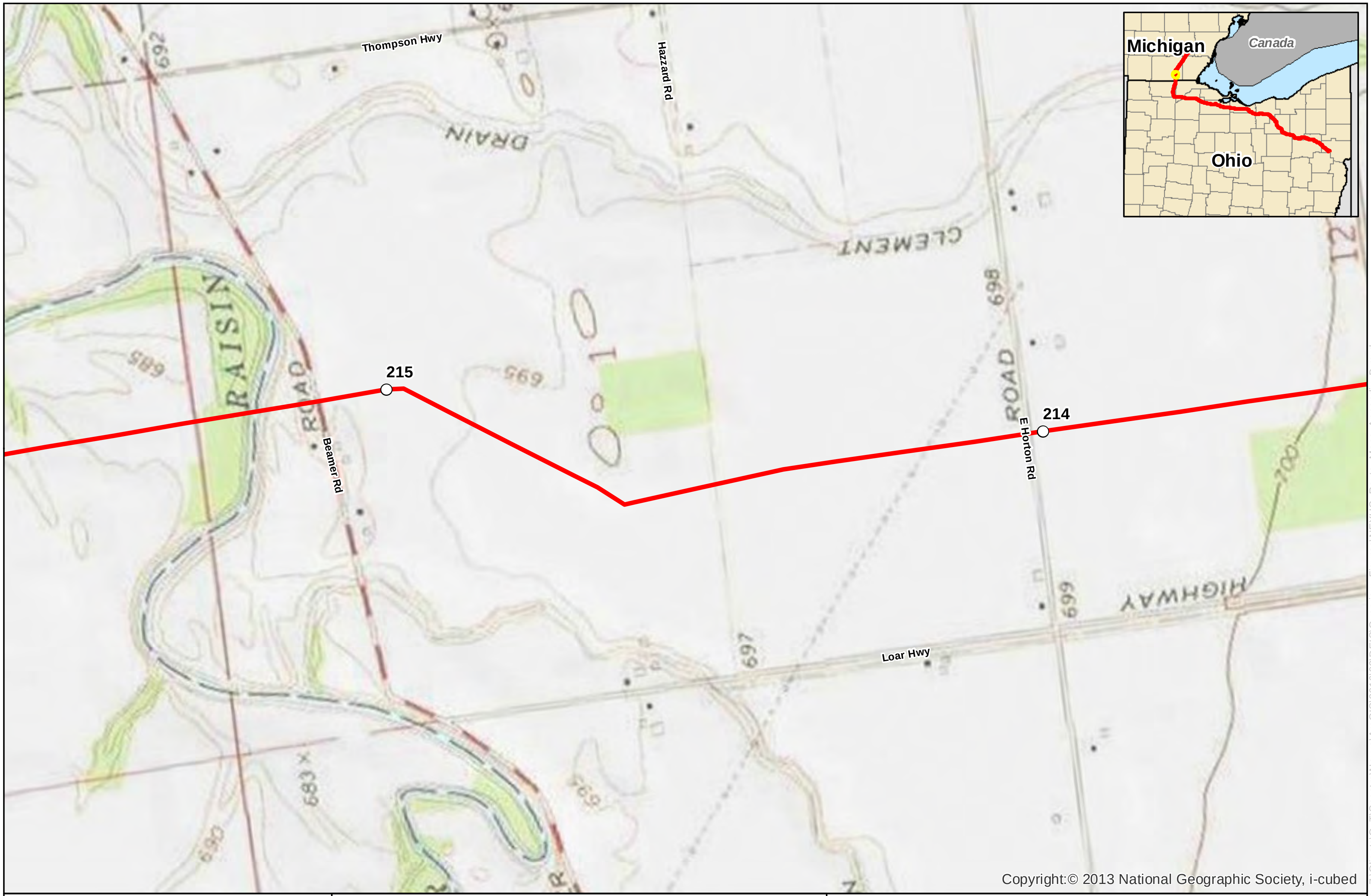

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⧓ Proposed Main Line Valve
- 🟥 Proposed NEXUS Mainline Pipeline
- ▬ ▬ Proposed TEAL Connecting Pipeline
- ▬ Proposed TGP Interconnect
- ▬ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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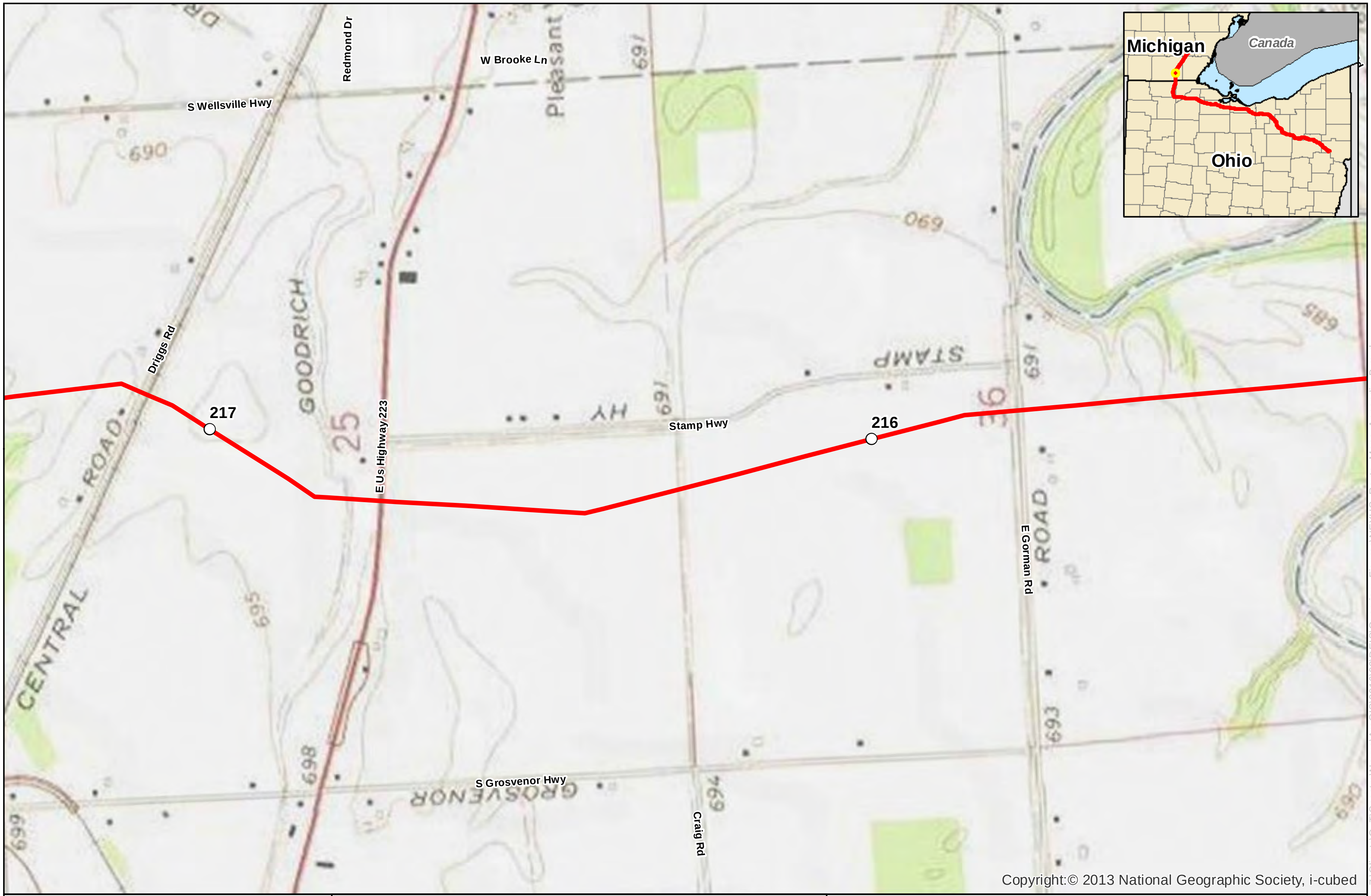

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Appendix B-1
NGT Project
Route Map

○	Milepost	—	Proposed TGP Interconnect
●	Tee-Tap Location	—	Proposed Access Road
⋈	Proposed Main Line Valve	▭	Proposed Compressor Station
—	Proposed NEXUS Mainline Pipeline	▭	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	▭	M&R Station

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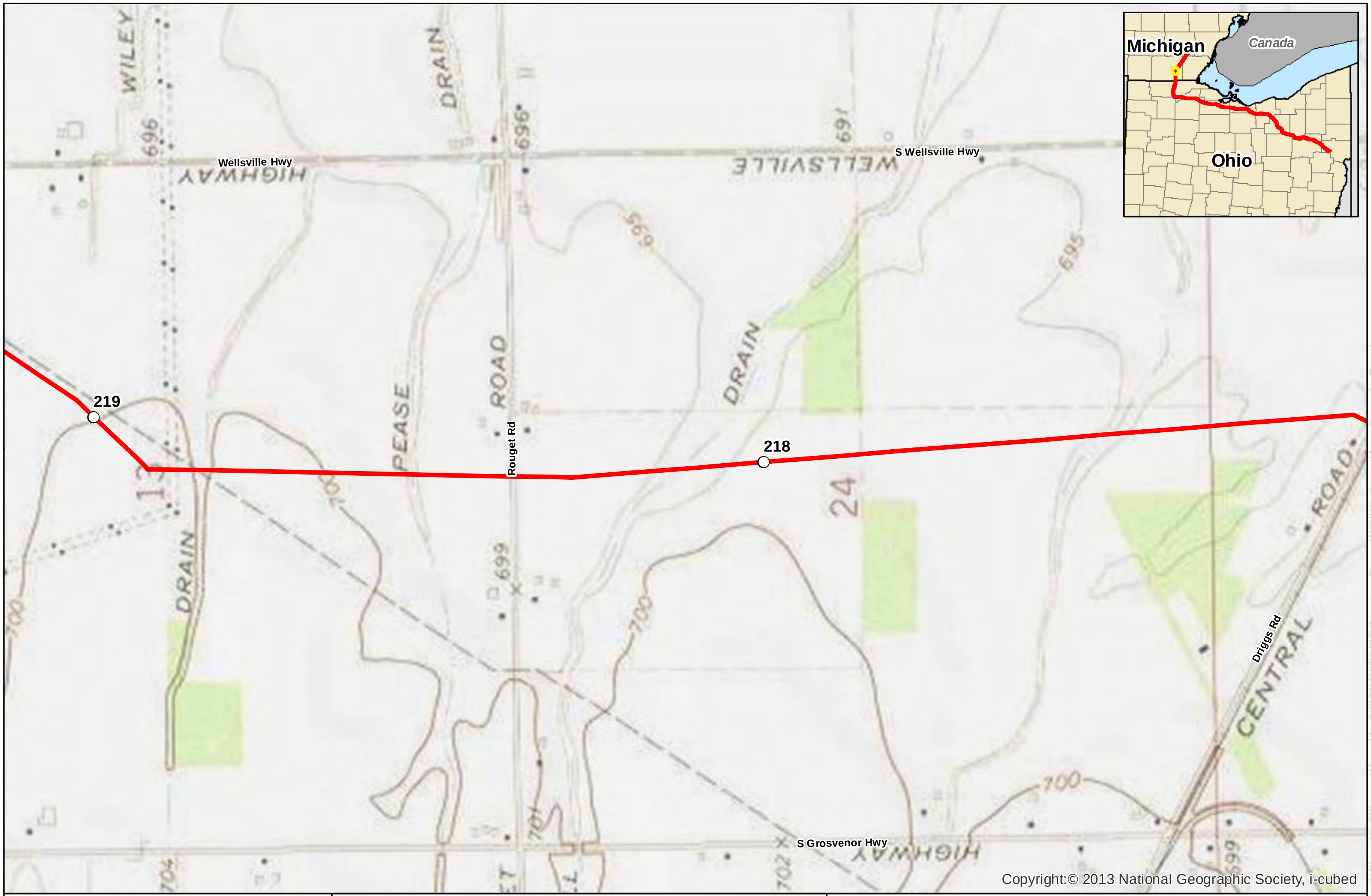

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1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧗	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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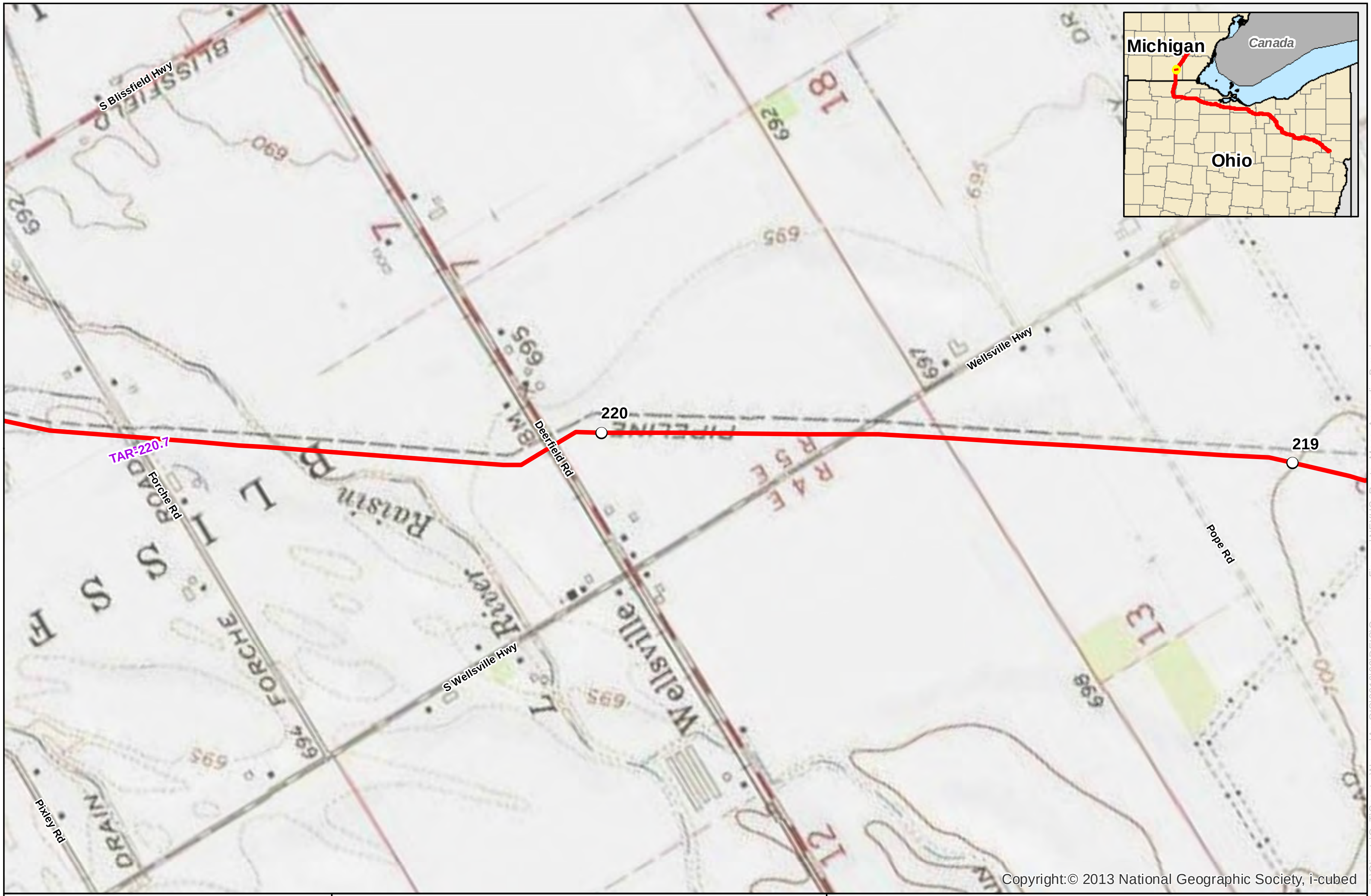

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
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- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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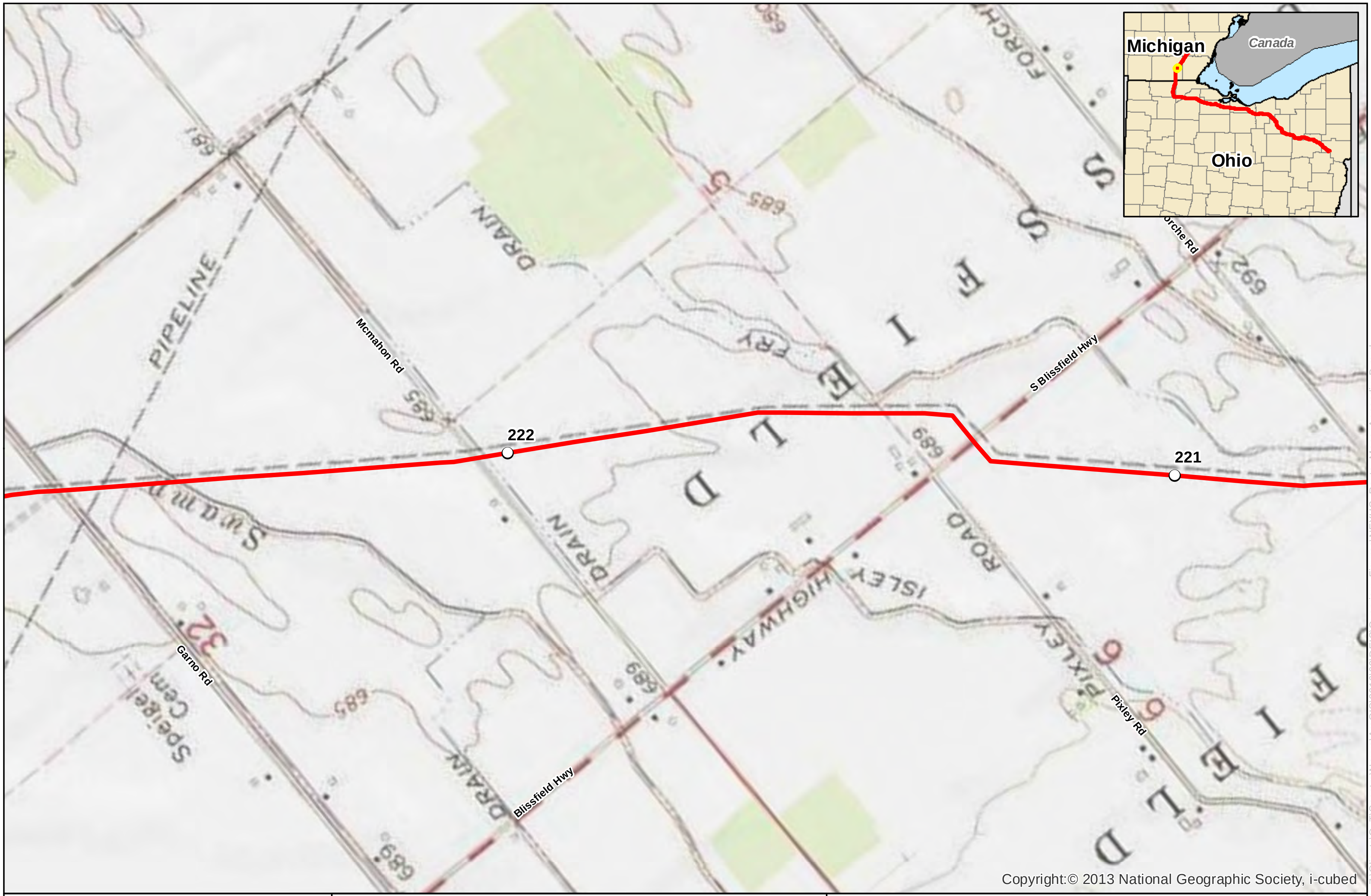

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⋈	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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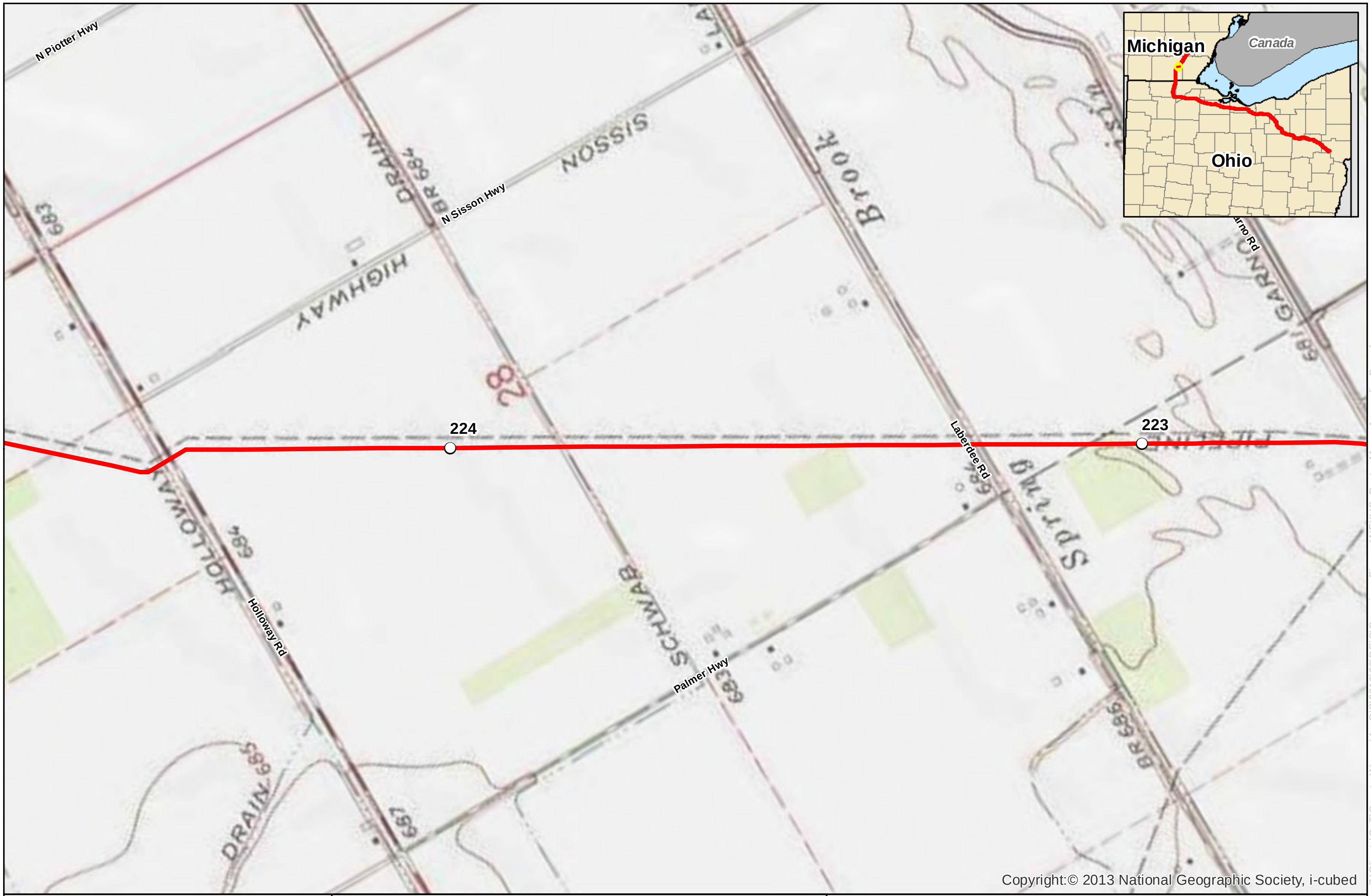

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⧓ Proposed Main Line Valve
━ Proposed NEXUS Mainline Pipeline
╍ Proposed TEAL Connecting Pipeline
━ Proposed TGP Interconnect
━ Proposed Access Road
▢ Proposed Compressor Station
▢ Proposed Ware Yard
▢ M&R Station

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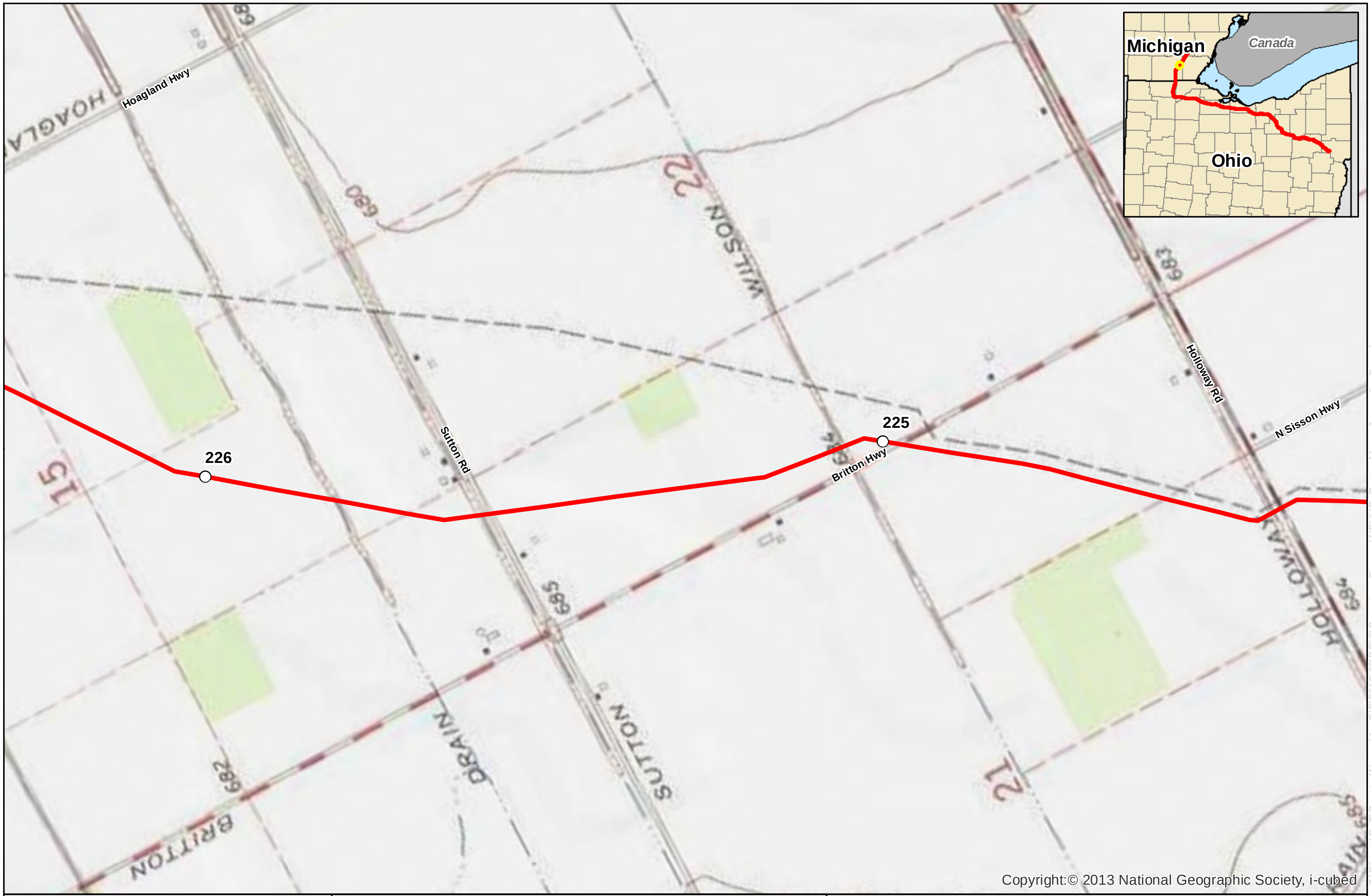

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⋈	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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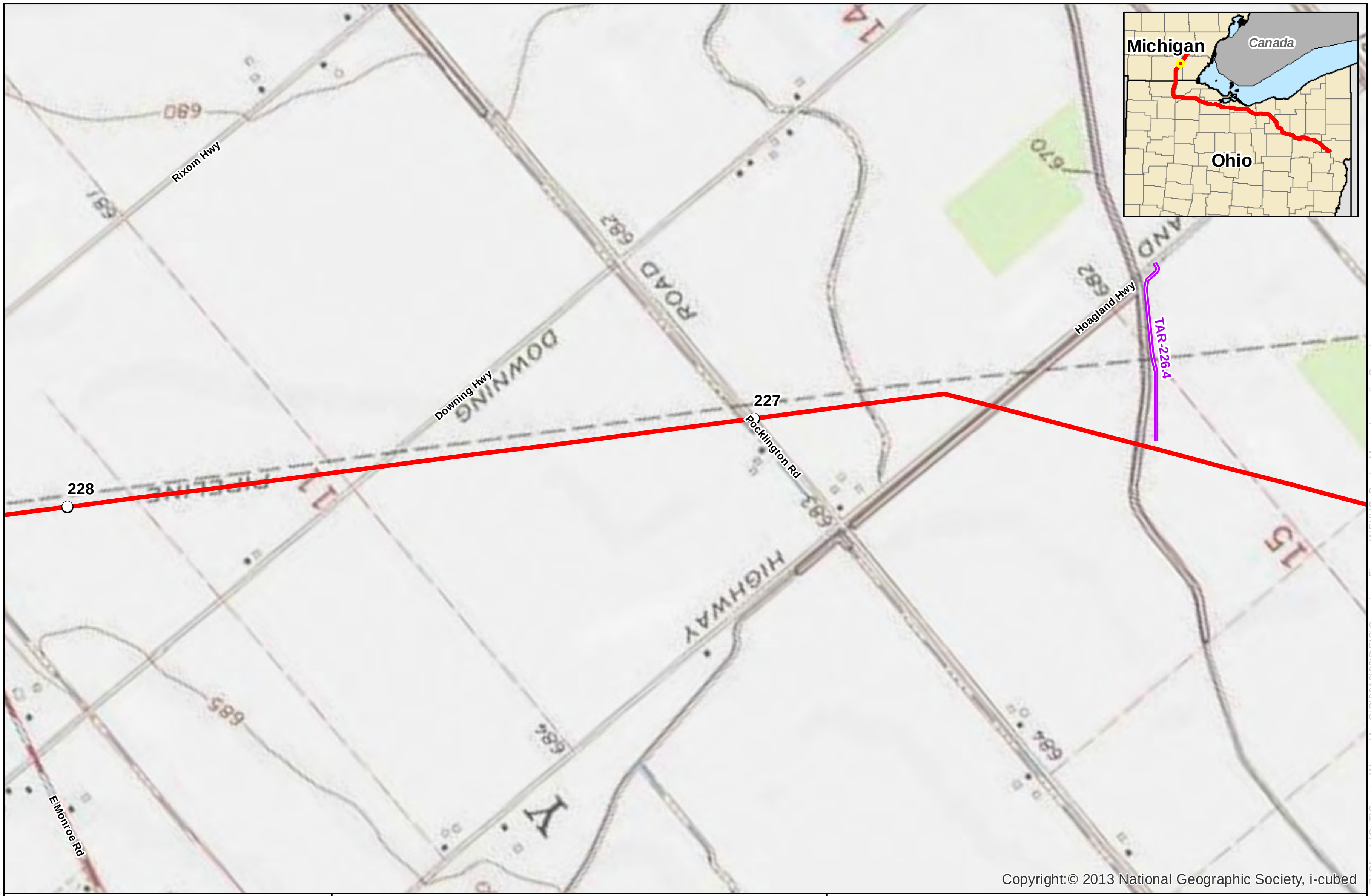

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⧓ Proposed Main Line Valve
— Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
— Proposed TGP Interconnect
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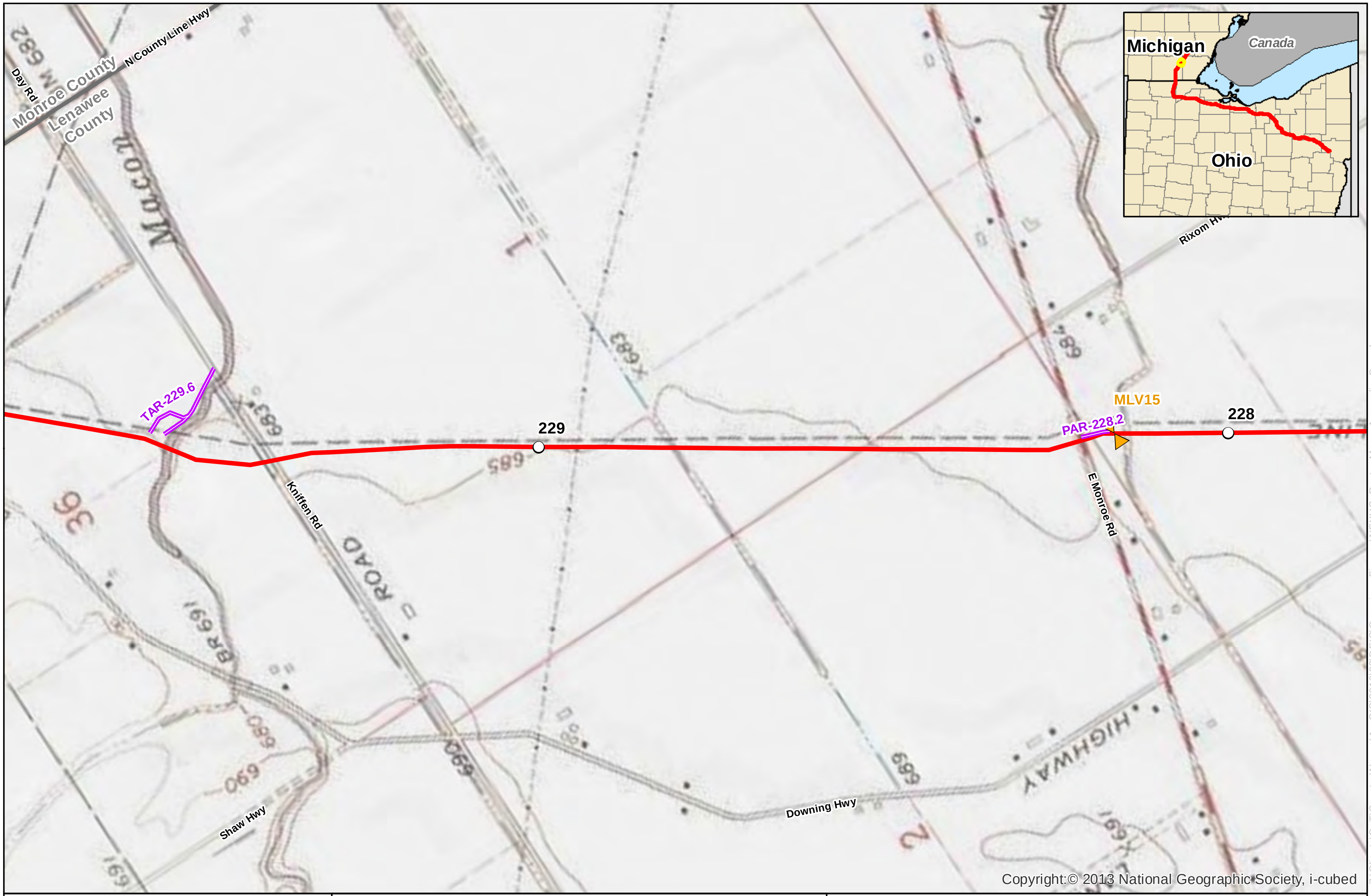

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1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

▶◀ Proposed Main Line Valve

— Proposed NEXUS Mainline Pipeline

- - - Proposed TEAL Connecting Pipeline

— Proposed TGP Interconnect

— Proposed Access Road

☐ Proposed Compressor Station

☐ Proposed Ware Yard

☐ M&R Station

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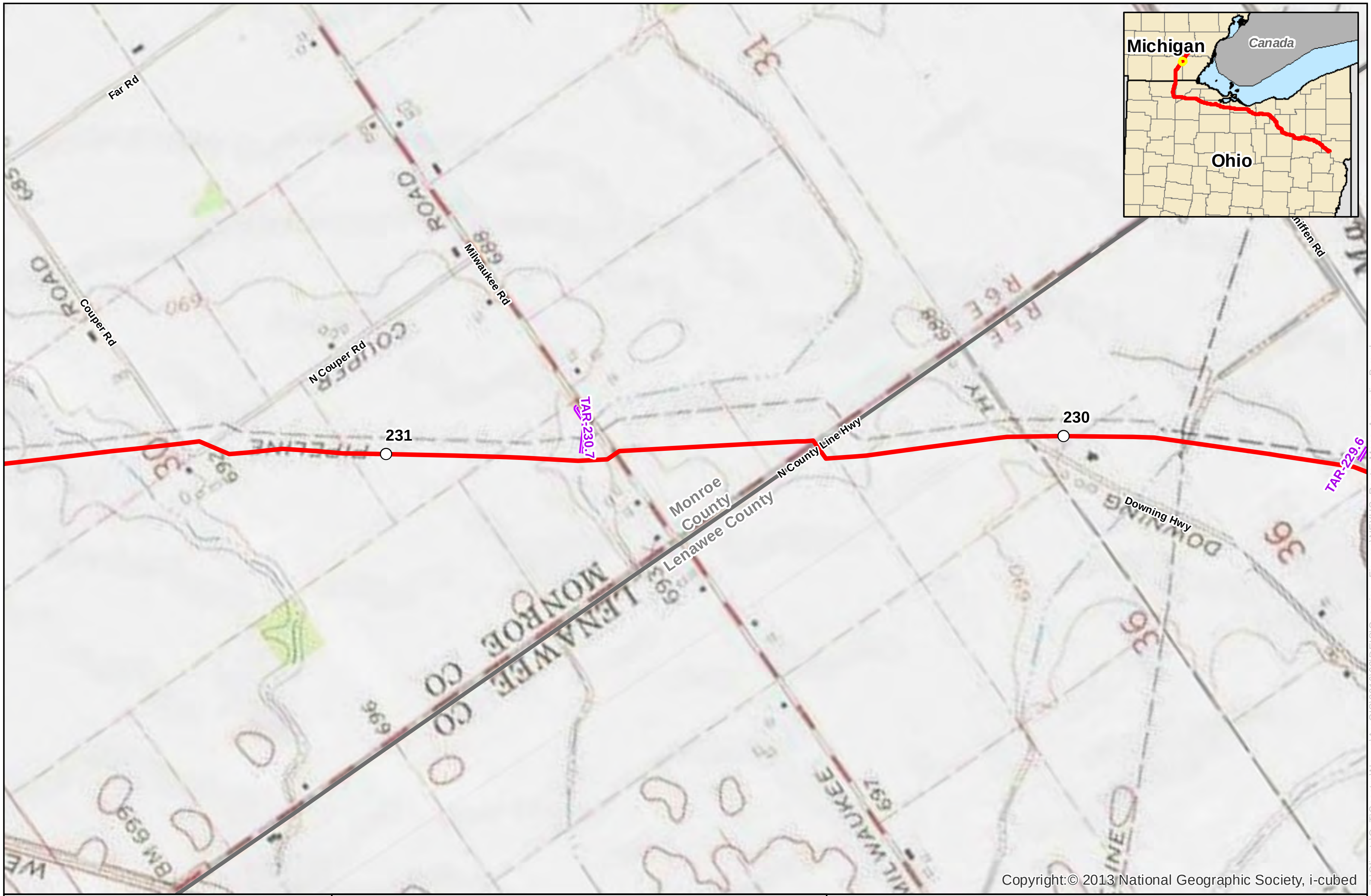

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Appendix B-1

NGT Project

Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⋈	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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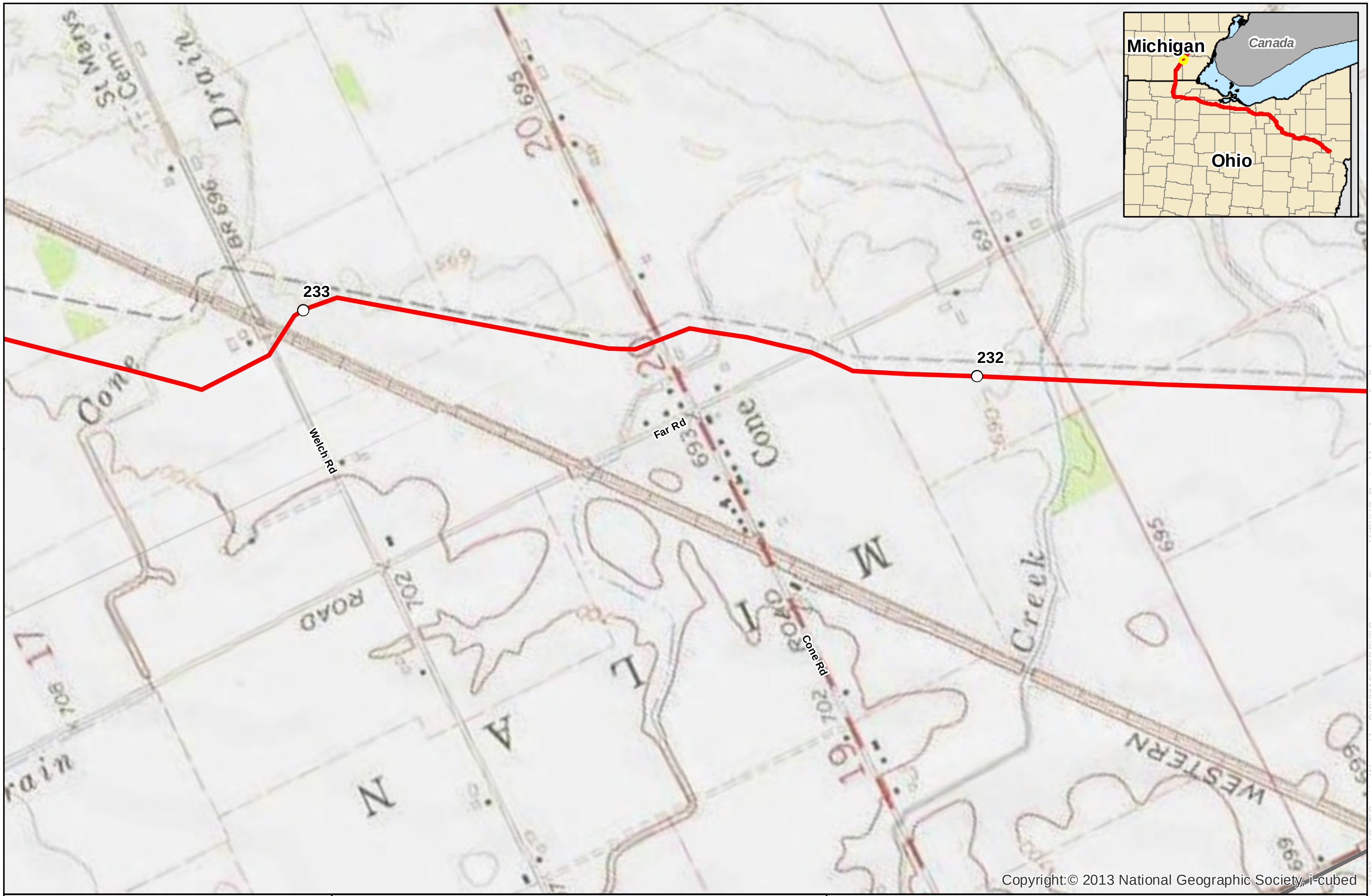

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Appendix B-1
NGT Project
Route Map

○	Milepost		Proposed TGP Interconnect
●	Tee-Tap Location		Proposed Access Road
⧓	Proposed Main Line Valve	☐	Proposed Compressor Station
	Proposed NEXUS Mainline Pipeline	☐	Proposed Ware Yard
	Proposed TEAL Connecting Pipeline	☐	M&R Station

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1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

○ Milepost

● Tee-Tap Location

⋈ Proposed Main Line Valve

━ Proposed NEXUS Mainline Pipeline

┅ Proposed TEAL Connecting Pipeline

━ Proposed TGP Interconnect

━ Proposed Access Road

▢ Proposed Compressor Station

▢ Proposed Ware Yard

▢ M&R Station

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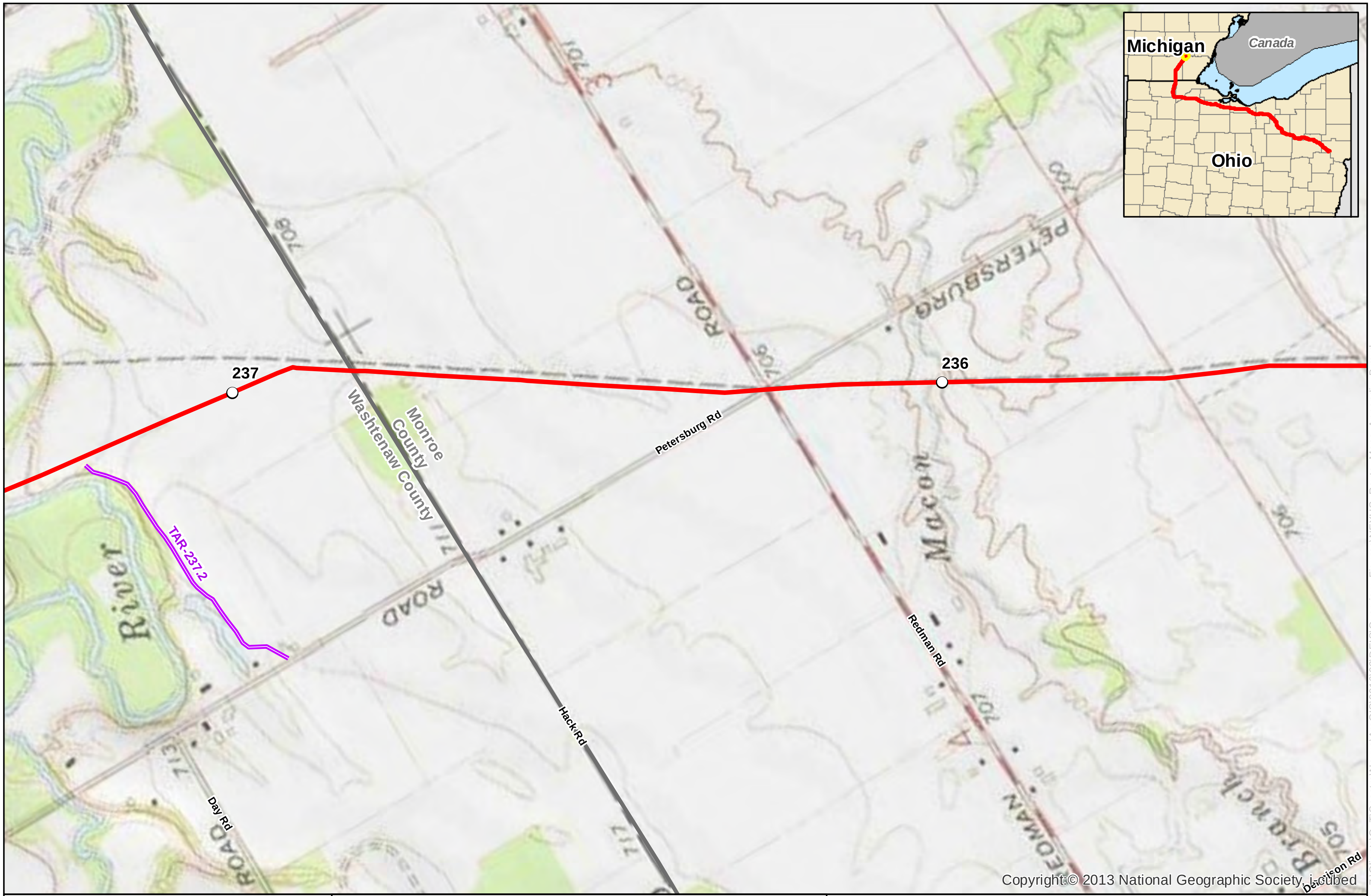

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⋈	Proposed Main Line Valve	☐	Proposed Compressor Station
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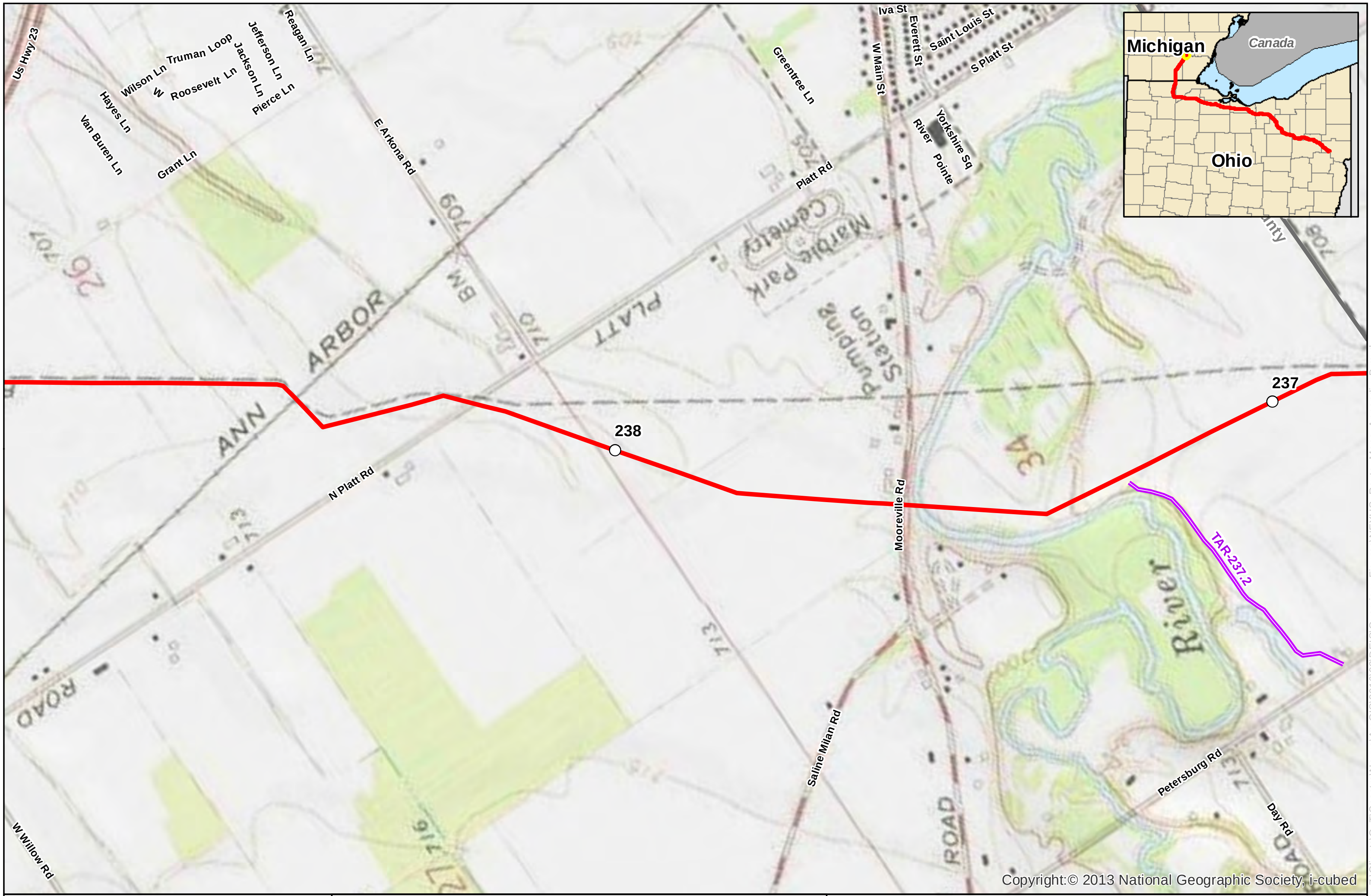

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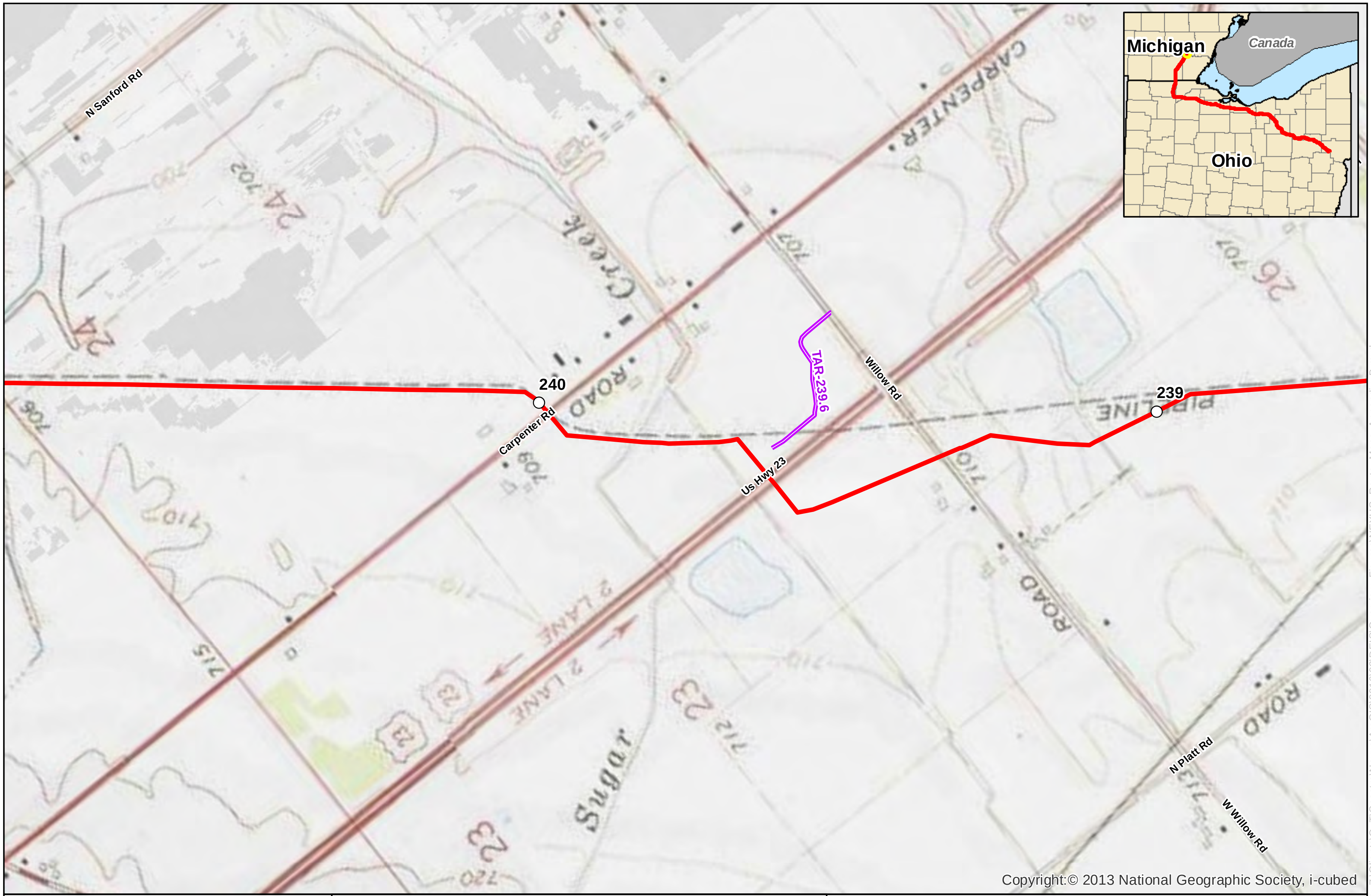
Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⧓ Proposed Main Line Valve
- ▬ Proposed NEXUS Mainline Pipeline
- ‐ ‐ ‐ Proposed TEAL Connecting Pipeline
- ▬ Proposed TGP Interconnect
- ═ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

Source: Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\03\DEIS\Overview_Figures\NEXUS_Route_Maps_Appendix_B.mxd

Date: (6/20/2016)



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Feet

1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⋈ Proposed Main Line Valve
- ━ Proposed NEXUS Mainline Pipeline
- ╍ Proposed TEAL Connecting Pipeline
- ━ Proposed TGP Interconnect
- ═ Proposed Access Road
- ▢ Proposed Compressor Station
- ▢ Proposed Ware Yard
- ▢ M&R Station

Source: Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\03\DEIS\Overview_Figures\NEXUS_Route_Maps_Appendix_B.mxd

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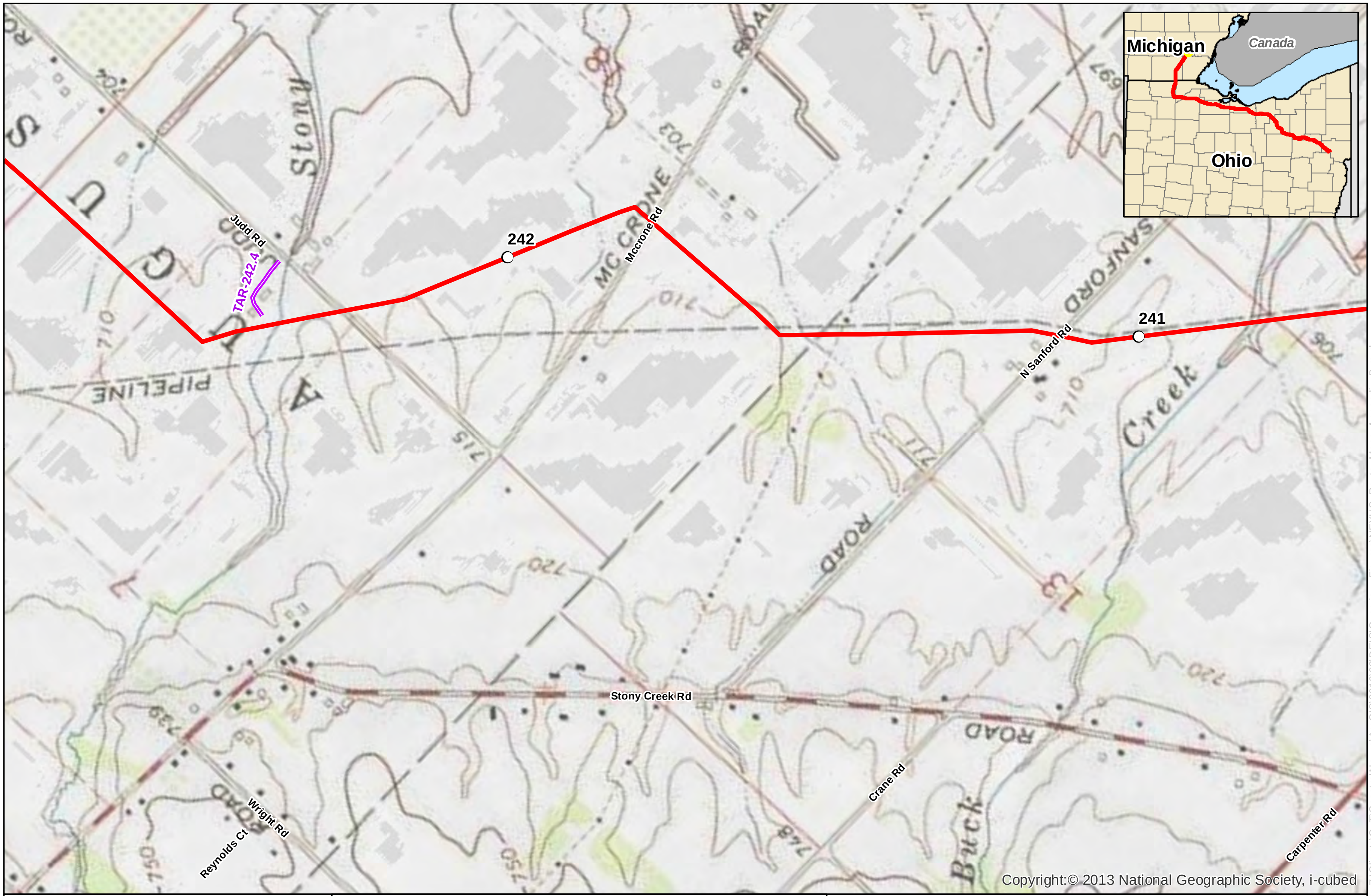

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⋈ Proposed Main Line Valve
— Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
— Proposed TGP Interconnect
═ Proposed Access Road
▢ Proposed Compressor Station
▢ Proposed Ware Yard
▢ M&R Station

Source: Z:\Clients\O_T\Spectra\Nexus\ArcGIS\2016\03\DEIS\Overview_Figures\NEXUS_Route_Maps_Appendix_B.mxd

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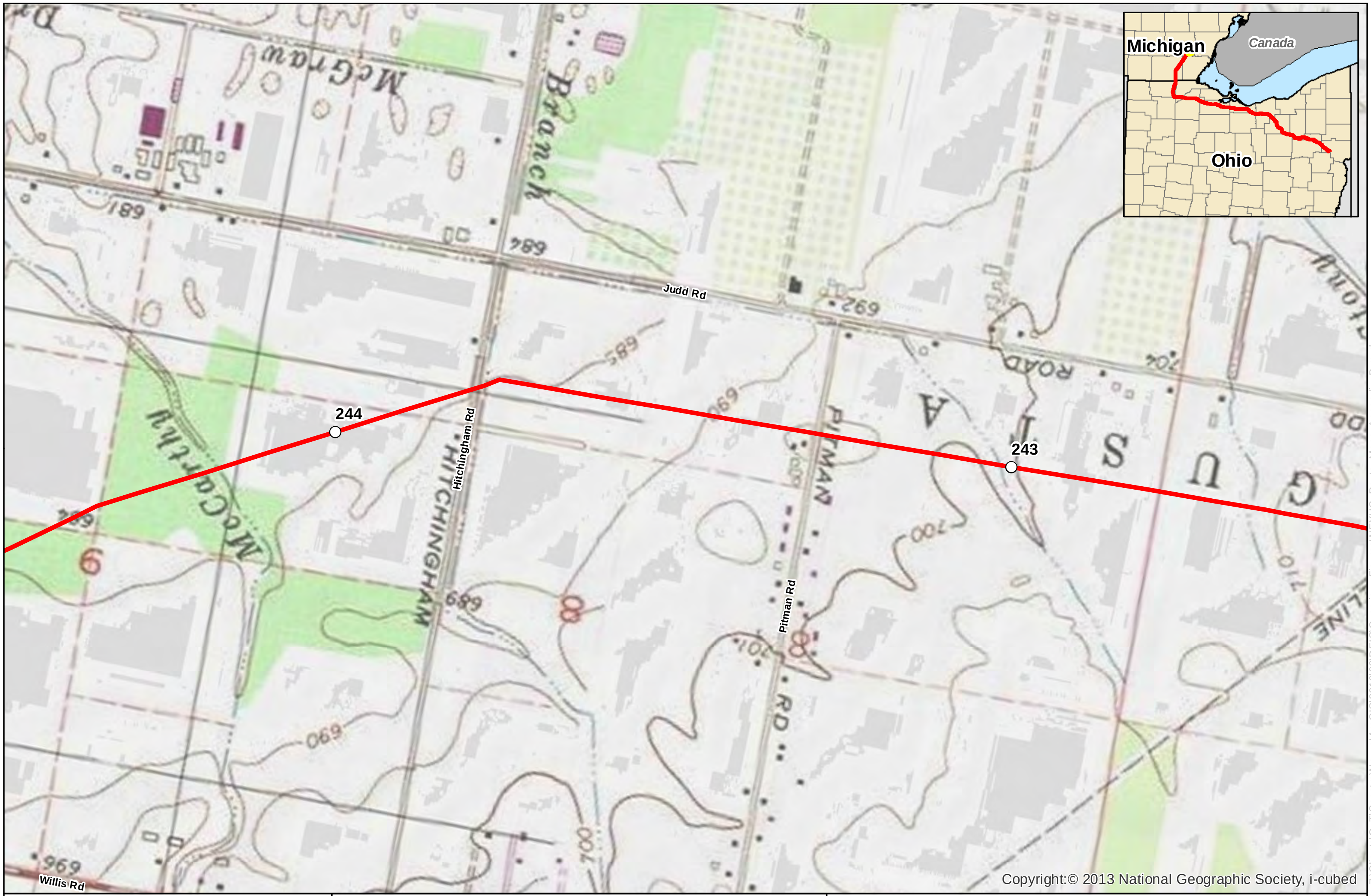

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Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⧓	Proposed Main Line Valve	🟦	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	🟧	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	🟩	M&R Station

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Appendix B-1
NGT Project
Route Map

○ Milepost
● Tee-Tap Location
⧓ Proposed Main Line Valve
🟥 Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
🟨 Proposed TGP Interconnect
🟪 Proposed Access Road
🟦 Proposed Compressor Station
🟧 Proposed Ware Yard
🟩 M&R Station

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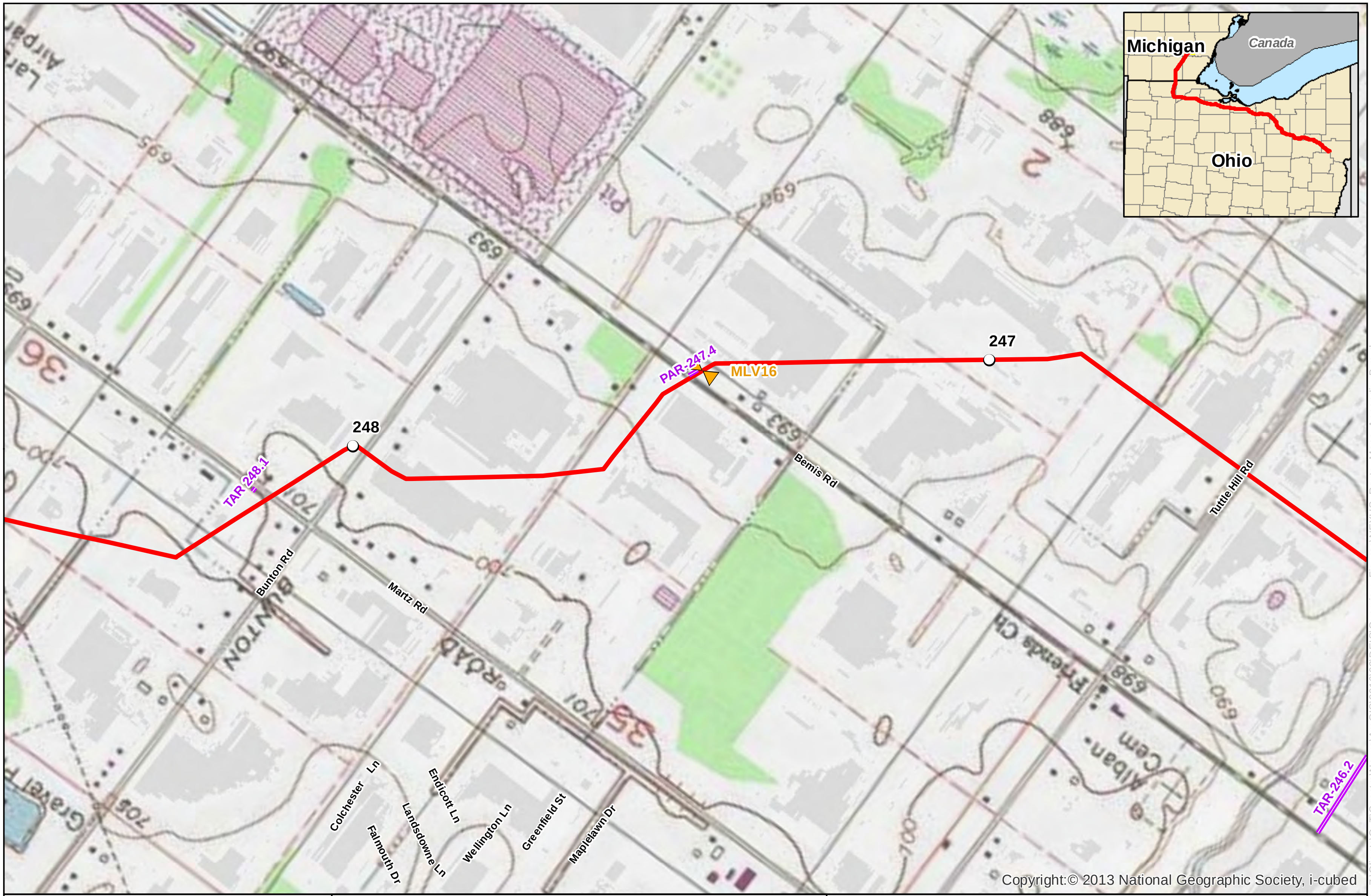

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1 inch = 1,000 feet

Appendix B-1
NGT Project
Route Map

○	Milepost		Proposed TGP Interconnect
●	Tee-Tap Location		Proposed Access Road
⧓	Proposed Main Line Valve	☐	Proposed Compressor Station
	Proposed NEXUS Mainline Pipeline	☐	Proposed Ware Yard
	Proposed TEAL Connecting Pipeline	☐	M&R Station

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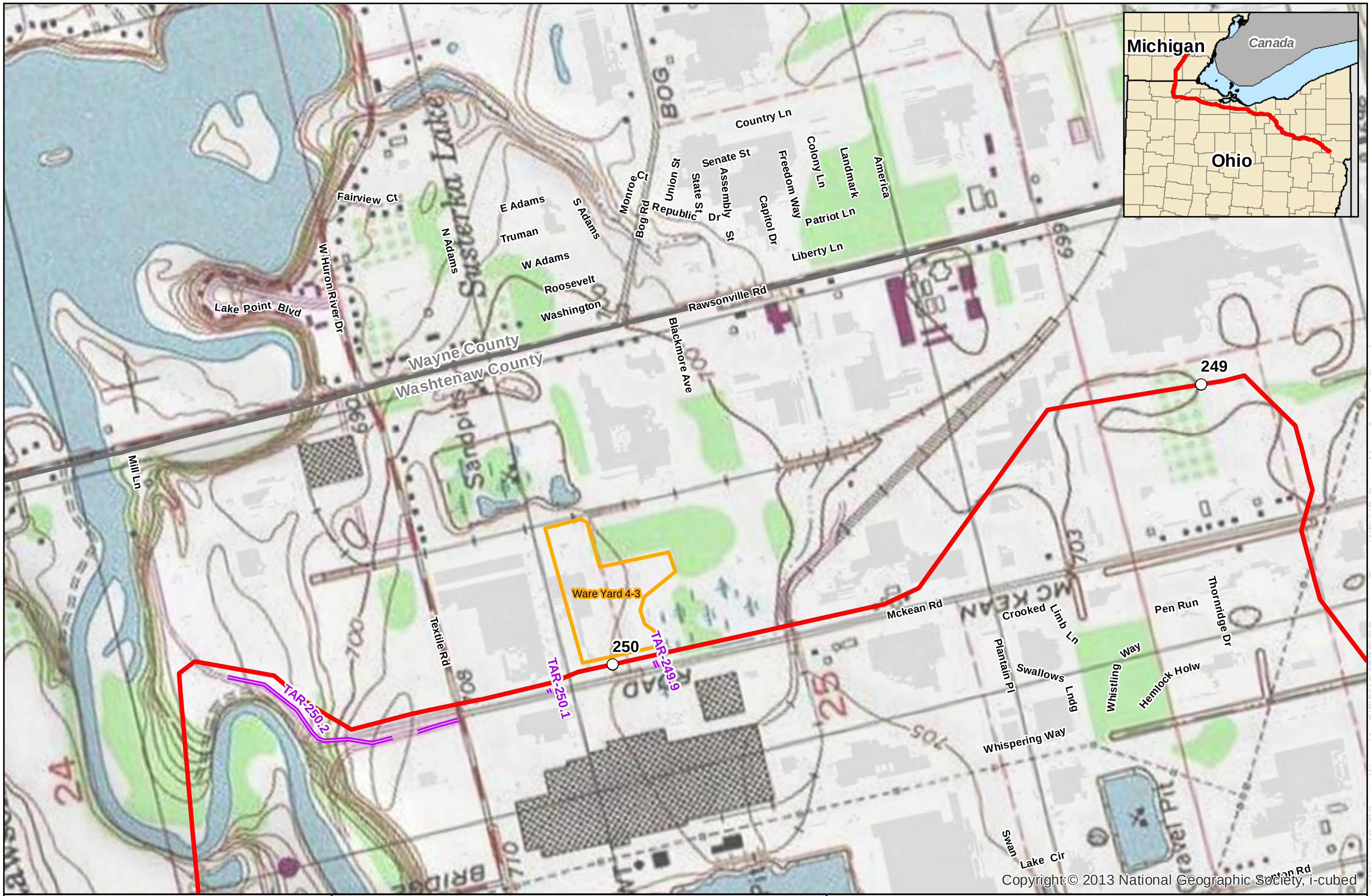

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Appendix B-1
NGT Project
Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⋈ Proposed Main Line Valve
- 🟥 Proposed NEXUS Mainline Pipeline
- ‐ ‐ Proposed TEAL Connecting Pipeline
- 🟨 Proposed TGP Interconnect
- 🟪 Proposed Access Road
- 🟦 Proposed Compressor Station
- 🟧 Proposed Ware Yard
- 🟩 M&R Station

Source: Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\03\DEIS\Overview_Figures\NEXUS_Route_Maps_Appendix_B.mxd

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1 inch = 1,000 feet

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Appendix B-1
NGT Project
Route Map

○	Milepost		Proposed TGP Interconnect
●	Tee-Tap Location		Proposed Access Road
⧓	Proposed Main Line Valve	☐	Proposed Compressor Station
―	Proposed NEXUS Mainline Pipeline	☐	Proposed Ware Yard
- - -	Proposed TEAL Connecting Pipeline	☐	M&R Station

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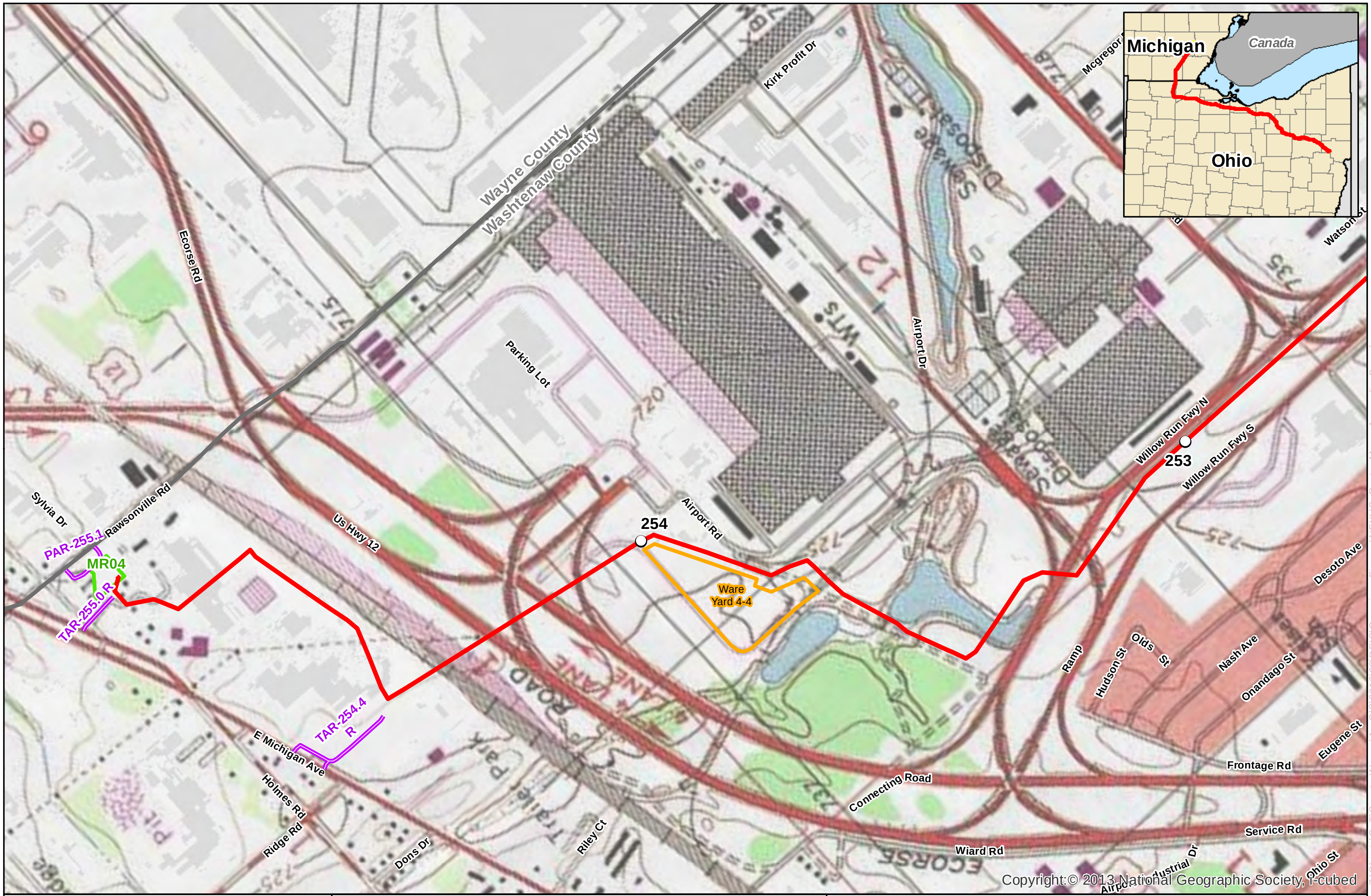

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Appendix B-1

NGT Project

Route Map

- ○ Milepost
- ● Tee-Tap Location
- ⋈ Proposed Main Line Valve
- ▬ Proposed NEXUS Mainline Pipeline
- - - Proposed TEAL Connecting Pipeline
- ▬ Proposed TGP Interconnect
- ═ Proposed Access Road
- ☐ Proposed Compressor Station
- ☐ Proposed Ware Yard
- ☐ M&R Station

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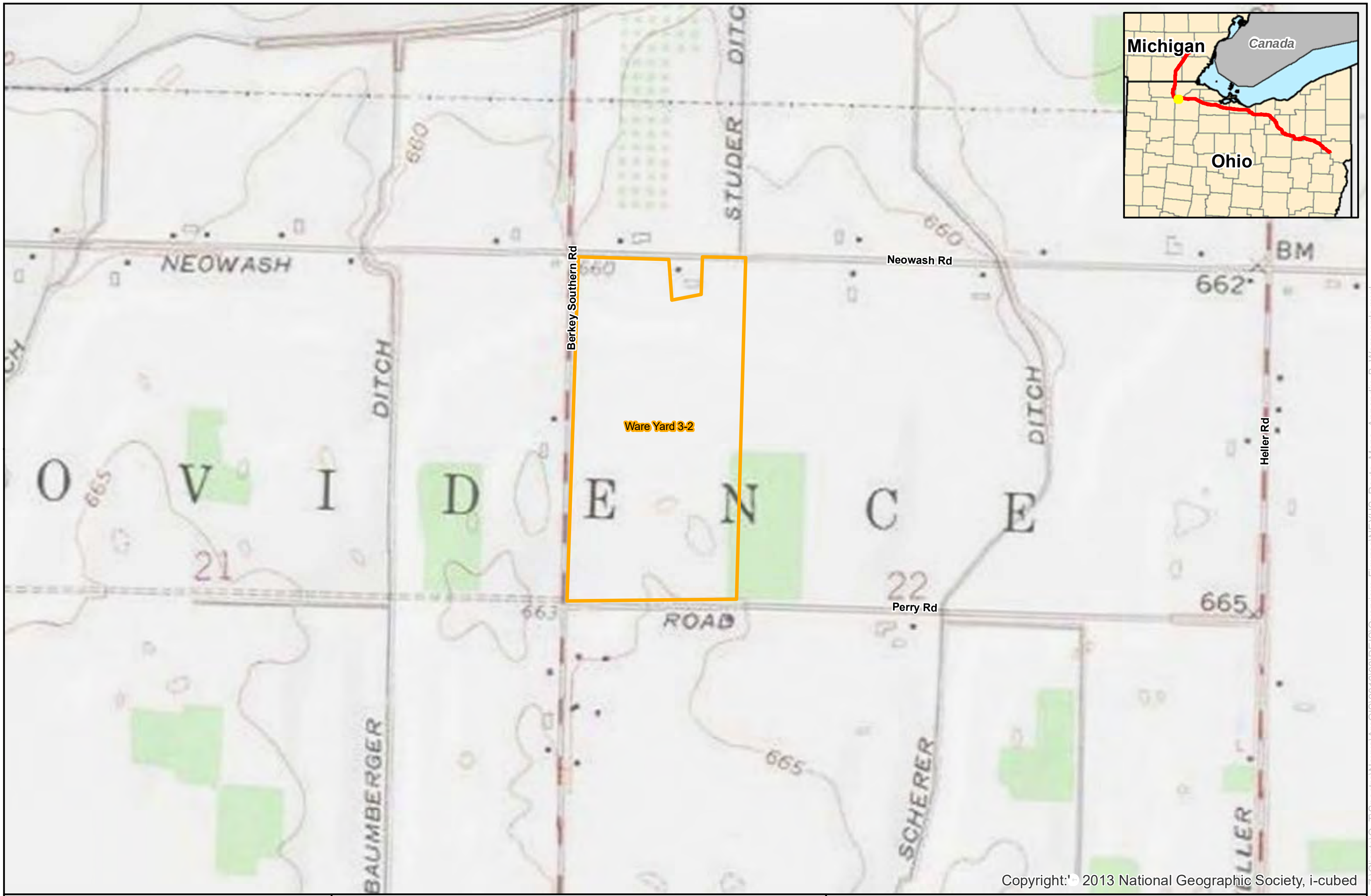

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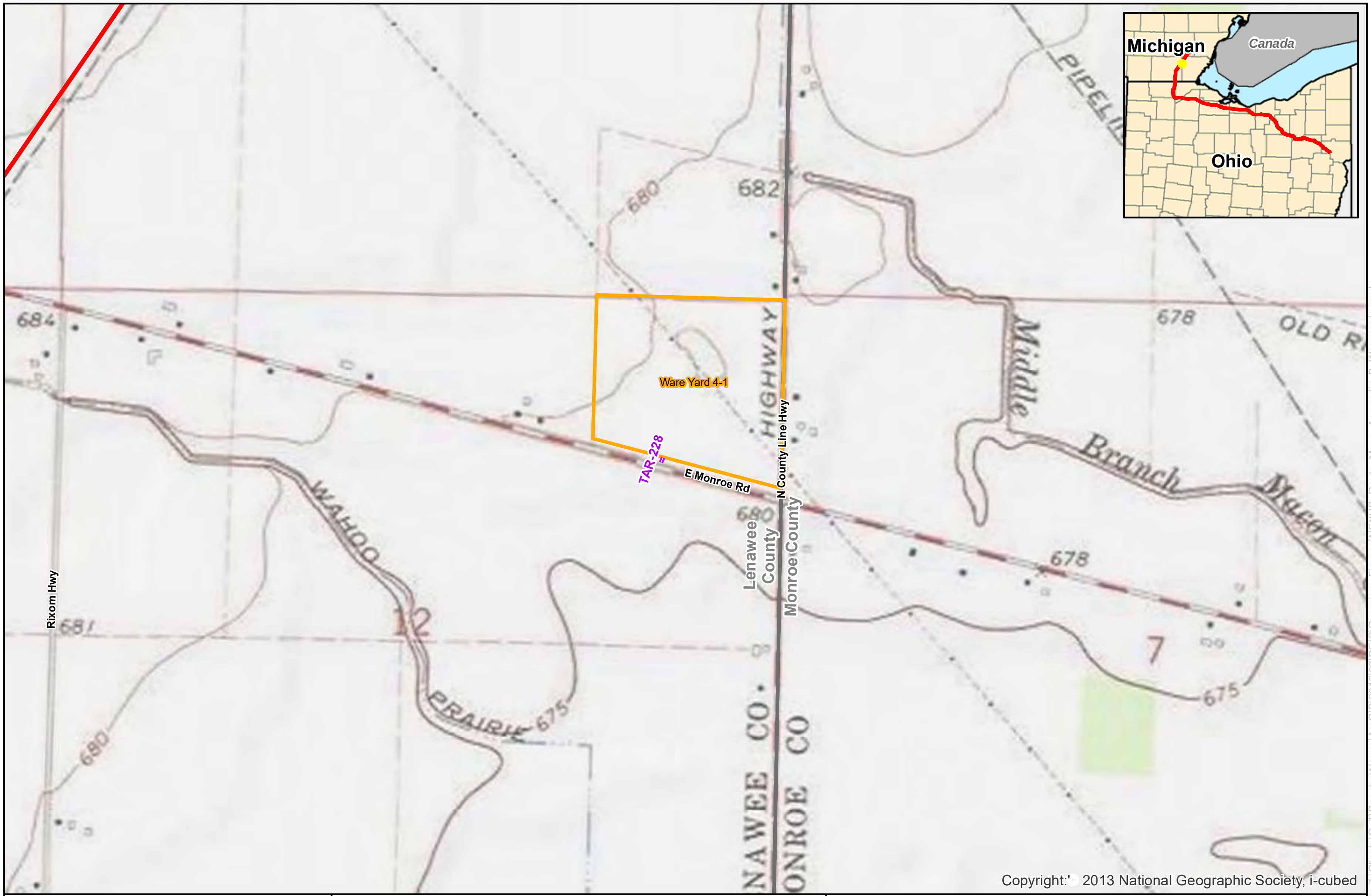
Ware Yard 3-2

Appendix B-1
NGT Project
Route Map

○ Milepost	Proposed TGP Interconnect
● Tee-Tap Location	Proposed Access Road
⧓ Proposed Main Line Valve	▢ Proposed Compressor Station
Proposed NEXUS Mainline Pipeline	▢ Proposed Ware Yard
Proposed TEAL Connecting Pipeline	▢ M&R Station

Date: (6/20/2016) **Source:** Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\03\DEIS\Overview_Figures\NEXUS_Route_Maps_Appendix_B_Wareyards.mxd



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Ware Yard 4-1

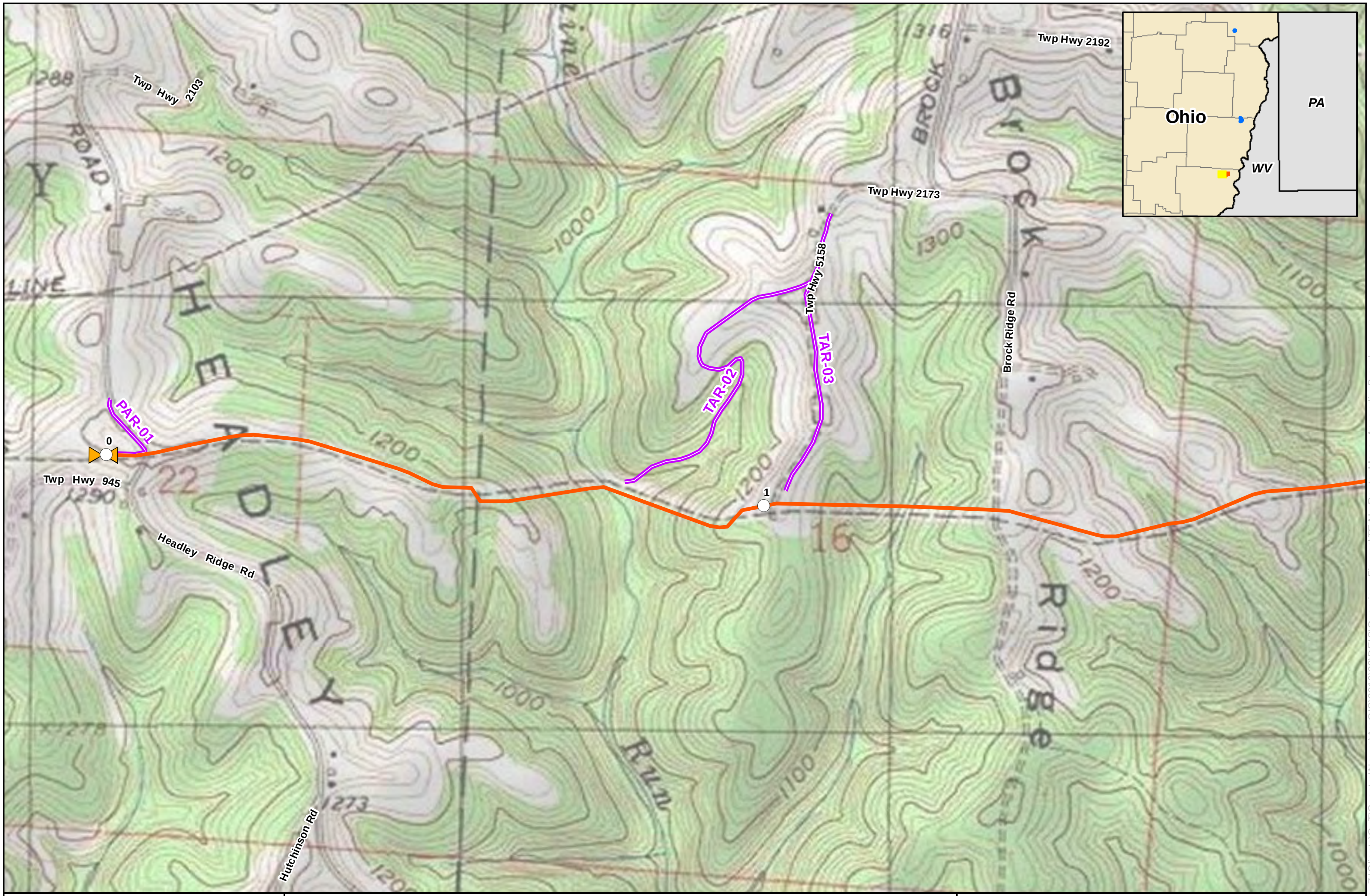
Appendix B-1
NGT Project
Route Map

○	Milepost	🟨	Proposed TGP Interconnect
●	Tee-Tap Location	🟪	Proposed Access Road
⋈	Proposed Main Line Valve	☐	Proposed Compressor Station
🟥	Proposed NEXUS Mainline Pipeline	☐	Proposed Ware Yard
- -	Proposed TEAL Connecting Pipeline	☐	M&R Station

Date: (6/20/2016) **Source:** Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\03\DEIS\Overview_Figures\NEXUS_Route_Maps_Appendix_B_Wareyards.mxd

APPENDIX B-2

TEAL PROJECT ROUTE MAPS



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Appendix B-2
TEAL Project
Route Map

○ Milepost

⧓ Proposed TEAL Valve

▬ Proposed TEAL Pipeline Loop

▬ Proposed Access Road

▭ Proposed Compressor Station

▭ Proposed Regulator/Receiver Site

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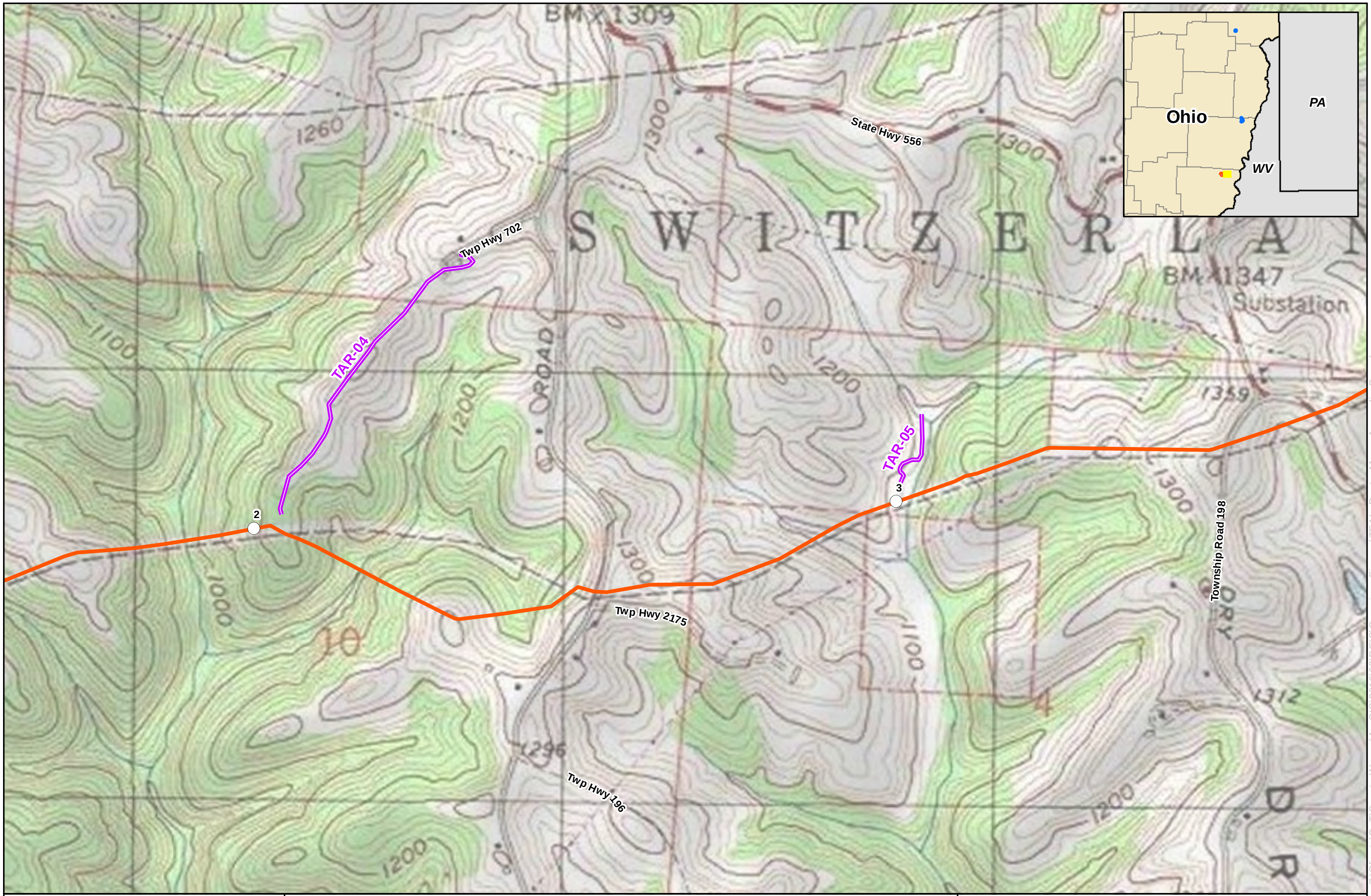

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Appendix B-2
TEAL Project
Route Map

○	Milepost	▭	Proposed Compressor Station
⧓	Proposed TEAL Valve	▭	Proposed Regulator/Receiver Site
━	Proposed TEAL Pipeline Loop		
═	Proposed Access Road		

Source: Z:\Clients\Q_T\SpectraNexus\ArcGIS\2016\03\DEIS\Overview_Figures\TEAL_Route_Maps_Appendix_B.mxd

Date: (6/20/2016)

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Appendix B-2
TEAL Project
Route Map

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- ○ Milepost
- ⧓ Proposed TEAL Valve
- Proposed TEAL Pipeline Loop
- Proposed Access Road
- ▭ Proposed Compressor Station
- ▭ Proposed Regulator/Receiver Site

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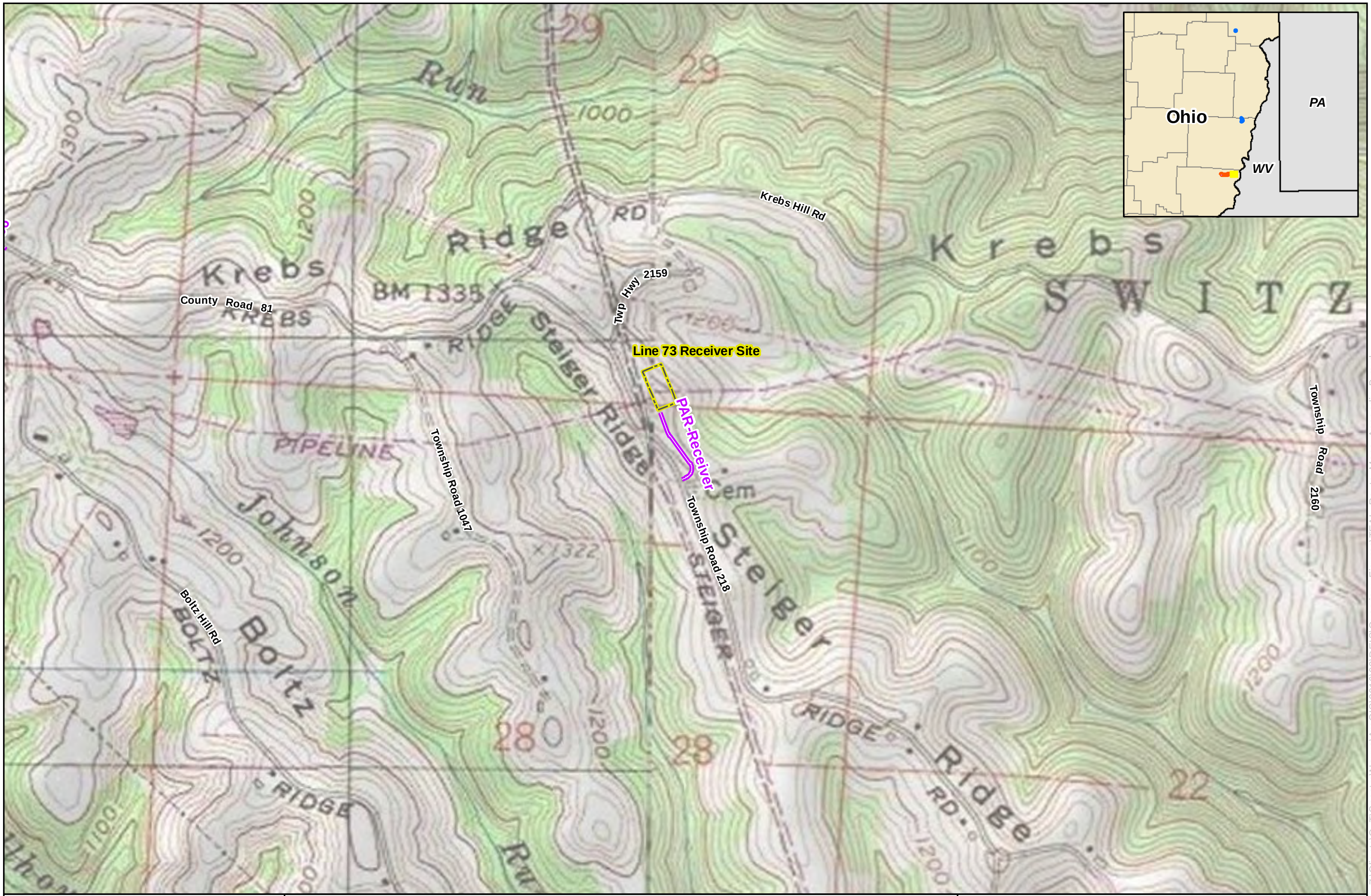

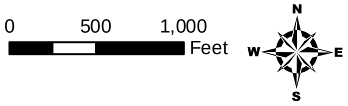

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Appendix B-2
TEAL Project
Route Map

- ○ Milepost
- ⋈ Proposed TEAL Valve
- — Proposed TEAL Pipeline Loop
- ═ Proposed Access Road
- ▭ Proposed Compressor Station
- ▭ Proposed Regulator/Receiver Site

Source: Z:\Clients\Q_T\SpectraNexus\ArcGIS\2016\03\DEIS\Overview_Figures\TEAL_Route_Maps_Appendix_B.mxd

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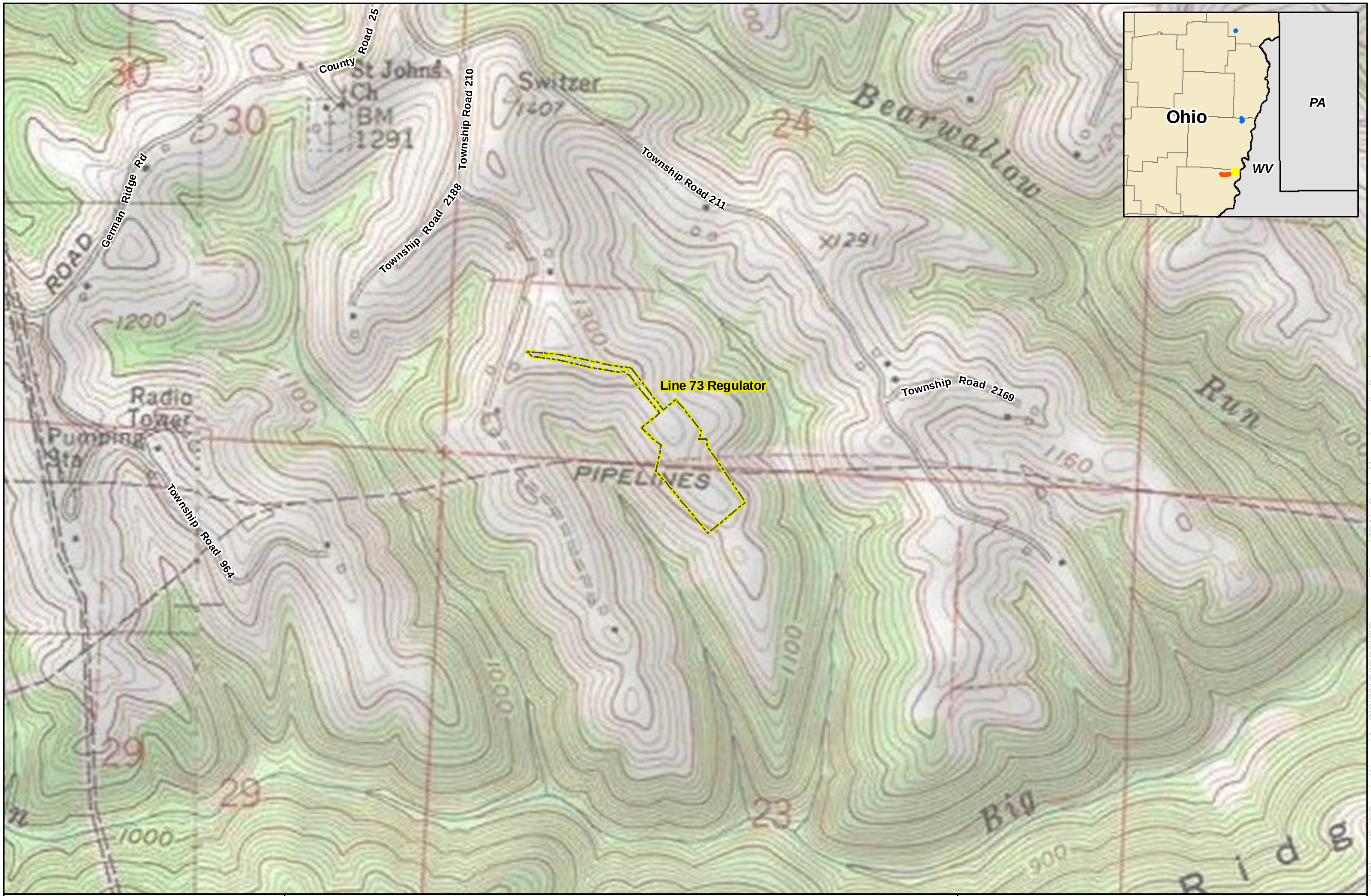

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Appendix B-2
TEAL Project
Route Map

○ Milepost

⧓ Proposed TEAL Valve

▬ Proposed TEAL Pipeline Loop

═ Proposed Access Road

▭ Proposed Compressor Station

▭ Proposed Regulator/Receiver Site

Source: Z:\Clients\Q_T\SpectraNexus\ArcGIS\2016\03\DEIS\Overview_Figures\TEAL_Route_Maps_Appendix_B.mxd

Date: (6/20/2016)

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Appendix B-2
TEAL Project
Route Map

○ Milepost

⧓ Proposed TEAL Valve

Proposed TEAL Pipeline Loop

Proposed Access Road

▭ Proposed Compressor Station

▭ Proposed Regulator/Receiver Site

Source: Z:\Clients\Q_T\SpectraNexus\ArcGIS\2016\03\DEIS\Overview_Figures\TEAL_Route_Maps_Appendix_B.mxd

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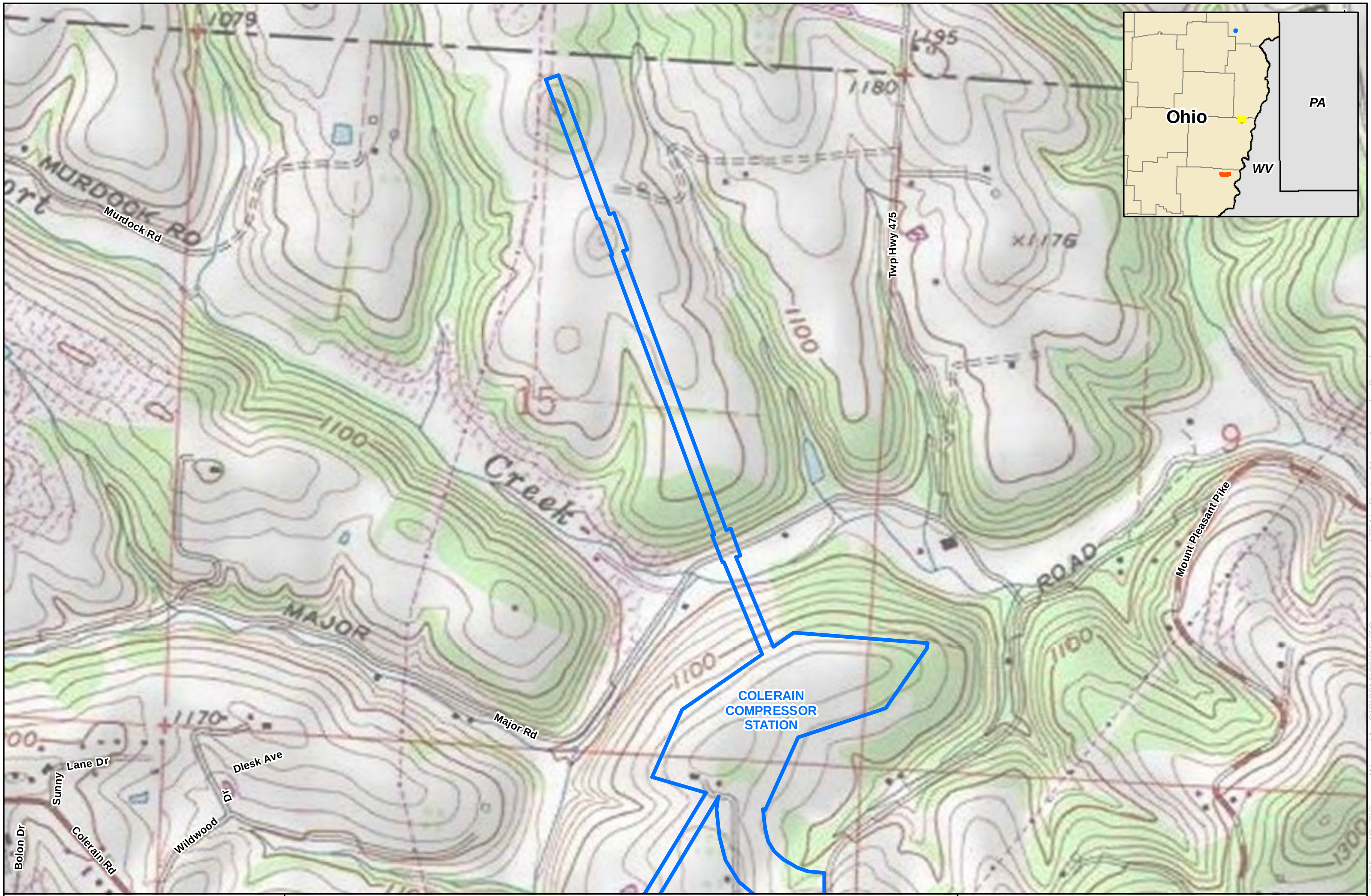

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Appendix B-2
TEAL Project
Route Map

○ Milepost

⧓ Proposed TEAL Valve

Proposed TEAL Pipeline Loop

Proposed Access Road

▭ Proposed Compressor Station

▭ Proposed Regulator/Receiver Site

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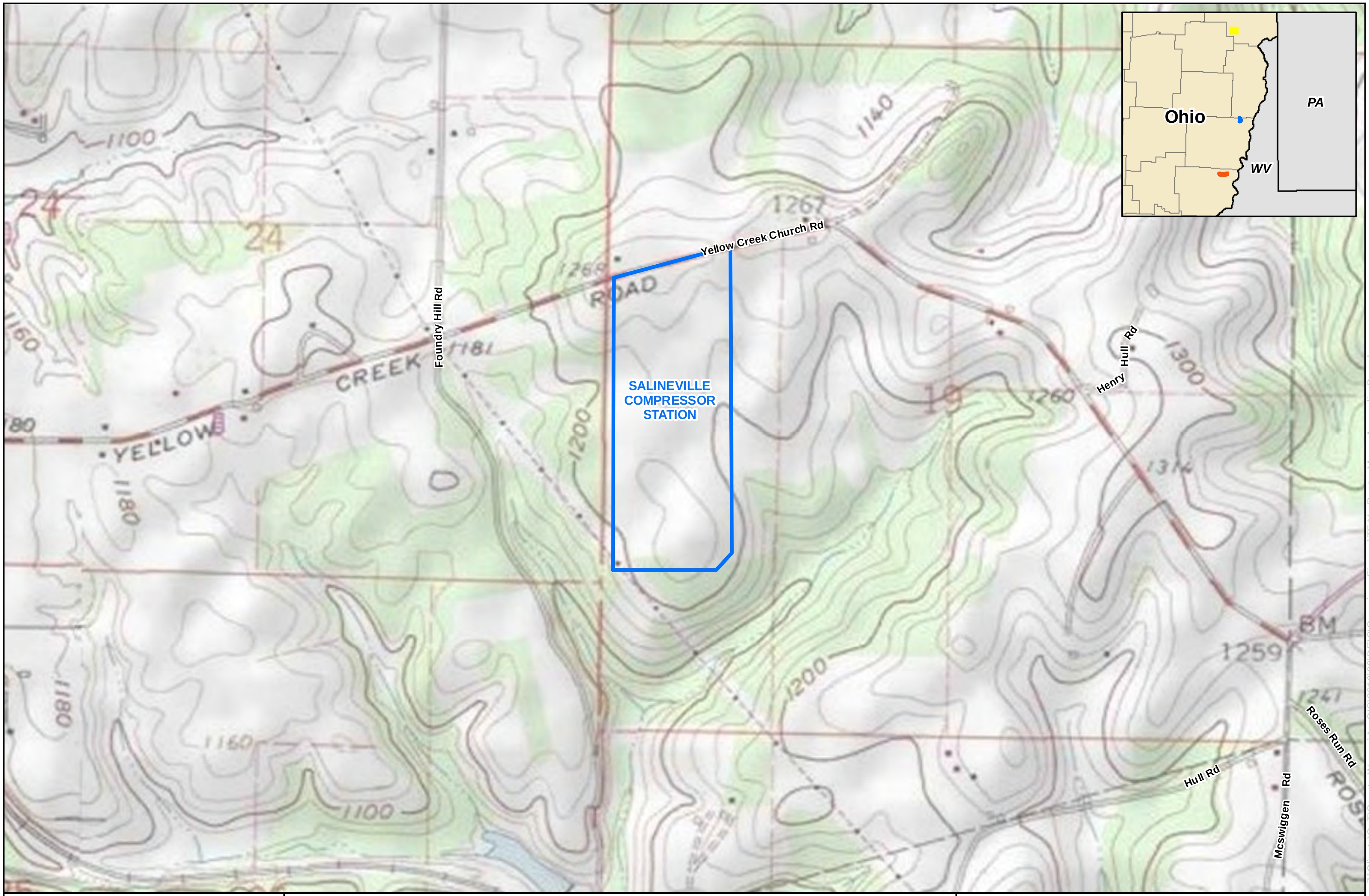

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Appendix B-2
TEAL Project
Route Map

○	Milepost
⧓	Proposed TEAL Valve
🟧	Proposed TEAL Pipeline Loop
🟪	Proposed Access Road
▭	Proposed Compressor Station
▭	Proposed Regulator/Receiver Site

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APPENDIX C

PROJECT DESCRIPTION TABLES

APPENDIX C-1

SUMMARY OF NGT PIPELINE CO-LOCATION WITH EXISTING RIGHTS-OF-WAY

APPENDIX C-1

Summary of NGT Pipeline Co-location with Existing Rights-of-Way

State, Facility, Utility [a]	Utility Type	Beginning Milepost [a]	Ending Milepost [a]	Length Adjacent to or Within Existing ROW (miles)	Total Co-location Length (miles)	Width of Existing Right-of-Way (feet)	Notes [b]	Width of Existing Right-of-Way Used for NGT Construction (feet)	Width of Existing Right-of-Way Used for NGT Operation (feet)	NEXUS Centerline Offset from Utility Centerline (feet) [c]
OHIO										
TGP Interconnecting Pipeline										
Access Midstream X2	Pipeline	0.2	0.7	0.6	0.6	165	2	100	0-25	108
M3 Ohio Midstream X2	Pipeline	0.2	0.7	0.6			2			114
M3 Ohio Midstream Fiber	Fiber Optic	0.6	0.7	0.1			2			55
Tunnel Hill Road	Road	0.6	0.9	0.3	0.3	54	2	26	0	82
Unknown	Power Line	0.6	0.9	0.3			2			63
Mainline										
S&S Energy Corp	Pipeline	0.4	1.0	0.7	0.7	100	1	25	0	44
Midstream X2	Pipeline	0.4	1.0	0.6			1			80
Williams	Pipeline	0.4	1.0	0.6			1			63
First Energy	Power Line	1.3	1.4	0.2	0.2	215	2	25	0	85
Unknown	Powerline	2.0	2.0	0.1	0.1	50	2	25	0	77
Unknown	Pipeline	3.3	3.3	0.1	0.1	25	1	0	0	192
First Energy	Power Line	3.4	4.4	1	1.0	200	2	25	0	157
General Telephone Company	Telephone Line	3.6	3.7	0.1			1			200
First Energy X5	Power Line	5.2	6.2	1	1.0	220	2	25	0	76
Atlas Energy	Pipeline	6.3	6.4	0.1	0.1	50	1	0	0	55
Atlas Energy	Pipeline	7.0	7.2	0.2	0.2	25	1	20	0	116
SR 172	Road	7.0	7.2	0.2			1			99
Unknown	Powerline	7.0	7.2	0.2			1			70
America Oil	Pipeline	7.6	7.6	0.1	0.1	25	1	0	0	106
Unknown	Pipeline	8.6	8.9	0.3	0.4	150	1, 2	25	0	64
First Energy	Power Line	8.6	9.0	0.3			2			136
First Energy	Power Line	9.8	10.8	1	1.0	210	2	25	0	95
Columbia Gas	Pipeline	11.2	11.3	0.1	0.1	50	1	0	0	206
Unknown	Powerline	11.3	11.4	0.1	0.1	75	1	0	0	87
First Energy	Power Line	11.7	13.1	1.4	1.4	215	2	25	0	92
Unknown	Powerline	13.2	13.3	0.1	0.1	75	2	0	0	208
First Energy	Power Line	13.6	14.7	1.1	1.1	215	2	25	0	110
Salem Church Rd	Road	14.1	14.1	0.1			1			66
Unknown	Pipeline	15.8	16.2	0.4	0.4	50	1	0	0	56
Atlas Energy	Pipeline	17.3	17.4	0.1	0.4	50	1	0	0	170
Unknown	Pipeline	17.4	17.8	0.4			1			130
Unknown	Powerline	22.0	22.2	0.2	0.4	100	1, 2	0	0	201
Marlboro Rd	Road	22.0	22.2	0.2			1, 2			172
Enervest Energy Partners	Pipeline	22.0	22.4	0.4			1, 2			172
Enervest Energy Partners	Pipeline	23.1	23.2	0.2	0.2	25	1	0	0	116
Enervest Energy Partners	Pipeline	23.9	24.0	0.1	0.1	25	1	0	0	218

APPENDIX C-1 (cont'd)

Summary of NGT Pipeline Co-location with Existing Rights-of-Way

State, Facility, Utility [a]	Utility Type	Beginning Milepost [a]	Ending Milepost [a]	Length Adjacent to or Within Existing ROW (miles)	Total Co-location Length (miles)	Width of Existing Right-of-Way (feet)	Notes [b]	Width of Existing Right-of-Way Used for NGT Construction (feet)	Width of Existing Right-of-Way Used for NGT Operation (feet)	NEXUS Centerline Offset from Utility Centerline (feet) [c]
Enervest Energy Partners	Pipeline	24.2	24.5	0.3	0.3	25	1	0	0	98
Enervest Energy Partners	Pipeline	24.9	25.0	0.1	0.1	25	1	0	0	156
Enervest Energy Partners	Pipeline	25.5	25.7	0.1	0.1	25	2	0	0	127
Enervest Energy Partners	Pipeline	26.3	26.4	0.1	0.1	25	1	0	0	163
MB Operating	Pipeline	28.1	28.2	0.1	0.1	25	1	0	0	142
Enervest Energy Partners	Pipeline	28.2	28.4	0.2	0.3	25	1	0	0	125
First Energy	Power Line	29.9	29.9	0.1	0.1	150	2	0	0	230
First Energy	Power Line	30.2	30.7	0.5	0.5	150	2	25	0	107
First Energy	Power Line	31.0	31.4	0.3	0.3	150	2	43	0	110
First Energy	Power Line	31.5	31.8	0.3	0.3	150	2	48	0	125
Enervest Energy Partners	Pipeline	31.8	32.0	0.2	0.2	150	1	0	0	261
Unknown	Power Line	31.8	32.0	0.2			2			241
Midway St NW	Road	31.8	32.0	0.2			2			257
First Energy	Power Line	32.1	32.8	0.7	0.7	150	2	51	0	90
Dotwood St NW	Road	32.7	32.8	0.1			2			268
Lake Township Water	Utility	32.7	32.8	0.1			1			287
Stark County Sanitary Sewer	Utility	32.7	32.8	0.1			2			255
Dominion	Pipeline	32.7	32.8	0.1			2			296
AT&T	Utility	32.7	32.8	0.1			1			242
Unknown	Powerline	32.8	33.1	0.3	0.3	50	2	0-10	0	207
Unknown	Cable	32.9	32.9	0.1			1			58
Dominion East Ohio	Pipeline	32.9	33.0	0.1			2			288
Cleveland Ave	Road	33.1	33.2	0.2	0.2	150	2	72	25	50
Unknown	Power Line	33.1	33.2	0.2			2			84
Unknown	Telephone Line	33.1	33.2	0.2			2			14
Unknown	Sewer Line	33.3	33.7	0.4	0.4	20	1	0	0	90
First Energy	Power Line	35.4	36.0	0.6	0.6	200	2	25	0	84
First Energy	Power Line	36.0	36.4	0.3	0.3	150	2	25	0	174
Unknown	Power Line	36.2	36.4	0.2			1			75
Dominion East Ohio	Pipeline	36.4	36.9	0.4	0.4	50	2	0	0	100
East Ohio Gas Company	Pipeline	37.3	37.3	0.1	0.1	50	1	0-25	0	57
Unknown	Power Line	39.0	39.1	0.1	0.1	75	2	0	0	58
Unknown	Power Line	41.2	41.3	0.1	0.1	50	2, 3	0-25	0	60
Dominion East Ohio	Pipeline	41.3	41.5	0.3	0.3	50	2	0-50	0	70
Unknown	Power Line	41.5	42.0	0.5	0.5	60	2	0-50	0	84
Unknown	Power Line	41.5	41.7	0.2			1			89
Dominion East Ohio	Pipeline	41.9	42.0	0.1	0.1	60	2	10	0	54
Dominion East Ohio	Pipeline	42.2	42.6	0.4	0.4	60	2	13	0	44
Dominion East Ohio	Pipeline	43.3	43.5	0.2	0.2	60	2	0-20	0	96

APPENDIX C-1 (cont'd)

Summary of NGT Pipeline Co-location with Existing Rights-of-Way

State, Facility, Utility [a]	Utility Type	Beginning Milepost [a]	Ending Milepost [a]	Length Adjacent to or Within Existing ROW (miles)	Total Co-location Length (miles)	Width of Existing Right-of-Way (feet)	Notes [b]	Width of Existing Right-of-Way Used for NGT Construction (feet)	Width of Existing Right-of-Way Used for NGT Operation (feet)	NEXUS Centerline Offset from Utility Centerline (feet) [c]
Ohio East Gas Company	Pipeline	43.3	43.5	0.2			2			101
Dominion East Ohio	Pipeline	43.8	44.0	0.2	0.2	60	1	0	0	75
Dominion East Ohio	Pipeline	44.3	44.7	0.4	0.4	60	2	25	0	71
Dominion East Ohio X2	Pipeline	44.8	45.2	0.4	0.4	60	2	13	0	67
Dominion East Ohio	Pipeline	45.3	46.3	1	2.0	60	1	0-30	0	26
Dominion East Ohio	Pipeline	46.2	47.3	1.1			2			47
First Energy	Power Line	47.8	49.1	1.4	1.4	150	2, 3	47	0	61
First Energy	Power Line	49.7	50.4	0.7	0.7	150	2	0-50	0	89
First Energy X2	Power Line	50.4	52.7	2.2	2.2	275	2	50	0	92
SH 585	Road	53.5	53.9	0.4	0.4	50	1	0	0	120
Unknown	Utility	54.0	54.1	0.1	0.1	30	1	0	0	17
Unknown	Power Line	54.5	54.6	0.1	0.1	50	1	0	0	158
Unknown	Cable	54.5	54.6	0.1			1			144
CR18	Road	57.7	58.0	0.3	0.3	60	3	0	0	247
Enervest Energy Partners	Pipeline	59.7	60.7	1	1.0	50	1	50	0	68
Dominion East Ohio	Pipeline	59.7	60.2	0.5		80	1			43
Bass Energy	Pipeline	59.9	60.7	0.8		50	1			64
Unknown	Power Line	66.4	66.4	0.1	0.1	50	1	0	0	96
Unknown	Pipeline	66.4	66.5	0.1			2			140
Unknown	Power Line	69.1	69.1	0.1	0.1	40	1	0	0	78
Columbia Gas	Pipeline	69.1	69.2	0.1			1			91
CSX	Railroad	69.5	69.8	0.4	0.4	82	2	0	0	110
Carlton Road	Road	72.0	72.5	0.5	0.5	62	3	0	0	206
Unknown	Power Line	72.0	72.5	0.5			2			172
Gatherco, Inc.	Pipeline	72.7	73.1	0.4	0.4	50	1	25	0	63
CSX	Railroad	73.2	73.6	0.4	0.5	107	1	50	0	110
Columbia Gas	Pipeline	73.4	73.7	0.3			1			65
CSX	Railroad	73.7	74.2	0.6	0.6	107	1	0	0	143
Columbia Gas X2	Pipeline	75.0	75.3	0.3	0.3	100	1	0	0	45
CSX	Railroad	75.6	75.8	0.3	0.3	95	1	0	0	250
Columbia Gas	Pipeline	75.7	76.4	0.7	0.7	50	1	50	0	68
Columbia Gas	Pipeline	80.4	81.2	0.9	0.9	150	2	40	0	62
First Energy	Power Line	80.4	81.2	0.9			2			75
First Energy	Power Line	81.6	82.5	0.9	0.9	150	2	40	0	75
First Energy	Power Line	82.6	83.2	0.7	0.7	150	2	49	0	95
Columbia Gas	Pipeline	82.9	83.1	0.2			1			180
First Energy	Power Line	83.5	83.7	0.2	0.5	150	1	43	0	93
First Energy	Power Line	85.0	85.3	0.3	0.3	150	2	53	0	86
First Energy	Power Line	86.9	87.8	0.9	0.9	150	2	63	0	77
Dominion X2	Pipeline	88.5	89.7	1.2	1.2	80	2	25	0	55
Dominion X2	Pipeline	91.3	92.0	0.9	0.9	80	2	25	0	68
Dominion X2	Pipeline	92.4	92.8	0.4	0.4	80	2	20	0	302
Dominion X2	Pipeline	93.3	93.4	0.1	0.1	86	1	0	0	235
Dominion X2	Pipeline	93.6	94.5	0.9	1.7	80	2	26	0	65
Buckeye Pipeline Company, LP	Pipeline	94.2	95.3	1.2			1			50

APPENDIX C-1 (cont'd)

Summary of NGT Pipeline Co-location with Existing Rights-of-Way

State, Facility, Utility [a]	Utility Type	Beginning Milepost [a]	Ending Milepost [a]	Length Adjacent to or Within Existing ROW (miles)	Total Co-location Length (miles)	Width of Existing Right-of-Way (feet)	Notes [b]	Width of Existing Right-of-Way Used for NGT Construction (feet)	Width of Existing Right-of-Way Used for NGT Operation (feet)	NEXUS Centerline Offset from Utility Centerline (feet) [c]
Buckeye Pipeline Company, LP	Pipeline	95.6	97.1	1.5	1.5	35	1	15	0	44
Buckeye Pipeline Company, LP	Pipeline	98.3	99.0	0.7	0.7	50	1	25	0	45
North Coast Gas	Pipeline	98.3	99.0	0.7			1			52
Dominion X2	Pipeline	106.2	107.2	0.9	1.0	80	2	26	0	65
First Energy	Power Line	112.6	113.6	1	1.0	225	2	89	0	145
AEP Ohio	Power Line	112.6	113.6	1			2			50
AEP Ohio	Power Line	114.2	114.3	0.2	0.2	225	2	29	0	148
First Energy	Power Line	114.2	114.3	0.2			2			251
First Energy	Power Line	115.1	118.0	2.9	2.9	225	2	85	0	167
AEP Ohio	Power Line	115.1	118.0	2.9			2			60
Sanitary Sewer	Utility	118.1	119.2	1.1	1.1	225	1	15	0	61
First Energy	Power Line	118.3	119.2	0.9			1			140
Columbus Southern Power	Power Line	118.3	119.2	0.9			1			250
Unknown	Power Line	119.4	119.5	0.1	0.1	75	1	30	0	61
First Energy	Power Line	121.1	122.8	1.8	1.8	225	2	62	0	139
AEP Ohio	Power Line	121.1	122.8	1.8		225	2	93	0	50
Dominion X2	Pipeline	125.3	125.9	0.5	0.5	105	1	0	0	47
Dominion X2	Pipeline	127.0	127.7	0.7	0.7	102	2	29	0	133
Dominion	Pipeline	128.3	128.8	0.5	1.0	105	1	16	0	45
Ohio East Gas Company	Pipeline	128.4	129.3	1			1			77
Dominion X2	Pipeline	129.9	130.5	0.7	0.7	80	2	25	0	45
Dominion	Pipeline	130.9	132.0	1.1	1.1	80	2	25	0	74
I-80	Road	132.6	132.7	0.1	0.1	240	1	0	0	260
I-80	Road	132.8	133.4	0.6	0.6	240	1	0	0	230
Dominion	Pipeline	135.2	135.6	0.4	0.4	60	2	0	0	218
Dominion	Pipeline	137.5	138.9	1.4	1.5	80	2	24	0	64
Ohio East Gas Company	Pipeline	137.5	138.9	1.4			1			84
Ohio East Gas Company	Pipeline	139.6	140.4	0.7	0.7	80	1	24	0	85
Dominion	Pipeline	139.3	140.4	1			2			65
Dominion	Pipeline	140.8	140.9	0.1	0.1	80	1	0	0	125
Ohio East Gas Company	Pipeline	140.8	140.9	0.1			1			100
I-80	Road	144.8	144.9	0.1	0.1	240	2	0	0	240
CR 99	Road	146.5	146.6	0.1	0.1	28	2	11	0	100
Dominion	Pipeline	150.5	154.0	3.5	3.5	80	2	25	0	63
Ohio East Gas Company	Pipeline	150.5	154.0	3.5			1			26
Dominion	Pipeline	157.0	161.9	4.9	4.9	80	2	25	0	65
Ohio East Gas Company	Pipeline	157.0	161.9	4.9			1			85
Dominion	Pipeline	162.8	163.9	1.1	1.1	90	2	27	0	45
Ohio East Gas Company	Pipeline	162.8	163.9	1.1			2			75

APPENDIX C-1 (cont'd)

Summary of NGT Pipeline Co-location with Existing Rights-of-Way

State, Facility, Utility [a]	Utility Type	Beginning Milepost [a]	Ending Milepost [a]	Length Adjacent to or Within Existing ROW (miles)	Total Co-location Length (miles)	Width of Existing Right-of-Way (feet)	Notes [b]	Width of Existing Right-of-Way Used for NGT Construction (feet)	Width of Existing Right-of-Way Used for NGT Operation (feet)	NEXUS Centerline Offset from Utility Centerline (feet) [c]
Dominion	Pipeline	164.5	167.2	2.6	2.6	90	2	25	0	60
Ohio East Gas Company	Pipeline	164.5	167.2	2.6			1			95
Dominion	Pipeline	167.3	168.3	1	1.0	80	2	25	0	65
Ohio East Gas Company	Pipeline	167.3	168.3	1			1			
First Energy X2	Power Line	168.3	175.3	7	7.0	245	2	98	0	45
Kinder Morgan	Pipeline	173.8	174.2	0.4			1			45
First Energy X3	Power Line	176.3	179.0	2.6	2.6	245	2	100	0	48
First Energy X2	Power Line	184.1	185.4	1.3	1.3	200	1	80	0	60
First Energy	Power Line	187.6	188.1	0.4	0.4	200	1	0	0	50
AT&T	Fiber Optic	189.7	189.9	0.2	0.2	30	1, 2	15	0	58
First Energy X2	Power Line	192.5	193.7	1.2	1.2	150	2	29	0	88
First Energy X3	Power Line	200.7	204.5	3.8	3.8	150	2	34	0	48
First Energy X3	Power Line	205.3	208.3	3	3.0	150	2	27	0	78
				Ohio Total:	**89.3**					
MICHIGAN										
Mainline										
Transcanada X2	Pipeline	218.8	225.0	6.3	6.5	100	1	0-10	0	65
Britton Highway	Road	224.9	225.2	0.2			2			147
Unknown	Power Line	224.9	225.2	0.2			1			177
Transcanada X2	Pipeline	226.6	233.0	6.4	6.4	70	1	0-10	0	66
Transcanada X2	Pipeline	233.6	234.0	0.5	0.5	70	1	0-10	0	117
Transcanada X2	Pipeline	235.1	237.0	1.9	1.9	70	1	0-18	0	65
Petersburg Rd	Road	236.2	236.3	0.1			2			115
Transcanada X2	Pipeline	238.1	239.0	0.9	0.9	70	1	20	0	65
Unknown	Pipeline	238.3	238.4	0.1			1			129
Transcanada X2	Pipeline	239.2	239.3	0.1	0.1	70	1	0	0	250
Transcanada X2	Pipeline	239.7	241.6	1.9	2.0	70	1	20	0	65
Transcanada X2	Pipeline	242.4	242.5	0.1	0.1	70	1	0-10	0	284
BP	Pipeline	248.6	248.9	0.4	0.4	50	1	0	0	65
Michcon	Pipeline	248.9	249.2	0.3	0.3	50	1	0	0	64
Norfolk Southern Railway Company	Railroad	249.3	249.6	0.3	0.9	330	1	0	0	187
McKean Road	Road	249.5	250.4	0.9			2			84
Michigan Bell	Utility	249.7	249.9	0.1			1			135
Unknown	Power Line	249.7	250.2	0.5			1			52
YCUA Water	Utility	250.2	250.4	0.2			1			113
Michcon Gas X2	Pipeline	250.2	250.5	0.2			1			55
Ypsilanti County Utility	Sewer line	251.0	251.1	0.1	0.1	20	1	0-20	0	73
Michcon Gas (DTE)	Pipeline	251.1	252.0	0.8	0.9	200	1	0	0	45
Unknown X4	Power Line	251.1	252.0	0.9			1			70
Bridge Road	Road	251.1	251.4	0.3			2			160
DTE	Pipeline	251.1	251.4	0.3			1			194
YCUA Water	Utility	251.1	252.0	0.9			1			15
Unknown	Power Line	252.0	252.2	0.1	0.1	75	2	0	0	195
Transcanada X2	Pipeline	252.4	253.3	0.9	0.9	100	1	50	0	74
Michcon X2	Pipeline	252.4	253.3	0.9			1	50	0	52

APPENDIX C-1 (cont'd)

Summary of NGT Pipeline Co-location with Existing Rights-of-Way

State, Facility, Utility [a]	Utility Type	Beginning Milepost [a]	Ending Milepost [a]	Length Adjacent to or Within Existing ROW (miles)	Total Co-location Length (miles)	Width of Existing Right-of-Way (feet)	Notes [b]	Width of Existing Right-of-Way Used for NGT Construction (feet)	Width of Existing Right-of-Way Used for NGT Operation (feet)	NEXUS Centerline Offset from Utility Centerline (feet) [c]
Ypsilanti County Utility Authority X3	Utility	252.4	253.5	0.2	1.0	100	1	100	0	163
ANR Transcanada	Pipeline	252.5	253.3	0.7			1			77
Willow Run Fwy	Road	252.4	253.5	1.0			1			130
DTE X2	Pipeline	253.5	254.0	0.5	0.5	150	1	75		75
Ypsilanti County Water Authority X3	Utility	253.5	253.8	0.4			1			116
Old Escorse Rd	Road	253.5	253.7	0.2			1			40
Unknown	Power Line	253.5	253.7	0.2			1			58
Hydramatic Rd	Road	253.8	253.9	0.1			1			120
Ypsilanti County Water Authority	Utility	253.8	254.0	0.1			1			70
DTE Energy X2	Pipeline	254.6	254.8	0.2	0.2	80	1	80	0	100
Unknown	Power Line	254.6	254.7	0.1			1			118
				Michigan Pipeline Total:	**23.7**					
				Total NGT Project Co-location with Existing Rights-of-Way:	**113.0**					

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a Approximate mileposts along the pipeline rounded to the nearest tenth.

b Notes: 1) Estimated maintained ROW and overlap widths are based on aerial photo interpretation; 2) Easement and overland widths obtained by civil survey or coordination with utility personnel; 3) Workspace associated with HDD. Utilities followed by 'X' and associated number, designates the number of utilities at crossing.

c Approximate offset due to existing utility centerline not being uniformly parallel.

APPENDIX C-2

SUMMARY OF ATWS ASSOCIATED WITH THE NGT PIPELINE PROJECT

APPENDIX C-2

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
OHIO									
TGP Interconnecting Pipeline									
Columbiana	ATWS-3700	0.0	0.1	Right	193	50	0.2	AG,ID,FW,OL	Road Crossing
Columbiana	ATWS-1869	0.0	0.1	Right	323	75	0.6	AG,ID,FW	Road Crossing
Columbiana	ATWS-4430	0.1	0.1	Left	124	20	0.1	ID,FW,RE	Extending Width of Road Turn Radius for Vehicle/ Material Movement
Columbiana	ATWS-4429	0.1	0.1	Left	118	20	0.1	ID,FW	Extending Width of Road Turn Radius for Vehicle/ Material Movement
Columbiana	ATWS-3702	0.1	0.2	Left	348	25	0.2	AG,FW	Bend Installation
Columbiana	ATWS-1870	0.1	0.3	Right	928	50	1.1	AG	Bend Installation and Topsoil Segregation
Columbiana	ATWS-1871	0.2	0.5	Left	1,420	25	0.8	AG,OL	Topsoil Segregation
Columbiana	ATWS-1872	0.5	0.6	Left	503	50	0.6	OL	Bend Installation and Road and Existing Pipeline Crossing and Topsoil Segregation
Columbiana	ATWS-3470	0.6	0.6	Right	100	75	0.2	ID,FW,OL	Road and Existing Pipeline Crossing
Columbiana	ATWS-3307	0.6	0.7	Right	345	50	0.4	ID,FW,OL	Road Crossing and Side Slope/ Hill Construction
Columbiana	ATWS-3306	0.6	0.6	Left	186	50	0.2	ID,OL	Road Crossing
Columbiana	ATWS-4423	0.6	0.6	Left	118	20	0.1	ID,FW,OL,RE	Extending Width of Road Turn Radius for Vehicle/ Material Movement
Columbiana	ATWS-4422	0.6	0.6	Left	68	25	0	ID,OL	Extending Width of Road Turn Radius for Vehicle/ Material Movement
Columbiana	ATWS-2054	0.6	0.7	Left	106	50	0.1	ID,OL	Road and Waterbody Crossing
Columbiana	ATWS-4427	0.7	0.7	Left	150	25	0.1	OL	Extending Width of Road Turn Radius for Vehicle/ Material Movement
Columbiana	ATWS-4425	0.7	0.7	Left	150	20	0.1	AG,ID,OL	Extending Width of Road Turn Radius for Vehicle/ Material Movement
Columbiana	ATWS-4428	0.7	0.7	Left	50	78	0.1	OL	Extending Width of Road Turn Radius for Vehicle/ Material Movement
Columbiana	ATWS-4426	0.7	0.7	Left	190	20	0.1	AG,ID,OL	Extending Width of Road Turn Radius for Vehicle/ Material Movement
Columbiana	ATWS-4424	0.7	0.7	Left	99	25	0.1	ID,OL	Extending Width of Road Turn Radius for Vehicle/ Material Movement
				TGP Interconnecting Pipeline - Subtotal			**5.2**		
Mainline									
Columbiana	ATWS-727	0.2	0.2	Right	252	50	0.3	AG	Bend Installation and Topsoil Segregation
Columbiana	ATWS-3989	0.2	0.2	Left	148	25	0.1	AG,FW	Bend Installation
Columbiana	ATWS-1109	0.2	0.3	Right	486	25	0.3	AG	Topsoil Segregation
Columbiana	ATWS-3039	0.3	0.3	Right	102	50	0.1	AG	Topsoil Segregation and Existing Pipeline Crossing
Columbiana	ATWS-2354	0.3	0.4	Right	283	50	0.3	AG	Bend Installation and Existing Pipeline Crossing and Topsoil Segregation
Columbiana	ATWS-2355	0.4	0.5	Right	668	25	0.4	AG,OL	Topsoil Segregation
Columbiana	ATWS-725	0.7	0.7	Right	293	75	0.5	AG,OL	Topsoil Segregation, Wetland Crossing and Waterbody Crossing
Columbiana	ATWS-1092	0.7	0.8	Right	559	25	0.3	AG	Topsoil Segregation
Columbiana	ATWS-3041	0.8	0.9	Right	187	75	0.3	AG,OL	Bend Installation and Existing Pipeline Crossing and Topsoil Segregation
Columbiana	ATWS-3040	0.9	0.9	Left	198	75	0.3	AG	Bend Installation and Existing Pipeline Crossing and Topsoil Segregation
Columbiana	ATWS-2340	0.9	0.9	Left	155	50	0.2	AG	Wetland Crossing and Topsoil Segregation
Columbiana	ATWS-2341	1.0	1.1	Left	358	50	0.4	AG,ID,FW,OL	Road, Waterbody and Wetland Crossing
Columbiana	ATWS-724	1.0	1.1	Right	208	75	0.4	AG,ID,FW,OL	Road Crossing
Columbiana	ATWS-1874	1.1	1.1	Left	239	75	0.4	AG,ID,OL	Road Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions[a]		ATWS Acres Affected[b]	Existing Land Use[c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Columbiana	ATWS-723	1.1	1.1	Right	195	50	0.2	AG,ID,FW	Road Crossing
Columbiana	ATWS-3301	1.1	1.1	Left	172	25	0.1	AG	Bend Installation
Columbiana	ATWS-3302	1.1	1.1	Right	157	25	0.1	AG,FW	Topsoil Segregation
Columbiana	ATWS-2345	1.2	1.3	Right	247	25	0.1	AG,FW	Topsoil Segregation
Columbiana	ATWS-3042	1.4	1.5	Right	411	25	0.2	AG	Topsoil Segregation
Columbiana	ATWS-3690	1.5	1.6	Left	154	25	0.1	FW	Steep Terrain Construction
Columbiana	ATWS-3043	1.6	1.6	Left	154	25	0.1	FW	Existing Pipeline Crossing
Columbiana	ATWS-2344	1.6	1.7	Left	327	25	0.2	FW	Bend Installation and Existing Pipeline Crossing
Columbiana	ATWS-2343	1.7	1.8	Right	466	25	0.3	AG,ID,FW	Bend and Sideslope Construction
Columbiana	ATWS-3691	1.8	1.8	Left	41	25	0	AG	Existing Pipeline Crossing
Columbiana	ATWS-3044	1.8	1.8	Left	220	50	0.3	AG	Bend Installation and Existing Pipeline Crossing and Topsoil Segregation
Columbiana	ATWS-2498	1.8	1.8	Right	125	50	0.1	AG	Bend Installation and Existing Pipeline Crossing and Topsoil Segregation
Columbiana	ATWS-3046	1.8	1.9	Right	467	25	0.3	AG,ID,OL,RE	Topsoil Segregation
Columbiana	ATWS-3045	1.8	1.9	Left	75	25	0	AG,OL	Existing Pipeline Crossing
Columbiana	ATWS-2342	1.9	2.0	Right	450	95	0.7	ID,OL,RE	Road and Waterbody Crossing
Columbiana	ATWS-2570	2.0	2.1	Left	286	100	0.7	AG,OL	Road, Waterbody and Wetland Crossing
Columbiana	ATWS-2618	2.0	2.1	Right	275	75	0.6	AG,OL	Road, Waterbody and Wetland Crossing
Columbiana	ATWS-3047	2.1	2.2	Right	167	75	0.3	AG,ID,OL	Road and Wetland Crossing
Columbiana	ATWS-1096	2.2	2.2	Right	177	75	0.3	AG,ID,OL	Road, Waterbody and Wetland Crossing
Columbiana	ATWS-4453	2.2	2.2	Left	123	50	0.1	AG	Road Crossing
Columbiana	ATWS-4452	2.2	2.2	Left	144	50	0.1	AG,ID,OL,RE	Existing Pipeline Crossing Access Around Waterbody
Columbiana	ATWS-3048	2.2	2.3	Left	343	25	0.2	AG	Bend Installation and Existing Pipeline Crossing
Columbiana	ATWS-1105	2.2	2.7	Right	2,566	25	1.5	AG,ID	Topsoil Segregation
Columbiana	ATWS-3990	2.4	2.4	Left	185	25	0.1	AG,FW	Bend Installation
Columbiana	ATWS-2225	2.7	2.9	Right	787	25	0.5	AG	Topsoil Segregation
Columbiana	ATWS-2226	2.9	3.1	Right	1,012	25	0.6	AG,FW,OL	Topsoil Segregation
Columbiana	ATWS-2228	3.1	3.1	Left	177	25	0.1	AG	Bend Installation
Columbiana	ATWS-4360	3.1	3.2	Right	284	25	0.2	AG	Topsoil Segregation
Columbiana	ATWS-4196	3.2	3.2	Left	100	25	0.1	AG,FW,OL	Existing Pipeline Crossing
Columbiana	ATWS-2227	3.2	3.3	Right	610	25	0.3	AG	Topsoil Segregation
Columbiana	ATWS-31	3.3	3.3	Right	170	100	0.3	AG,ID	Road Crossing
Columbiana	ATWS-30	3.3	3.4	Right	148	75	0.3	AG,ID	Road Crossing
Columbiana	ATWS-1111	3.4	3.4	Right	113	25	0.1	AG	Topsoil Segregation
Columbiana	ATWS-3992	3.5	3.5	Left	326	50	0.4	ID,FW	Road Crossing
Columbiana	ATWS-3703	3.5	3.5	Right	141	50	0.2	ID,FW	Road Crossing and Bend Installation
Columbiana	ATWS-3	3.5	3.5	Right	307	75	0.5	AG,ID,FW,OL	Road Crossing
Columbiana	ATWS-3991	3.5	3.5	Left	152	50	0.2	ID,FW,OL	Road Crossing
Columbiana	ATWS-4198	3.9	3.9	Left	105	50	0.1	FW,OL	Waterbody Crossing
Columbiana	ATWS-4197	3.9	3.9	Right	106	50	0.1	FW	Waterbody Crossing
Columbiana	ATWS-4200	3.9	3.9	Left	101	50	0.1	FW,OL	Waterbody Crossing
Columbiana	ATWS-4199	3.9	3.9	Right	103	50	0.1	FW	Waterbody Crossing
Columbiana	ATWS-569	4.0	4.2	Left	760	25	0.4	FW	Bend Installation
Columbiana	ATWS-570	4.0	4.1	Right	366	25	0.2	FW	Bend Installation and Topsoil Segregation
Columbiana	ATWS-1106	4.3	4.6	Right	1,297	25	0.7	AG,OL	Topsoil Segregation
Columbiana	ATWS-4345	4.4	4.4	Left	205	25	0.1	AG	Bend Installation
Columbiana	ATWS-3053	4.5	4.5	Left	305	25	0.2	AG	Bend Installation
Columbiana	ATWS-15	4.8	4.8	Right	370	75	0.6	AG,FW	Road, Waterbody and Wetland Crossing
Columbiana	ATWS-3051	4.8	4.9	Left	406	50	0.5	AG	Road, Waterbody and Wetland Crossing
Columbiana	ATWS-3050	4.9	5.0	Left	286	25	0.2	FW,OL	Road, Waterbody and Wetland Crossing
Columbiana	ATWS-3049	4.9	5.0	Right	317	50	0.4	OL	Road and Wetland Crossing
Columbiana	ATWS-4201	5.0	5.0	Left	279	25	0.2	ID,OL	Road, Waterbody and Wetland Crossing
Columbiana	ATWS-4	5.0	5.1	Right	245	75	0.4	AG,FW	Road Crossing
Columbiana	ATWS-633	5.0	5.1	Left	139	75	0.2	AG,ID	Road Crossing
Columbiana	ATWS-1107	5.1	5.1	Right	426	25	0.2	AG	Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Columbiana	ATWS-3071	5.1	5.2	Left	305	25	0.2	AG	Bend Installation
Columbiana	ATWS-498	5.1	5.2	Right	425	75	0.7	AG	Wetland Crossing, Topsoil Segregation and Side Slope Construction
Columbiana	ATWS-3993	5.2	5.2	Left	151	25	0.1	AG	Bend Installation
Columbiana	ATWS-27	5.5	5.6	Left	170	75	0.3	ID,FW,OL	Road Crossing
Columbiana	ATWS-2302	5.5	5.6	Left	158	75	0.3	ID,OL	Road and Wetland Crossing
Columbiana	ATWS-3994	5.7	5.7	Left	184	25	0.1	FW,RE	Bend Installation
Columbiana	ATWS-3704	5.7	5.8	Left	300	25	0.2	FW	Bend Installation
Columbiana	ATWS-571	5.9	5.9	Right	201	25	0.1	OL	Bend Installation and Topsoil Segregation
Columbiana	ATWS-4202	6.0	6.1	Right	300	25	0.2	AG	Bend Installation
Columbiana	ATWS-3298	6.1	6.2	Right	406	25	0.2	AG	Bend Installation and topsoil segregation
Columbiana	ATWS-1112	5.9	6.2	Left	1,761	25	1	AG,OL	Topsoil segregation
Columbiana	ATWS-5	6.2	6.3	Right	255	50	0.3	AG	Bend Installation and Topsoil Segregation
Columbiana	ATWS-3995	6.2	6.3	Left	262	25	0.2	AG	Bend Installation
Columbiana	ATWS-3693	6.3	6.3	Left	211	50	0.2	AG,ID	Road Crossing
Columbiana	ATWS-3692	6.3	6.3	Right	185	75	0.3	AG,ID	Road Crossing
Columbiana	ATWS-3694	6.3	6.4	Left	325	25	0.2	ID,OL,RE	Road Crossing and Bend Installation
Columbiana	ATWS-3300	6.4	6.4	Right	65	50	0.1	OL	Waterbody and Wetland Crossing
Columbiana	ATWS-3695	6.5	6.5	Left	195	50	0.2	AG,OL	Waterbody and Wetland Crossing
Columbiana	ATWS-20	6.5	6.5	Right	197	75	0.3	AG	Waterbody and Wetland Crossing
Columbiana	ATWS-1113	6.5	6.6	Right	709	25	0.4	AG	Bend Installation and Topsoil Segregation
Columbiana	ATWS-3696	6.5	6.6	Left	397	25	0.2	AG	Bend Installation
Columbiana	ATWS-3697	6.6	6.7	Right	300	50	0.3	AG	Bend Installation and Topsoil Segregation
Columbiana	ATWS-3699	6.6	6.8	Left	586	25	0.3	AG	Bend Installation
Columbiana	ATWS-4358	6.7	6.7	Right	113	25	0.1	AG	Topsoil Segregation
Columbiana	ATWS-3698	6.7	6.9	Right	683	25	0.4	AG	Topsoil Segregation
Columbiana	ATWS-3054	6.9	6.9	Left	196	25	0.1	OL	Bend Installation
Columbiana	ATWS-2552	6.9	7.0	Right	196	50	0.2	OL	Bend Installation and Topsoil Segregation
Columbiana	ATWS-2555	7.0	7.1	Right	553	25	0.3	OL	Topsoil Segregation
Columbiana	ATWS-4371	7.0	7.2	Left	686	25	0.4	OL	Bend Installation
Columbiana	ATWS-2554	7.1	7.2	Right	537	25	0.3	OL	Topsoil Segregation
Columbiana	ATWS-2560	7.3	7.3	Right	398	25	0.2	OL	Bend Installation and Topsoil Segregation
Columbiana	ATWS-2559	7.3	7.4	Left	348	25	0.2	FW,OL	Bend Installation
Columbiana	ATWS-4462	7.4	7.4	Right	429	25	0.2	FW,OL	Topsoil Segregation
Columbiana	ATWS-2561	7.5	7.6	Right	607	25	0.3	AG,OL	Topsoil Segregation
Columbiana	ATWS-3996	7.5	7.6	Left	239	25	0.1	AG,OL	Bend Installation
Columbiana	ATWS-2562	7.6	7.7	Right	239	75	0.4	AG,ID,OL	Road Crossing and Bend Installation
Columbiana	ATWS-2563	7.6	7.7	Left	321	50	0.4	AG,ID	Road Crossing and Bend Installation
Columbiana	ATWS-2565	7.7	7.7	Right	185	75	0.3	ID,FW,OL,RE	Road Crossing
Columbiana	ATWS-2564	7.7	7.7	Left	152	50	0.2	ID,FW,OL	Road Crossing
Columbiana	ATWS-4203	7.8	7.8	Left	80	25	0	OL	Existing Pipeline Crossing
Columbiana	ATWS-4205	7.8	7.8	Right	126	25	0.1	FW,OL	Bend Installation
Columbiana	ATWS-4204	7.8	7.9	Right	327	75	0.6	FW,OL	HDD Entry Location
Columbiana	ATWS-4206	7.8	7.9	Left	464	25	0.3	OL	HDD Entry Location
Columbiana	ATWS-3997	8.3	8.5	Right	665	125	1.9	AG,FW	HDD Exit Location
Columbiana	ATWS-3999	8.4	8.5	Left	340	50	0.4	AG	HDD Exit Location
Columbiana	ATWS-3998	8.5	8.6	Right	695	25	0.4	AG	Topsoil Segregation
Columbiana	ATWS-3056	8.6	8.6	Left	107	25	0.1	AG	Existing Pipeline Crossing
Columbiana	ATWS-3055	8.6	8.6	Left	175	50	0.2	AG	Existing Pipeline Crossing and Bend Installation
Columbiana	ATWS-4207	8.6	8.6	Left	2,309	100	5.3	AG,OL,RE	HDD Pull Back String
Columbiana	ATWS-3057	8.6	8.9	Left	1,127	25	0.6	AG	Topsoil Segregation
Columbiana	ATWS-3059	8.9	8.9	Left	330	50	0.4	AG	Bend Installation and Existing Pipeline Crossing and Topsoil Segregation
Columbiana	ATWS-3058	8.9	9.0	Left	111	50	0.1	AG	Topsoil Segregation and Existing Pipeline Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Columbiana	ATWS-2557	9.7	9.8	Right	126	50	0.1	AG	Waterbody Crossing
Columbiana	ATWS-652	9.7	9.8	Left	115	75	0.2	AG	Waterbody Crossing
Columbiana	ATWS-653	9.8	9.8	Left	115	75	0.2	AG	Waterbody Crossing
Columbiana	ATWS-2556	9.8	9.8	Right	114	50	0.1	AG	Waterbody Crossing
Columbiana	ATWS-3317	9.8	9.8	Left	234	50	0.3	AG,FW	Bend Installation and Topsoil Segregation
Columbiana	ATWS-1117	9.9	9.9	Left	224	25	0.1	AG	Topsoil Segregation
Columbiana	ATWS-3316	9.9	9.9	Left	110	50	0.1	AG	Road Crossing
Columbiana	ATWS-3314	9.9	10.0	Left	106	50	0.1	AG,RE	Road Crossing
Columbiana	ATWS-3315	10.0	10.0	Left	197	25	0.1	AG	Topsoil Segregation
Columbiana	ATWS-8	10.0	10.0	Left	179	75	0.3	AG,ID	Road Crossing
Columbiana	ATWS-4208	10.1	10.1	Left	82	75	0.1	OL	Road Crossing
Columbiana	ATWS-25	10.1	10.1	Left	75	50	0.1	OL	Topsoil Segregation and Driveway Crossing
Columbiana	ATWS-3706	10.1	10.2	Left	340	25	0.2	AG,OL	Topsoil Segregation
Columbiana	ATWS-4000	10.2	10.2	Left	200	50	0.2	AG	Bend Installation and Topsoil Segregation
Columbiana	ATWS-1118	10.2	10.3	Right	465	25	0.3	AG	Bend Installation
Columbiana	ATWS-4001	10.2	10.3	Left	222	25	0.1	AG	Topsoil Segregation
Columbiana	ATWS-604	10.3	10.3	Right	303	75	0.5	AG,OL	Wetland Crossing
Columbiana	ATWS-3296	10.3	10.3	Left	151	50	0.2	AG,OL	Bend Installation and Topsoil Segregation
Columbiana	ATWS-3707	10.3	10.4	Right	275	25	0.2	AG,FW	Topsoil Segregation
Columbiana	ATWS-3709	10.5	10.5	Left	120	50	0.1	ID,FW,OL	Road Crossing
Columbiana	ATWS-3313	10.5	10.5	Right	150	75	0.3	AG,ID,FW,OL	Road Crossing
Columbiana	ATWS-3708	10.5	10.6	Left	298	50	0.3	AG,ID,FW	Road Crossing
Columbiana	ATWS-9	10.5	10.6	Right	192	75	0.3	AG,ID	Road Crossing
Columbiana	ATWS-3711	10.6	10.6	Left	281	50	0.3	AG,FW	Waterbody Crossing
Columbiana	ATWS-640	10.6	10.6	Right	79	75	0.1	AG,FW	Waterbody and Wetland Crossing
Columbiana	ATWS-3710	10.6	10.6	Right	61	25	0	AG	Topsoil Segregation
Columbiana	ATWS-2151	10.6	10.6	Right	134	75	0.2	AG	Waterbody Crossing
Columbiana	ATWS-3312	10.6	10.7	Right	302	25	0.2	AG	Topsoil Segregation
Columbiana	ATWS-3060	10.7	10.8	Right	313	50	0.4	AG,OL	Bend Installation and Topsoil Segregation
Columbiana	ATWS-4346	10.7	10.8	Left	200	25	0.1	AG	Bend Installation
Columbiana	ATWS-2290	10.8	10.9	Right	833	25	0.5	AG	Topsoil Segregation
Columbiana	ATWS-2288	10.9	11.0	Right	133	75	0.2	AG	Waterbody and Wetland Crossing.
Columbiana	ATWS-2289	10.9	11.0	Left	123	50	0.1	AG	Waterbody and Wetland Crossing.
Columbiana	ATWS-2287	11.0	11.0	Left	160	75	0.3	OL	Waterbody and Wetland Crossing.
Columbiana	ATWS-3061	11.0	11.1	Right	145	75	0.3	AG,OL	Waterbody and Wetland Crossing.
Columbiana	ATWS-3063	11.1	11.1	Left	250	25	0.1	OL	Bend Installation
Columbiana	ATWS-3062	11.1	11.1	Right	110	25	0.1	OL	Topsoil Segregation
Columbiana	ATWS-2286	11.1	11.1	Right	186	25	0.1	OL	Topsoil Segregation
Columbiana	ATWS-2493	11.1	11.2	Left	300	75	0.5	OL	Bend Installation and Rail, Waterbody and Wetland Crossing
Columbiana	ATWS-2635	11.1	11.2	Right	330	250	1	OL	Rail, Waterbody and Wetland Crossing
Columbiana	ATWS-2492	11.2	11.3	Left	225	75	0.4	FW,OL	Rail, Waterbody and Wetland Crossing
Columbiana	ATWS-2279	11.2	11.3	Right	207	100	0.5	FW,OL	Rail, Waterbody and Wetland Crossing
Columbiana	ATWS-2285	11.3	11.3	Left	141	50	0.2	ID,OL	Road and Wetland Crossing
Columbiana	ATWS-2278	11.3	11.4	Right	110	50	0.1	ID,OL,RE	Road Crossing
Columbiana	ATWS-4209	11.3	11.4	Left	169	25	0.1	ID,OL	Road Crossing
Columbiana	ATWS-2277	11.4	11.4	Right	152	50	0.2	ID,OL	Road Crossing
Columbiana	ATWS-4002	11.4	11.4	Left	64	25	0	OL,RE	Bend Installation
Columbiana	ATWS-2276	11.4	11.7	Right	1,094	25	0.6	AG,FW	Topsoil Segregation
Columbiana	ATWS-4210	11.5	11.6	Left	296	25	0.2	AG	Bend Installation
Columbiana	ATWS-4211	11.6	11.6	Left	250	25	0.1	AG	Bend Installation
Columbiana	ATWS-3712	11.7	11.7	Right	131	25	0.6	AG,FW	Bend Installation
Columbiana	ATWS-3064	11.7	11.8	Left	659	25	0.4	AG,RE	Topsoil Segregation
Columbiana	ATWS-1122	11.9	12.2	Left	1,696	25	1	AG,OL	Topsoil Segregation
Columbiana	ATWS-729	12.2	12.2	Left	152	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Columbiana	ATWS-3291	12.3	12.3	Left	297	75	0.5	AG,OL	Waterbody and Existing Pipeline Crossing and Topsoil Segregation
Columbiana	ATWS-3713	12.4	12.4	Left	252	25	0.1	AG	Topsoil Segregation
Columbiana	ATWS-33	12.4	12.5	Left	226	75	0.4	AG,ID,OL	Road Crossing
Columbiana	ATWS-18	12.5	12.5	Left	348	75	0.6	AG,ID,OL	Road Crossing
Stark	ATWS-34	12.5	12.6	Left	263	75	0.5	AG,ID	Road Crossing
Stark	ATWS-1124	12.6	12.9	Left	1,540	25	0.9	AG	Topsoil Segregation
Stark	ATWS-4003	13.0	13.0	Left	323	60	0.4	AG	Drag Section for Wetland Crossing
Stark	ATWS-3714	13.0	13.0	Left	261	50	0.3	AG,FW,OL	Waterbody and Wetland Crossing and Topsoil Segregation
Stark	ATWS-3715	13.0	13.1	Left	120	25	0.1	FW	Bend Installation and Topsoil Segregation
Stark	ATWS-3290	13.1	13.2	Left	237	50	0.3	ID,OL,RE	Road and Wetland Crossing
Stark	ATWS-80	13.1	13.2	Right	216	75	0.4	ID,OL,RE	Road and Wetland Crossing
Stark	ATWS-3716	13.2	13.2	Left	155	50	0.2	ID,FW,OL	Road Crossing
Stark	ATWS-667	13.2	13.2	Right	287	50	0.3	ID,FW,OL	Road Crossing
Stark	ATWS-3319	13.3	13.3	Left	284	25	0.2	OL,RE	Bend Installation
Stark	ATWS-3320	13.3	13.4	Right	376	25	0.2	AG,OL	Topsoil Segregation
Stark	ATWS-4485	13.3	13.4	Right	314	25	0.2	AG,OL,OW	Access To Hydrostatic Test Water
Stark	ATWS-3293	13.3	13.4	Left	122	50	0.1	AG,OL	Bend Installation and Waterbody and Wetland Crossing
Stark	ATWS-3294	13.4	13.4	Right	100	75	0.2	AG	Waterbody Crossing
Stark	ATWS-3295	13.4	13.4	Right	104	75	0.2	AG	Waterbody Crossing
Stark	ATWS-3292	13.4	13.4	Left	100	50	0.1	AG	Waterbody Crossing
Stark	ATWS-1126	13.4	13.5	Right	347	25	0.2	AG	Topsoil Segregation
Stark	ATWS-4486	13.4	13.5	Right	880	25	0.6	AG,FW,OL, OW,RE	Access To Hydrostatic Test Water
Stark	ATWS-3717	13.5	13.5	Right	205	25	0.1	FW,OL	Topsoil Segregation
Stark	ATWS-3318	13.5	13.6	Right	399	50	0.5	AG,OL	Bend Installation and Topsoil Segregation
Stark	ATWS-4212	13.5	13.6	Left	200	25	0.1	AG,OL	Bend Installation
Stark	ATWS-2010	13.6	13.6	Right	163	75	0.3	AG	Waterbody and Wetland Crossing
Stark	ATWS-3718	13.6	13.7	Right	54	25	0	AG	Topsoil Segregation
Stark	ATWS-2230	13.7	13.8	Right	278	25	0.2	OL	Topsoil Segregation
Stark	ATWS-35	14.0	14.0	Right	111	50	0.1	FW	Road, Waterbody and Wetland Crossing
Stark	ATWS-3726	14.0	14.1	Left	222	50	0.3	FW	Road and Waterbody Crossing
Stark	ATWS-666	14.0	14.1	Right	578	75	1	AG,ID,OL	Road, Waterbody and Wetland Crossing
Stark	ATWS-3719	14.1	14.2	Right	82	75	0.1	AG,ID,OL	Bend Installation and Road Crossing
Stark	ATWS-642	14.1	14.2	Left	153	195	0.4	AG	Road Crossing
Stark	ATWS-1128	14.2	14.4	Left	975	25	0.6	AG,OL	Bend Installation
Stark	ATWS-3720	14.2	14.3	Right	300	50	0.3	AG	Bend Installation and Topsoil Segregation
Stark	ATWS-1129	14.3	14.6	Right	1,410	25	0.8	AG	Topsoil Segregation
Stark	ATWS-3727	14.5	14.6	Left	101	25	0.1	AG	Existing Pipeline Crossing
Stark	ATWS-685	14.6	14.7	Right	440	50	0.5	AG,FW	Bend Installation and Topsoil Segregation
Stark	ATWS-4213	14.6	14.7	Left	329	25	0.2	AG	Bend Installation
Stark	ATWS-1130	14.7	14.7	Right	259	25	0.1	AG	Topsoil Segregation
Stark	ATWS-36	14.7	14.8	Left	189	50	0.2	AG,ID,OL	Road Crossing
Stark	ATWS-3065	14.7	14.8	Right	163	75	0.3	AG,ID,OL	Road Crossing
Stark	ATWS-4214	14.8	14.8	Right	200	75	0.3	AG,ID,OL	Road and Wetland Crossing
Stark	ATWS-1131	14.8	14.8	Left	164	50	0.2	AG,ID,OL	Road Crossing
Stark	ATWS-1132	14.8	15.0	Right	850	25	0.5	AG	Topsoil Segregation
Stark	ATWS-499	15.0	15.0	Right	290	75	0.5	AG	Wetland Crossing and Topsoil Segregation
Stark	ATWS-4005	15.0	15.0	Left	200	25	0.1	AG	Bend Installation
Stark	ATWS-4531	15.0	15.1	Right	245	25	0.1	AG,OL	Topsoil Segregation
Stark	ATWS-4479	15.1	15.2	Left	75	25	0	AG,FW	Existing Pipeline Crossing
Stark	ATWS-1878	15.2	15.3	Right	517	75	0.9	AG,FW	Waterbody and Wetland Crossing and Topsoil Segregation
Stark	ATWS-4006	15.5	15.5	Left	226	25	0.1	AG	Bend Installation
Stark	ATWS-1134	15.5	15.7	Right	1,229	25	0.7	AG	Topsoil Segregation
Stark	ATWS-3722	15.7	15.7	Left	268	50	0.3	AG	Wetland Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a] Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Stark	ATWS-1879	15.7	15.7	Right	90	25	0.1	AG	Wetland Crossing
Stark	ATWS-3721	15.8	15.8	Left	120	50	0.1	AG,OL	Bend Installation and Topsoil Segregation
Stark	ATWS-3311	15.8	15.8	Right	360	75	0.6	AG	Bend Installation, Topsoil Segregation and Wetland Crossing
Stark	ATWS-4458	15.8	15.9	Left	730	25	0.4	AG	Bend Installation
Stark	ATWS-3310	16.0	16.0	Left	269	25	0.2	AG	Existing Pipeline Crossing
Stark	ATWS-37	15.8	16.2	Right	1,659	25	1	AG	Topsoil Segregation
Stark	ATWS-1135	16.2	16.2	Right	167	75	0.3	AG, ID	Topsoil Segregation
Stark	ATWS-38	16.2	16.2	Right	201	75	0.3	AG,ID	Road Crossing
Stark	ATWS-39	16.2	16.3	Left	296	50	0.3	AG,ID	Road Crossing
Stark	ATWS-1136	16.2	16.4	Right	841	25	0.5	AG	Topsoil Segregation
Stark	ATWS-4456	16.4	16.4	Left	293	25	0.2	AG,OL	Bend Installation
Stark	ATWS-4457	16.4	16.4	Right	181	25	0.1	FW,OL	Bend Installation
Stark	ATWS-3723	16.5	16.6	Right	494	25	0.3	AG	Topsoil Segregation
Stark	ATWS-4455	16.5	16.6	Left	174	25	0.1	AG	Bend Installation
Stark	ATWS-3725	16.6	16.7	Right	329	25	0.2	AG, OL	Topsoil Segregation
Stark	ATWS-40	16.7	16.7	Right	140	75	0.2	AG	Road Crossing
Stark	ATWS-4007	16.7	16.7	Left	197	50	0.2	AG,ID	Road Crossing
Stark	ATWS-4480	16.8	16.9	Right	353	75	0.6	AG,FW	Waterbody and Wetland Crossing
Stark	ATWS-1880	16.9	17.0	Right	223	25	0.1	AG,OL	Topsoil Segregation
Stark	ATWS-2006	16.9	17.0	Right	330	50	0.4	AG	Wetland Crossing and Topsoil Segregation
Stark	ATWS-42	17.0	17.1	Right	514	75	0.9	AG, FW	Waterbody, Wetland and Rail / Trail Crossing
Stark	ATWS-4454	17.3	17.4	Right	468	25	0.3	AG	Topsoil Segregation
Stark	ATWS-730	17.4	17.5	Right	311	50	0.4	AG	Bend Installation and Topsoil Segregation
Stark	ATWS-4215	17.4	17.5	Left	195	25	0.1	AG	Bend Installation
Stark	ATWS-551	17.5	17.6	Right	567	25	0.3	AG	Topsoil Segregation
Stark	ATWS-1138	17.6	17.6	Right	165	75	0.3	AG	Wetland Crossing
Stark	ATWS-1140	17.7	17.7	Right	237	25	0.1	AG,FW	Topsoil Segregation
Stark	ATWS-4481	17.7	17.7	Left	74	25	0	AG,FW	Existing Pipeline Crossing
Stark	ATWS-4216	17.7	17.8	Left	171	50	0.2	AG	Road Crossing
Stark	ATWS-44	17.7	17.8	Right	153	75	0.3	AG,OL	Waterbody Crossing
Stark	ATWS-43	17.8	17.8	Right	224	75	0.4	AG	Waterbody Crossing
Stark	ATWS-4217	17.8	17.8	Left	125	50	0.1	AG	Road and Waterbody Crossing
Stark	ATWS-1139	17.8	17.9	Right	458	25	0.3	AG	Topsoil Segregation
Stark	ATWS-1141	18.0	18.2	Right	916	25	0.5	AG,OL	Topsoil Segregation
Stark	ATWS-1881	18.2	18.3	Right	458	25	0.3	AG,OL	Topsoil Segregation
Stark	ATWS-3066	18.3	18.3	Left	292	50	0.3	AG,OL	Road Crossing
Stark	ATWS-45	18.3	18.3	Right	220	75	0.4	AG,OL	Road Crossing and Bend Installation
Stark	ATWS-1142	18.3	18.5	Right	832	25	0.5	AG,ID,OL,RE	Topsoil Segregation
Stark	ATWS-46	18.3	18.4	Left	130	50	0.1	AG,ID,RE	Road Crossing
Stark	ATWS-47	18.4	18.5	Left	509	25	0.3	AG,RE	Bend Installation
Stark	ATWS-48	18.5	18.6	Right	377	75	0.6	AG,ID	Rail and Road Crossing
Stark	ATWS-49	18.6	18.7	Right	335	125	1	AG	Rail and Road Crossing
Stark	ATWS-50	18.6	18.7	Left	346	75	0.6	AG,OL	Rail and Road Crossing
Stark	ATWS-2239	18.7	18.9	Right	1,038	25	0.6	AG	Topsoil Segregation
Stark	ATWS-2238	18.9	19.0	Right	330	50	0.4	AG	Bend Installation and Wetland Crossing and Topsoil Segregation
Stark	ATWS-4218	18.9	18.9	Left	200	25	0.1	AG	Bend Installation
Stark	ATWS-2240	19.0	19.3	Right	1,587	25	0.9	AG,OL	Topsoil Segregation
Stark	ATWS-2241	19.2	19.3	Left	198	25	0.1	AG	Bend Installation
Stark	ATWS-2924	19.3	19.3	Right	154	75	0.3	AG	Waterbody and Wetland Crossing
Stark	ATWS-2543	19.5	19.6	Right	881	75	1.5	AG,ID,OL	Waterbody and Wetland Crossing and Topsoil Segregation
Stark	ATWS-2547	19.6	19.6	Left	323	50	0.4	AG,ID	Road Crossing
Stark	ATWS-2546	19.6	19.7	Left	151	50	0.2	AG,ID	Road Crossing
Stark	ATWS-2545	19.6	19.7	Right	150	75	0.3	AG,ID	Road Crossing
Stark	ATWS-3068	19.7	19.8	Right	1,010	25	0.6	AG,FW	Topsoil Segregation
Stark	ATWS-3067	19.8	19.9	Right	250	50	0.3	AG,FW	Bend Installation and Topsoil Segregation
Stark	ATWS-4219	19.9	19.9	Left	177	25	0.1	AG	Bend Installation
Stark	ATWS-2572	19.9	20.3	Right	2,083	25	1.2	AG	Topsoil Segregation
Stark	ATWS-3069	19.9	20.0	Left	300	25	0.2	AG	Bend Installation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Stark	ATWS-3070	20.1	20.2	Left	297	25	0.2	AG	Bend Installation
Stark	ATWS-2534	20.3	20.4	Right	375	125	1.1	AG	Road Crossing
Stark	ATWS-3126	20.3	20.4	Left	271	75	0.5	AG	Road Bore Pull Back String
Stark	ATWS-2535	20.3	20.4	Left	241	75	0.4	AG	Road Crossing
Stark	ATWS-2573	20.4	20.5	Right	307	75	0.5	FW,OL	Waterbody, Wetland and Road Crossing
Stark	ATWS-2575	20.4	20.5	Left	177	75	0.3	FW,OL	Road and Waterbody Crossing
Stark	ATWS-4220	20.5	20.6	Right	340	125	1	AG	Waterbody Crossing and Topsoil Segregation
Stark	ATWS-4347	20.5	20.6	Left	300	25	0.2	AG	Bend Installation
Stark	ATWS-2574	20.6	20.7	Right	658	25	0.4	AG	Topsoil Segregation
Stark	ATWS-2588	20.7	20.8	Right	286	75	0.5	AG,ID	Road Crossing
Stark	ATWS-3073	20.7	20.8	Left	211	50	0.2	AG,ID	Road Crossing
Stark	ATWS-3072	20.8	20.8	Left	241	50	0.3	AG	Road Crossing
Stark	ATWS-2587	20.8	20.8	Right	165	75	0.3	AG,ID	Road Crossing
Stark	ATWS-2577	20.8	21.1	Right	1,550	25	0.9	AG	Topsoil Segregation
Stark	ATWS-2470	21.1	21.2	Right	251	75	0.4	AG,ID	Road Crossing and Bend Installation
Stark	ATWS-2468	21.1	21.2	Left	359	50	0.4	AG,ID	Road Crossing and Bend Installation
Stark	ATWS-2467	21.2	21.2	Right	238	75	0.4	AG,ID	Road Crossing
Stark	ATWS-2469	21.2	21.2	Left	185	50	0.2	AG,ID	Road Crossing
Stark	ATWS-2576	21.2	21.3	Right	368	25	0.2	AG	Topsoil Segregation
Stark	ATWS-3127	21.3	21.3	Right	300	50	0.3	AG	Bend Installation and Topsoil Segregation
Stark	ATWS-4008	21.3	21.3	Left	200	25	0.1	AG	Bend Installation
Stark	ATWS-2583	21.3	21.7	Right	1,814	25	1	AG,ID	Topsoil Segregation
Stark	ATWS-2497	21.6	21.7	Left	207	75	0.4	AG,ID	Road Crossing
Stark	ATWS-2581	21.7	21.7	Left	179	75	0.3	AG,ID	Road Crossing
Stark	ATWS-2582	21.7	21.7	Right	228	75	0.4	AG,ID	Road Crossing
Stark	ATWS-2586	21.7	21.8	Right	145	25	0.1	AG	Topsoil Segregation
Stark	ATWS-3128	21.7	21.8	Left	197	50	0.2	AG	Waterbody Crossing
Stark	ATWS-2585	21.8	21.8	Right	102	75	0.2	AG,OL	Waterbody Crossing
Stark	ATWS-3129	21.8	21.8	Left	100	50	0.1	AG	Waterbody Crossing
Stark	ATWS-2584	21.8	21.8	Right	108	75	0.2	AG	Waterbody Crossing
Stark	ATWS-2580	21.8	22.0	Right	824	25	0.5	AG	Topsoil Segregation
Stark	ATWS-4009	21.8	21.9	Left	200	25	0.1	AG	Bend Installation
Stark	ATWS-2283	22.0	22.0	Left	199	50	0.2	AG,OL	Road and Waterbody Crossing
Stark	ATWS-2755	22.0	22.1	Right	341	75	0.6	AG	Road and Waterbody Crossing
Stark	ATWS-2282	22.0	22.1	Left	490	50	0.6	AG,ID	Road and Waterbody Crossing
Stark	ATWS-2471	22.1	22.1	Right	249	75	0.4	AG,ID	Road and Waterbody Crossing
Stark	ATWS-2908	22.1	22.2	Right	529	25	0.3	AG	Topsoil Segregation
Stark	ATWS-3201	22.2	22.2	Left	100	25	0.1	AG	Bend Installation
Stark	ATWS-2303	22.2	22.2	Left	126	75	0.2	AG,ID	Road and Waterbody Crossing
Stark	ATWS-2601	22.2	22.2	Right	254	75	0.4	AG,ID	Waterbody, Wetland and Road Crossing
Stark	ATWS-2602	22.3	22.3	Right	148	75	0.3	AG,OL	Waterbody, Wetland and Road Crossing
Stark	ATWS-1154	22.3	22.7	Right	2,194	25	1.3	AG	Topsoil Segregation
Stark	ATWS-4010	22.5	22.6	Left	300	25	0.2	AG	Bend Installation
Stark	ATWS-3202	22.7	22.8	Left	145	50	0.2	AG,OL	Waterbody Crossing
Stark	ATWS-689	22.7	22.7	Right	105	75	0.2	AG,OL	Waterbody Crossing
Stark	ATWS-688	22.8	22.8	Right	142	75	0.2	AG	Waterbody Crossing
Stark	ATWS-3203	22.8	22.8	Left	100	50	0.1	AG	Waterbody Crossing
Stark	ATWS-1885	22.8	23.0	Right	1,008	25	0.6	AG	Topsoil Segregation
Stark	ATWS-3207	23.0	23.0	Right	125	50	0.1	AG	Waterbody Crossing
Stark	ATWS-3204	23.0	23.0	Left	100	50	0.1	AG	Waterbody Crossing
Stark	ATWS-3205	23.0	23.0	Left	131	50	0.2	AG	Waterbody Crossing
Stark	ATWS-3206	23.0	23.0	Right	100	50	0.1	AG	Waterbody Crossing
Stark	ATWS-4401	23.0	23.1	Right	285	25	0.2	AG	Topsoil Segregation
Stark	ATWS-2002	23.1	23.1	Left	75	25	0	AG	Existing Pipeline Crossing
Stark	ATWS-2003	23.1	23.1	Left	76	25	0	AG	Existing Pipeline Crossing
Stark	ATWS-1155	23.1	23.2	Right	685	25	0.4	AG	Topsoil Segregation
Stark	ATWS-3130	23.2	23.2	Left	136	25	0.1	AG	Road Crossing
Stark	ATWS-60	23.2	23.2	Right	136	75	0.2	AG	Road Crossing
Stark	ATWS-59	23.2	23.3	Right	130	75	0.2	AG,ID	Road and Existing Pipeline Crossing
Stark	ATWS-2001	23.2	23.3	Left	305	50	0.3	AG,ID	Road and Existing Pipeline Crossing
Stark	ATWS-1156	23.3	23.5	Right	1,116	25	0.6	AG	Topsoil Segregation
Stark	ATWS-3133	23.5	23.5	Left	170	25	0.1	AG,ID	Road Crossing
Stark	ATWS-3132	23.5	23.6	Right	345	75	0.6	AG,ID	Road Crossing
Stark	ATWS-3131	23.5	23.6	Left	337	25	0.2	ID,OL	Road Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Stark	ATWS-61	23.6	23.6	Right	157	75	0.3	ID,OL	Road Crossing
Stark	ATWS-1157	23.6	23.8	Right	1,271	25	0.7	FW,OL	Topsoil Segregation
Stark	ATWS-734	23.8	23.9	Right	307	50	0.4	AG,OL	Bend Installation and Topsoil Segregation
Stark	ATWS-4011	23.8	23.9	Left	200	25	0.1	AG	Bend Installation
Stark	ATWS-1158	23.9	24.1	Right	1,083	25	0.6	AG	Topsoil Segregation
Stark	ATWS-733	23.9	24.0	Left	295	15	0.1	AG	Bend Installation
Stark	ATWS-10	24.1	24.1	Right	75	50	0.1	AG	Waterbody Crossing
Stark	ATWS-2	24.1	24.1	Right	97	50	0.1	AG	Waterbody Crossing
Stark	ATWS-1886	24.1	24.2	Right	408	25	0.2	AG	Topsoil Segregation
Stark	ATWS-3074	24.2	24.2	Left	171	50	0.2	AG,ID,OL	Road Crossing
Stark	ATWS-64	24.2	24.2	Right	168	75	0.3	AG,ID	Road Crossing
Stark	ATWS-63	24.2	24.3	Right	152	75	0.3	AG,ID	Road Crossing
Stark	ATWS-1159	24.3	24.4	Right	868	25	0.5	AG	Topsoil Segregation
Stark	ATWS-4221	24.4	24.5	Left	300	25	0.2	AG	Bend Installation
Stark	ATWS-1160	24.4	24.5	Right	304	75	0.5	AG	Waterbody and Wetland Crossing and Topsoil Segregation
Stark	ATWS-77	24.7	24.7	Right	275	75	0.5	AG	Waterbody and Wetland Crossing and Topsoil Segregation
Stark	ATWS-1162	24.7	25.0	Right	1,316	25	0.8	AG,OL	Topsoil Segregation
Stark	ATWS-65	25.0	25.0	Right	98	75	0.2	AG,OL	Road Crossing
Stark	ATWS-2936	25.0	25.0	Left	97	50	0.1	AG,OL	Road Crossing
Stark	ATWS-2937	25.0	25.0	Left	96	50	0.1	ID,OL	Road Crossing
Stark	ATWS-66	25.0	25.0	Right	94	75	0.2	ID,OL	Road Crossing
Stark	ATWS-1161	25.0	25.1	Right	267	25	0.2	OL	Topsoil Segregation
Stark	ATWS-550	25.2	25.2	Left	268	25	0.2	FW,OL	Bend Installation
Stark	ATWS-1164	25.3	25.3	Right	262	25	0.2	AG,FW	Topsoil Segregation
Stark	ATWS-3134	25.3	25.4	Right	380	50	0.4	AG	Bend Installation and Topsoil Segregation
Stark	ATWS-4012	25.3	25.4	Left	200	25	0.1	AG	Bend Installation
Stark	ATWS-1165	25.4	25.4	Right	148	75	0.3	AG	Wetland Crossing
Stark	ATWS-1166	25.5	25.5	Right	266	50	0.3	AG	Bend Installation and Wetland Crossing and Topsoil Segregation
Stark	ATWS-4013	25.5	25.5	Left	200	25	0.1	AG	Bend Installation
Stark	ATWS-573	25.5	25.5	Right	118	75	0.2	AG	Road Crossing
Stark	ATWS-2938	25.5	25.6	Left	180	50	0.2	AG,ID	Road Crossing
Stark	ATWS-67	25.5	25.6	Right	200	75	0.3	AG,ID,OL	Road Crossing
Stark	ATWS-2939	25.6	25.6	Left	140	50	0.2	AG,ID,OL	Road Crossing
Stark	ATWS-1167	25.6	25.7	Right	718	25	0.4	AG	Topsoil Segregation
Stark	ATWS-3135	25.7	25.7	Left	108	50	0.1	AG,FW	Waterbody Crossing
Stark	ATWS-646	25.7	25.7	Right	147	75	0.3	AG	Waterbody Crossing
Stark	ATWS-3136	25.7	25.8	Left	153	50	0.2	AG	Waterbody Crossing
Stark	ATWS-645	25.8	25.8	Right	96	75	0.2	AG	Waterbody Crossing
Stark	ATWS-1163	25.8	25.9	Right	711	25	0.4	AG,FW	Topsoil Segregation
Stark	ATWS-3468	26.0	26.0	Left	102	25	0.1	FW	Existing Pipeline Crossing
Stark	ATWS-3208	26.0	26.0	Left	69	25	0	FW,OL	Existing Pipeline Crossing
Stark	ATWS-1171	26.1	26.3	Right	1,007	25	0.6	AG,FW	Topsoil Segregation
Stark	ATWS-2000	26.3	26.3	Right	155	50	0.2	AG	Extra Workspace for Construction Near Residential Building
Stark	ATWS-68	26.3	26.4	Left	88	25	0.1	AG,FW	Road Crossing
Stark	ATWS-1170	26.4	26.5	Right	538	25	0.3	AG,FW,OL	Topsoil Segregation
Stark	ATWS-69	26.4	26.4	Left	145	75	0.2	AG,ID	Road Crossing
Stark	ATWS-3137	26.4	26.4	Left	195	25	0.1	AG	Bend Installation
Stark	ATWS-70	26.5	26.7	Left	997	25	0.6	AG,FW	Bend Installation
Stark	ATWS-1173	26.5	26.7	Right	993	25	0.6	AG,FW	Topsoil Segregation
Stark	ATWS-2490	26.7	26.8	Right	188	75	0.3	AG	Waterbody and Wetland Crossing
Stark	ATWS-2491	26.8	26.8	Right	156	25	0.1	AG	Topsoil Segregation
Stark	ATWS-2489	26.8	26.8	Right	125	75	0.2	AG	Waterbody Crossing
Stark	ATWS-3139	26.8	26.8	Left	54	50	0.1	AG,FW	Waterbody Crossing
Stark	ATWS-3138	26.8	26.9	Left	110	50	0.1	OL	Waterbody Crossing
Stark	ATWS-2488	26.8	26.9	Right	166	75	0.3	OL	Waterbody and Wetland Crossing
Stark	ATWS-4482	26.9	26.9	Right	214	25	0.1	OL	Topsoil Segregation
Stark	ATWS-2487	26.9	27.2	Right	1,248	25	0.7	AG	Topsoil Segregation
Stark	ATWS-2486	27.2	27.2	Right	197	50	0.2	AG,ID	Road Crossing
Stark	ATWS-2485	27.2	27.2	Left	223	75	0.4	AG,ID	Road Crossing
Stark	ATWS-2484	27.2	27.3	Left	161	75	0.3	ID,OL	Road Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Stark	ATWS-2483	27.2	27.3	Right	164	75	0.3	AG,OL	Road Crossing and Bend Installation
Stark	ATWS-3140	27.3	27.3	Left	388	25	0.2	AG,OL	Bend Installation and Existing Pipeline Crossing
Stark	ATWS-2482	27.3	27.3	Right	110	50	0.1	AG	Existing Pipeline Crossing
Stark	ATWS-2481	27.3	27.4	Right	465	25	0.3	AG	Topsoil Segregation
Stark	ATWS-3141	27.3	27.4	Left	269	25	0.2	AG	Bend Installation and Existing Pipeline Crossing
Stark	ATWS-2301	27.4	27.4	Right	125	75	0.2	AG	Wetland Crossing
Stark	ATWS-2300	27.4	27.4	Left	120	50	0.1	AG	Wetland Crossing
Stark	ATWS-2298	27.4	27.5	Right	95	75	0.2	AG	Wetland Crossing
Stark	ATWS-2299	27.5	27.5	Left	150	50	0.2	AG,OL	Wetland Crossing
Stark	ATWS-4222	27.5	27.5	Right	198	25	0.1	AG	Topsoil Segregation
Stark	ATWS-4014	27.5	27.5	Left	198	25	0.1	AG	Bend Installation
Stark	ATWS-2297	27.5	27.6	Right	695	75	1.2	AG	Wetland Crossing and Topsoil Segregation
Stark	ATWS-4223	27.6	27.7	Right	319	125	0.9	AG	Waterbody Crossing
Stark	ATWS-2296	27.7	27.7	Left	132	50	0.2	AG	Waterbody Crossing
Stark	ATWS-2293	27.7	27.7	Right	173	75	0.3	AG	Waterbody and Wetland Crossing
Stark	ATWS-2295	27.7	27.8	Left	119	50	0.1	AG	Waterbody Crossing
Stark	ATWS-2294	27.7	27.8	Right	343	25	0.2	AG	Topsoil Segregation
Stark	ATWS-4440	27.8	27.8	Left	200	25	0.1	AG	Bend Installation
Stark	ATWS-4015	27.8	28.0	Right	777	25	0.4	FW,OL	Wetland Crossing and Moving Equipment
Stark	ATWS-4017	27.9	27.9	Left	200	25	0.1	OL	Bend Installation
Stark	ATWS-735	28.0	28.0	Left	141	295	0.9	OL	Rail and Wetland Crossing
Stark	ATWS-500	28.0	28.1	Right	360	100	0.8	FW,OL	Rail and Wetland Crossing
Stark	ATWS-736	28.0	28.1	Left	144	75	0.2	OL,RE	Rail Crossing
Stark	ATWS-501	28.1	28.1	Right	295	75	0.5	RE	Rail Crossing
Stark	ATWS-2940	28.1	28.2	Left	420	50	0.5	RE	Road and Existing Pipeline Crossing and Bend Installation
Stark	ATWS-85	28.2	28.2	Right	80	50	0.1	RE	Road Crossing
Stark	ATWS-2941	28.2	28.2	Left	151	50	0.2	AG,ID,OL	Road Crossing
Stark	ATWS-84	28.2	28.2	Right	316	125	0.9	AG,ID,OL	Road Crossing
Stark	ATWS-3076	28.2	28.3	Right	526	25	0.3	AG	Topsoil Segregation
Stark	ATWS-3075	28.3	28.4	Right	310	50	0.4	AG	Bend Installation and Topsoil Segregation
Stark	ATWS-4016	28.4	28.4	Left	200	25	0.1	AG	Bend Installation
Stark	ATWS-1177	28.4	28.6	Right	1,000	25	0.6	AG,FW	Topsoil Segregation
Stark	ATWS-4348	28.5	28.6	Left	254	25	0.1	AG,FW	Bend Installation
Stark	ATWS-3143	28.7	28.8	Left	676	50	0.8	AG	Wetland Crossing
Stark	ATWS-4018	28.7	28.8	Right	562	75	1	AG,FW	Wetland Crossing and Topsoil Segregation
Stark	ATWS-1176	28.8	28.9	Right	369	25	0.2	AG	Topsoil Segregation
Stark	ATWS-4349	28.8	28.8	Left	137	25	0.1	AG	Bend Installation
Stark	ATWS-1178	29.0	29.1	Left	411	75	0.7	AG,FW	Wetland Crossing and Topsoil Segregation
Stark	ATWS-3234	29.2	29.2	Left	166	50	0.2	FW	Waterbody, Wetland and Road Crossing
Stark	ATWS-86	29.2	29.2	Right	248	50	0.3	FW	Wetland Crossing
Stark	ATWS-1179	29.3	29.3	Left	172	75	0.3	AG,ID	Bend Installation and Road and Waterbody Crossing
Stark	ATWS-737	29.3	29.4	Right	405	75	0.7	AG	Waterbody Crossing
Stark	ATWS-738	29.3	29.4	Left	183	25	0.1	AG	Bend Installation
Stark	ATWS-1180	29.4	29.6	Right	1,086	25	0.6	AG	Topsoil Segregation
Stark	ATWS-3235	29.6	29.6	Left	144	50	0.2	AG	Waterbody Crossing
Stark	ATWS-1181	29.6	29.6	Right	131	75	0.2	AG	Waterbody Crossing
Stark	ATWS-739	29.6	29.7	Right	471	75	0.8	AG	Waterbody and Wetland Crossing
Stark	ATWS-2233	29.7	29.7	Left	140	50	0.2	AG,FW	Bend Installation and Topsoil Segregation
Stark	ATWS-2501	29.7	29.8	Right	421	50	0.5	AG	Bend Installation and Topsoil Segregation
Stark	ATWS-4019	29.8	29.8	Left	200	25	0.1	AG	Bend Installation
Stark	ATWS-3145	29.9	30.0	Left	287	25	0.2	FW,OL	Bend Installation
Stark	ATWS-4224	30.1	30.1	Left	200	25	0.1	AG	Bend Installation
Stark	ATWS-4359	30.0	30.2	Right	550	50	0.6	AG,OL	Bend Installation and Topsoil Segregation
Stark	ATWS-3144	30.1	30.3	Left	642	25	0.4	AG,OL	Bend Installation and Topsoil Segregation
Stark	ATWS-87	30.3	30.3	Left	171	75	0.2	AG,ID,RE	Road Crossing
Stark	ATWS-88	30.3	30.4	Left	227	75	0.4	AG,ID	Road Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a] Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Stark	ATWS-1999	30.4	30.4	Left	272	25	0.2	AG	Topsoil Segregation
Stark	ATWS-1182	30.4	30.5	Left	335	25	0.2	AG	Topsoil Segregation
Stark	ATWS-2160	30.5	30.6	Left	642	25	0.4	AG,OL	Topsoil Segregation
Stark	ATWS-3236	30.6	30.7	Left	364	50	0.4	AG	Waterbody Crossing, Bend Installation and Topsoil Segregation
Stark	ATWS-2496	30.7	30.7	Right	133	25	0.1	AG	Topsoil Segregation
Stark	ATWS-6	30.7	30.7	Right	100	50	0.1	AG	Waterbody Crossing
Stark	ATWS-3237	30.7	30.7	Right	100	50	0.1	AG	Waterbody Crossing
Stark	ATWS-3238	30.7	30.7	Left	100	50	0.1	AG	Waterbody Crossing
Stark	ATWS-2232	30.7	30.8	Right	404	25	0.2	AG	Topsoil Segregation
Stark	ATWS-3146	30.8	30.8	Left	150	50	0.2	AG,ID	Road Crossing
Stark	ATWS-2231	30.8	30.8	Right	149	75	0.3	AG,ID	Road Crossing
Stark	ATWS-612	30.8	30.9	Right	288	75	0.5	AG,ID	Road and Waterbody Crossing
Stark	ATWS-3147	30.8	30.9	Left	480	50	0.4	AG,ID	Road and Waterbody Crossing
Stark	ATWS-613	30.9	31.0	Right	150	75	0.3	AG,OL	Waterbody Crossing
Stark	ATWS-3240	30.9	31.0	Left	180	50	0.2	AG	Waterbody Crossing
Stark	ATWS-1186	31.0	31.3	Right	1,918	25	1.1	AG	Topsoil Segregation
Stark	ATWS-3241	31.0	31.1	Left	303	25	0.2	AG	Bend Installation
Stark	ATWS-3242	31.1	31.2	Left	473	25	0.3	AG	Bend Installation
Stark	ATWS-3243	31.3	31.3	Right	150	75	0.3	AG	Wetland Crossing and Topsoil Segregation (Outside of Wetland)
Stark	ATWS-4225	31.4	31.5	Left	164	50	0.2	OL	Waterbody Crossing and Topsoil Segregation
Stark	ATWS-3151	31.5	31.6	Right	452	25	0.3	OL	Topsoil Segregation
Stark	ATWS-3148	31.6	31.6	Right	100	75	0.2	OL	Waterbody Crossing
Stark	ATWS-3149	31.6	31.6	Left	100	50	0.1	OL	Waterbody Crossing
Stark	ATWS-2254	31.6	31.6	Right	154	75	0.3	AG,OL	Waterbody Crossing
Stark	ATWS-3150	31.6	31.6	Left	100	50	0.1	AG	Waterbody Crossing
Stark	ATWS-2165	31.6	31.8	Right	1,122	25	0.6	AG	Topsoil Segregation
Stark	ATWS-3077	31.7	31.8	Left	290	25	0.2	AG	Bend Installation
Stark	ATWS-89	31.8	31.9	Left	350	50	0.4	AG,ID	Road Crossing and Bend Installation
Stark	ATWS-2251	31.8	31.9	Right	188	75	0.3	AG,ID	Road Crossing
Stark	ATWS-2252	31.9	31.9	Right	151	75	0.3	AG,ID	Road Crossing
Stark	ATWS-4511	31.9	31.9	Right	106	75	0.1	AG	Road Crossing
Stark	ATWS-2250	31.9	32.0	Left	363	50	0.4	AG,ID	Bend Installation and Road and Waterbody Crossing
Stark	ATWS-2253	31.9	32.0	Right	244	25	0.1	AG	Topsoil Segregation
Stark	ATWS-691	32.0	32.0	Right	110	75	0.2	AG	Waterbody Crossing
Stark	ATWS-2249	32.0	32.0	Left	114	50	0.1	AG	Waterbody Crossing
Stark	ATWS-3244	32.0	32.0	Right	100	75	0.2	AG	Waterbody Crossing
Stark	ATWS-1386	32.0	32.1	Right	297	25	0.2	AG	Topsoil Segregation
Stark	ATWS-90	32.1	32.1	Left	160	50	0.2	AG,OL	Road Crossing
Stark	ATWS-3245	32.1	32.1	Right	199	75	0.3	AG	Road Crossing
Stark	ATWS-3246	32.1	32.2	Right	255	75	0.4	AG,ID	Road and Wetland Crossing
Stark	ATWS-1384	32.2	32.2	Right	99	75	0.2	AG,OL	Waterbody Crossing
Stark	ATWS-740	32.2	32.3	Right	169	75	0.3	AG	Waterbody and Wetland Crossing
Stark	ATWS-1385	32.3	32.5	Right	1,416	25	0.8	AG	Topsoil Segregation
Stark	ATWS-1393	32.5	32.6	Right	537	50	0.6	AG	Bend Installation and Topsoil Segregation
Stark	ATWS-3247	32.6	32.7	Left	214	25	0.1	FW,OL	Bend Installation
Stark	ATWS-3248	32.7	32.7	Right	275	50	0.2	FW,OL	Bend Installation and Road and Wetland Crossing
Stark	ATWS-4020	32.7	32.7	Left	194	25	0.1	FW,OL	Bend Installation
Stark	ATWS-3250	32.7	32.8	Left	132	70	0.1	FW,OL	Bend Installation and Road and Wetland Crossing
Stark	ATWS-647	32.8	32.8	Left	287	75	0.5	ID,FW,OL	Road and Wetland Crossing
Stark	ATWS-3249	32.8	32.8	Right	220	50	0.2	FW,OL,RE	Road and Wetland Crossing
Stark	ATWS-2255	32.9	33.0	Left	220	195	0.9	ID,OL	Road Crossing
Stark	ATWS-2256	33.0	33.0	Right	103	20	0	ID,OL	Road Crossing
Stark	ATWS-3078	33.0	33.0	Right	150	25	0.1	ID,OL	Road Crossing
Stark	ATWS-3251	33.0	33.0	Left	129	50	0.1	ID,RE	Road Crossing
Stark	ATWS-3252	33.0	33.0	Right	104	65	0.1	OL,RE	Road Crossing
Stark	ATWS-3253	33.0	33.0	Right	45	25	0	OL,RE	Bend Installation
Stark	ATWS-3254	33.1	33.1	Right	147	105	0.3	FW,OL,RE	Road Crossing
Stark	ATWS-2258	33.1	33.1	Left	250	200	1.1	ID,FW,OL	Road and Wetland Crossing
Stark	ATWS-3255	33.1	33.1	Left	74	25	0	ID,OL	Road Crossing
Stark	ATWS-2260	33.3	33.3	Left	307	75	0.5	FW,OL,RE	Bend and Long Bore Installation
Stark	ATWS-3256	33.3	33.3	Right	130	135	0.5	ID,OL	Long Bore Pull Back String

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Stark	ATWS-2259	33.3	33.3	Right	52	60	0.1	FW,OL	Long Bore Installation
Stark	ATWS-4266	33.3	33.5	Left	881	25	0.5	FW,OL	Bend Installation
Stark	ATWS-4021	33.5	33.6	Left	279	25	0.2	FW	Bend Installation
Stark	ATWS-4022	33.7	33.7	Left	152	25	0.1	FW	Waterbody and Wetland Crossing
Stark	ATWS-2628	33.7	33.8	Left	211	50	0.2	FW	Waterbody and Wetland Crossing
Stark	ATWS-2629	33.8	33.9	Left	192	25	0.1	FW	Waterbody and Wetland Crossing
Stark	ATWS-2630	33.8	33.8	Left	99	50	0.1	FW	Waterbody and Wetland Crossing
Stark	ATWS-2235	33.9	33.9	Left	72	50	0.1	FW	Bend Installation and Waterbody and Wetland Crossing
Stark	ATWS-3152	33.9	33.9	Right	191	75	0.3	AG,FW,OL	Waterbody and Wetland Crossing
Stark	ATWS-2378	33.9	33.9	Left	105	50	0.1	OL	Waterbody Crossing
Stark	ATWS-2381	33.9	33.9	Right	123	75	0.2	OL	Waterbody Crossing
Stark	ATWS-2234	33.9	34.0	Right	111	25	0.1	OL	Topsoil Segregation
Stark	ATWS-2379	34.0	34.0	Right	228	75	0.4	ID,OL	Road Crossing
Stark	ATWS-3191	34.0	34.0	Left	200	50	0.2	ID,OL	Road Crossing
Stark	ATWS-2380	34.0	34.1	Right	524	75	0.9	AG,ID	Road Crossing and Bend Installation
Stark	ATWS-3192	34.0	34.1	Left	361	50	0.4	AG,ID	Road Crossing and Bend Installation
Stark/Summit	ATWS-4228	34.1	34.2	Right	300	125	0.9	AG,FW	Wetland Crossing and Topsoil Segregation
Summit	ATWS-2385	34.3	34.3	Left	216	75	0.4	OL	Rail Crossing
Summit	ATWS-2384	34.3	34.3	Right	222	100	0.5	OL	Rail Crossing
Summit	ATWS-2386	34.3	34.4	Left	156	75	0.3	OL	Rail Crossing
Summit	ATWS-2382	34.3	34.4	Right	315	100	0.7	FW,OL	Bend Installation and Rail Crossing
Summit	ATWS-3265	34.4	34.4	Left	75	25	0	OL	Existing Pipeline Crossing
Summit	ATWS-4229	34.4	34.6	Right	1,181	25	0.7	FW,OL,RE	Wetland Crossing and Equipment Movement
Summit	ATWS-3264	34.4	34.4	Left	75	25	0	OL	Existing Pipeline Crossing
Summit	ATWS-2359	34.6	34.7	Left	526	75	0.9	OL,RE	Waterbody and Wetland Crossing
Summit	ATWS-2357	34.7	34.7	Right	111	25	0.1	RE	Waterbody and Wetland Crossing
Summit	ATWS-4230	34.8	34.9	Right	667	75	1.1	AG,FW	Waterbody Crossing, Bend Installation and Topsoil Segregation
Summit	ATWS-2362	34.8	34.9	Left	495	25	0.3	AG	Bend Installation
Summit	ATWS-3155	34.9	34.9	Left	100	50	0.1	AG	Waterbody Crossing
Summit	ATWS-2363	34.9	35.0	Right	506	125	1.5	AG,ID,OL	Road and Waterbody Crossing and Topsoil Segregation
Summit	ATWS-2364	35.0	35.0	Left	246	50	0.3	AG,ID,FW,OL	Road and Waterbody Crossing
Summit	ATWS-2377	35.0	35.0	Right	134	50	0.2	ID,RE	Road Crossing
Summit	ATWS-2365	35.0	35.0	Left	105	60	0.1	ID,RE	Road Crossing
Summit	ATWS-3080	35.0	35.1	Left	240	25	0.1	OL,RE	Bend Installation
Summit	ATWS-2356	35.2	35.3	Right	400	75	0.7	OL	Wetland Crossing
Summit	ATWS-3158	35.2	35.2	Left	75	25	0	OL	Existing Pipeline Crossing
Summit	ATWS-3157	35.2	35.2	Left	75	25	0	OL	Existing Pipeline Crossing
Summit	ATWS-93	35.4	35.5	Right	436	100	1	AG	Bend Installation and Road and Wetland Crossing
Summit	ATWS-2337	35.4	35.4	Left	339	50	0.4	AG,FW,OL	Road and Wetland Crossing
Summit	ATWS-94	35.5	35.6	Right	204	100	0.5	FW	Road and Wetland Crossing
Summit	ATWS-4231	35.6	35.6	Right	288	25	0.2	AG,FW	Wetland Crossing and Topsoil Segregation
Summit	ATWS-2335	35.7	35.7	Right	331	75	0.6	AG	Wetland Crossing
Summit	ATWS-2336	35.7	35.8	Right	299	25	0.2	AG	Topsoil Segregation
Summit	ATWS-4483	35.8	35.9	Right	535	75	0.9	AG	Wetland Crossing and Topsoil Segregation
Summit	ATWS-2338	35.9	36.0	Left	324	25	0.2	AG	Bend Installation
Summit	ATWS-2333	36.0	36.0	Left	218	50	0.3	AG	Bend Installation and Topsoil Segregation
Summit	ATWS-4024	36.2	36.2	Left	272	25	0.2	FW	Bend Installation
Summit	ATWS-3160	36.4	36.4	Right	214	25	0.1	FW,OL	Bend Installation and Road and Wetland Crossing
Summit	ATWS-2339	36.4	36.5	Left	371	25	0.2	FW	Bend Installation and Existing Pipeline Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Summit	ATWS-4232	36.5	36.6	Right	162	25	0.1	FW,OL	Wetland Crossing
Summit	ATWS-3082	36.6	36.7	Right	423	25	0.2	OL	Wetland Crossing and Bend Installation
Summit	ATWS-4233	36.6	36.6	Left	129	75	0.2	FW	Waterbody and Wetland Crossing
Summit	ATWS-4025	36.7	36.7	Right	117	25	0.1	OL	Waterbody Crossing
Summit	ATWS-3211	36.8	36.8	Left	242	75	0.2	ID,RE	Road and Waterbody Crossing
Summit	ATWS-4026	36.8	36.8	Right	88	50	0.1	RE	Waterbody Crossing
Summit	ATWS-2351	36.8	36.8	Right	155	75	0.3	AG,OL,RE	Road Crossing and Bend Installation
Summit	ATWS-2350	36.8	36.9	Left	254	50	0.3	AG	Bend Installation and Road and Wetland Crossing
Summit	ATWS-4447	36.8	36.9	Right	324	25	0.2	OL	Topsoil Segregation
Summit	ATWS-4027	37.2	37.3	Right	517	75	0.9	AG	Bend Installation and Wetland Crossing and Topsoil Segregation
Summit	ATWS-4350	37.2	37.3	Left	210	25	0.1	AG,FW	Bend Installation
Summit	ATWS-2323	37.3	37.3	Right	88	50	0.1	AG,FW	Bend Installation and Topsoil Segregation
Summit	ATWS-2326	37.3	37.3	Right	181	75	0.3	FW	Road Crossing
Summit	ATWS-3212	37.4	37.4	Left	116	50	0.1	ID	Road Crossing
Summit	ATWS-2325	37.4	37.4	Left	159	75	0.3	ID,FW	Waterbody, Wetland and Road Crossing
Summit	ATWS-2324	37.4	37.4	Right	85	75	0.1	ID,FW	Waterbody, Wetland and Road Crossing
Summit	ATWS-2349	37.5	37.5	Right	186	25	0.1	OL	Topsoil Segregation
Summit	ATWS-2327	37.6	37.7	Right	635	75	1.1	AG	Wetland Crossing and Topsoil Segregation
Summit	ATWS-2328	37.6	37.7	Left	298	25	0.2	AG	Bend Installation
Summit	ATWS-2329	37.7	37.8	Left	205	50	0.2	FW	Bend Installation and Wetland Crossing
Summit	ATWS-3161	37.8	37.8	Left	103	50	0.1	ID,RE	Road Crossing
Summit	ATWS-3268	37.8	37.9	Left	181	50	0.2	ID,FW,RE	Road Crossing
Summit	ATWS-2330	37.8	37.9	Right	97	50	0.1	ID,FW,RE	Road Crossing
Summit	ATWS-2331	37.9	37.9	Right	265	25	0.2	FW,RE	Bend Installation
Summit	ATWS-4234	38.0	38.1	Right	463	50	0.5	FW	Existing Pipeline Crossing
Summit	ATWS-2322	38.2	38.2	Right	309	25	0.2	FW	Bend Installation
Summit	ATWS-2347	38.3	38.3	Left	118	50	0.1	FW	Road Crossing
Summit	ATWS-2265	38.3	38.3	Right	139	50	0.2	FW	Road Crossing
Summit	ATWS-2346	38.3	38.3	Left	82	50	0.1	ID,FW	Road Crossing
Summit	ATWS-2264	38.3	38.3	Right	85	50	0.1	ID,FW	Road Crossing
Summit	ATWS-4028	38.4	38.5	Right	433	50	0.5	FW,OL	Bend Installation and Topsoil Segregation
Summit	ATWS-3270	38.6	38.7	Right	75	25	0	OL	Driveway Crossing
Summit	ATWS-3167	38.9	38.9	Right	709	25	0.4	AG	Topsoil Segregation
Summit	ATWS-2312	38.9	39.0	Right	248	205	0.8	AG,ID,FW	Road Crossing
Summit	ATWS-2313	38.9	39.0	Left	292	50	0.3	AG,FW	Bend Installation and Road Crossing
Summit	ATWS-2315	39.0	39.0	Right	165	50	0.2	ID,RE	Road Crossing
Summit	ATWS-2314	39.0	39.0	Left	168	25	0.1	ID,RE	Road Crossing
Summit	ATWS-2316	39.1	39.1	Left	275	25	0.2	AG,FW,OL	Bend Installation
Summit	ATWS-2263	39.1	39.1	Right	318	25	0.2	AG,FW	Topsoil Segregation
Summit	ATWS-3272	39.2	39.2	Right	163	25	0.1	FW,RE	Topsoil Segregation
Summit	ATWS-2317	39.2	39.3	Right	290	50	0.3	RE	Bend Installation and Topsoil Segregation
Summit	ATWS-2262	39.3	39.3	Right	344	25	0.2	RE	Topsoil Segregation
Summit	ATWS-2318	39.3	39.3	Right	87	75	0.1	RE	Waterbody and Wetland Crossing
Summit	ATWS-2311	39.4	39.4	Right	151	75	0.3	AG	Waterbody and Wetland Crossing
Summit	ATWS-2319	39.4	39.4	Left	135	75	0.2	AG	Waterbody and Wetland Crossing
Summit	ATWS-2274	39.4	39.5	Right	452	25	0.3	AG	Wetland Crossing and Topsoil Segregation
Summit	ATWS-2320	39.5	39.5	Right	121	75	0.2	AG,FW	Waterbody Crossing and Topsoil Segregation
Summit	ATWS-2321	39.5	39.5	Left	115	50	0.1	AG,FW	Waterbody Crossing
Summit	ATWS-1401	39.5	39.6	Left	148	50	0.2	AG,FW,OL	Bend Installation and Waterbody Crossing
Summit	ATWS-2275	39.5	39.5	Right	328	50	0.4	AG	Waterbody Crossing, Bend Installation and Topsoil Segregation
Summit	ATWS-577	39.6	39.7	Right	295	50	0.3	FW,OL	Wetland Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Summit	ATWS-99	39.8	39.8	Left	152	50	0.2	ID,OL	Road and Wetland Crossing
Summit	ATWS-3274	39.8	39.8	Right	154	75	0.3	ID,OL	Road and Wetland Crossing
Summit	ATWS-4505	39.8	39.8	Right	38	75	0.1	ID,FW	Road Crossing
Summit	ATWS-4525	39.8	39.8	Right	48	50	0.1	OL	CP Installation (Deep Well Anodes)
Summit	ATWS-743	39.8	39.8	Right	60	75	0.1	FW,RE	Road Crossing
Summit	ATWS-3171	39.8	39.9	Left	258	50	0.3	ID,FW,OL,RE	Bend Installation and Road Crossing
Summit	ATWS-101	40.0	40.1	Right	190	25	0.1	OL	Bend Installation and Wetland Crossing
Summit	ATWS-100	40.1	40.1	Left	173	25	0.1	OL	Bend Installation and Wetland Crossing
Summit	ATWS-3276	40.1	40.2	Left	152	25	0.1	OL	Bend Installation
Summit	ATWS-627	40.2	40.2	Left	165	75	0.3	ID,OL	Road Crossing
Summit	ATWS-3275	40.2	40.3	Left	204	75	0.4	RE	Road Crossing
Summit	ATWS-3172	40.3	40.3	Right	293	25	0.2	FW	Bend Installation
Summit	ATWS-3213	40.4	40.5	Right	501	25	0.3	OL	Topsoil Segregation
Summit	ATWS-2089	40.5	40.5	Left	337	25	0.2	FW,OL	Bend Installation
Summit	ATWS-102	40.6	40.6	Right	144	100	0.3	FW,OL	Wetland Crossing
Summit	ATWS-1991	40.6	40.6	Left	246	25	0.1	FW,OL	Bend Installation
Summit	ATWS-4415	40.7	40.8	Left	166	50	0.2	AG,OL,RE	Waterbody Crossing
Summit	ATWS-103	40.8	40.9	Left	494	25	0.3	AG	Bend Installation and Waterbody Crossing
Summit	ATWS-2927	40.8	40.9	Right	570	25	0.3	AG,RE	Topsoil Segregation
Summit	ATWS-1402	40.9	40.9	Right	137	50	0.2	AG	Bend Installation and Waterbody Crossing
Summit	ATWS-2091	40.9	41.0	Left	420	125	1.2	AG	HDD Entry Location
Summit	ATWS-548	41.3	41.4	Left	656	125	1.9	AG	HDD Exit Location
Summit	ATWS-3214	41.5	41.6	Right	177	50	0.2	ID,OL	Road and Existing Pipeline Crossing
Summit	ATWS-4484	41.5	41.6	Left	537	170	1.3	AG,FW	HDD Pullback String
Summit	ATWS-4029	41.5	41.6	Left	467	50	0.5	ID,FW	Road and Waterbody Crossing and Side Slope Construction
Summit	ATWS-744	42.0	42.1	Right	284	25	0.2	OL,RE	Bend Installation and Road and Wetland Crossing
Summit	ATWS-2273	42.1	42.1	Left	282	75	0.5	ID,OL	Bend Installation and Road Crossing
Summit	ATWS-2272	42.1	42.2	Left	276	50	0.3	ID,FW,RE	Road Crossing
Summit	ATWS-2271	42.1	42.2	Right	160	75	0.3	FW,OL	Road Crossing
Summit	ATWS-4450	42.2	42.2	Right	182	25	0.1	FW,RE	Bend Installation
Summit	ATWS-3279	42.4	42.3	Left	150	25	0.1	RE	Existing Pipeline Crossing
Summit	ATWS-4451	42.2	42.3	Right	161	25	0.1	FW,OL	Bend Installation
Summit	ATWS-104	42.3	42.3	Right	177	50	0.2	OL	Topsoil Segregation
Summit	ATWS-3174	42.4	42.5	Right	100	50	0.1	OL	Waterbody Crossing
Summit	ATWS-3280	42.5	42.5	Left	100	50	0.1	FW,OL	Waterbody Crossing
Summit	ATWS-3175	42.5	42.5	Right	100	50	0.1	OL	Waterbody Crossing
Summit	ATWS-3281	42.5	42.6	Left	495	25	0.3	FW,OL,RE	Bend Installation and Additional Workspace for Construction Around Pond
Summit	ATWS-1403	42.6	42.6	Right	157	25	0.1	AG,RE	Topsoil Segregation
Summit	ATWS-105	42.6	42.7	Right	136	75	0.2	AG	Road Crossing
Summit	ATWS-106	42.7	42.7	Right	118	75	0.2	ID,FW,RE	Road Crossing
Summit	ATWS-3180	42.7	42.7	Left	115	45	0.1	ID,FW,RE	Road Crossing
Summit	ATWS-3216	42.8	42.8	Right	359	25	0.2	FW,OL,RE	Bend Installation
Summit	ATWS-745	42.8	42.9	Left	405	25	0.2	FW	Bend Installation
Summit	ATWS-1404	43.1	43.2	Right	414	25	0.2	OL	Topsoil Segregation
Summit	ATWS-3282	43.2	43.2	Left	75	25	0	FW	Existing Pipeline Crossing
Summit	ATWS-3283	43.2	43.2	Left	75	25	0	AG,FW	Existing Pipeline Crossing
Summit	ATWS-2157	43.2	43.2	Right	243	25	0.1	AG	Topsoil Segregation
Summit	ATWS-692	43.2	43.3	Right	145	75	0.2	AG,FW	Waterbody Crossing
Summit	ATWS-3219	43.3	43.3	Left	124	50	0.1	FW	Waterbody Crossing
Summit	ATWS-693	43.3	43.3	Right	176	50	0.2	AG	Waterbody and Existing Pipeline Crossing and Topsoil Segregation
Summit	ATWS-3218	43.3	43.3	Left	149	25	0.1	AG,FW	Existing Pipeline Crossing
Summit	ATWS-109	43.4	43.4	Right	130	50	0.1	AG	Ravine Crossing, Topsoil Segregation and Bend Installation
Summit	ATWS-4235	43.4	43.4	Left	253	25	0.1	AG,FW	Bend Installation
Summit	ATWS-3284	43.4	43.4	Right	290	25	0.2	AG	Topsoil Segregation
Summit	ATWS-110	43.5	43.6	Left	380	25	0.2	AG,FW	Bend Installation and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a] Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Summit	ATWS-1990	43.6	43.6	Left	228	75	0.4	AG,ID,OL,RE	Road Crossing
Summit	ATWS-107	43.6	43.6	Right	252	25	0.1	AG,ID,FW,OL	Road Crossing
Summit	ATWS-108	43.7	43.7	Right	175	50	0.2	FW,RE	Road Crossing
Summit	ATWS-1407	43.8	43.9	Left	194	25	0.1	FW,OL	Bend Installation
Summit	ATWS-1408	44.0	44.0	Left	213	25	0.1	AG	Topsoil Segregation
Summit	ATWS-4472	44.0	44.0	Left	91	25	0.1	AG,OL	Topsoil Segregation
Summit	ATWS-112	44.0	44.1	Right	535	75	0.9	AG,FW,OL	Waterbody and Wetland Crossing
Summit	ATWS-4389	44.2	44.2	Left	252	25	0.1	AG	Existing Pipeline Crossing
Summit	ATWS-2548	44.3	44.3	Left	115	75	0.2	AG	Road Crossing
Summit	ATWS-1365	44.2	44.4	Right	756	25	0.4	AG,OL	Topsoil Segregation
Summit	ATWS-3285	44.4	44.4	Left	256	45	0.3	OL	Topsoil Segregation
Summit	ATWS-1364	44.4	44.5	Right	239	20	0.1	AG,OL,RE	Topsoil Segregation
Summit	ATWS-2549	44.4	44.5	Left	100	50	0.1	AG,OL	Existing Pipeline Crossing
Summit	ATWS-2550	44.5	44.5	Left	100	50	0.1	AG	Existing Pipeline Crossing
Summit	ATWS-1366	44.5	44.6	Left	753	25	0.4	AG	Topsoil Segregation
Summit	ATWS-113	44.6	44.7	Left	162	75	0.3	AG	Bend Installation and Existing Pipeline Crossing
Summit	ATWS-3178	44.7	44.8	Left	114	25	0.1	FW	Bend Installation
Summit	ATWS-3177	44.7	44.8	Right	213	25	0.1	AG,FW	Topsoil Segregation
Summit	ATWS-3179	44.8	44.8	Left	79	50	0.1	AG,FW	Bend Installation and Existing Pipeline Crossing
Summit	ATWS-3176	44.8	44.8	Right	119	50	0.1	AG	Topsoil Segregation and Existing Pipeline Crossing
Summit	ATWS-1367	44.8	44.9	Right	319	25	0.2	AG,FW,OL	Topsoil Segregation
Summit	ATWS-114	44.8	44.8	Left	118	25	0.1	AG,FW	Existing Pipeline Crossing
Summit	ATWS-3287	44.8	44.9	Left	75	25	0	AG	Existing Pipeline Crossing
Summit	ATWS-1989	44.9	44.9	Right	94	25	0.1	AG,OL	Topsoil Segregation
Summit	ATWS-115	44.9	44.9	Right	238	75	0.4	AG,ID,OL	Road Crossing
Summit	ATWS-3220	45.0	45.1	Right	613	50	0.7	FW,RE	Wetland and Existing Pipeline Crossing
Summit	ATWS-1986	45.3	45.4	Left	189	25	0.1	OL	Bend Installation and Wetland and Existing Pipeline Crossing
Summit	ATWS-2479	45.4	45.4	Left	52	75	0.1	OL	Wetland and Existing Pipeline Crossing
Summit	ATWS-1985	45.4	45.5	Left	281	75	0.5	ID,OL	Road, Wetland and Existing Pipeline Crossing
Summit	ATWS-3288	45.4	45.5	Right	247	25	0.1	OL	Road, Wetland and Existing Pipeline Crossing
Summit	ATWS-3182	45.5	45.5	Left	136	50	0.2	ID,OL,RE	Road Crossing
Summit	ATWS-3289	45.5	45.5	Right	255	25	0.1	ID,OL	Bend Installation and Road Crossing
Summit	ATWS-3181	45.5	45.5	Left	100	25	0.1	OL	Existing Pipeline Crossing
Summit	ATWS-746	45.5	45.6	Left	252	25	0.1	FW,OL	Bend Installation
Summit	ATWS-579	45.7	45.8	Left	294	25	0.2	FW	Bend Installation
Summit	ATWS-1410	45.8	45.9	Left	676	75	1.2	AG,FW	Waterbody and Wetland Crossing and Topsoil Segregation
Summit	ATWS-4030	45.9	46.0	Left	106	50	0.1	FW	Waterbody and Wetland Crossing
Summit	ATWS-118	46.1	46.2	Right	120	75	0.2	ID,FW,OL	Road Crossing
Summit	ATWS-120	46.2	46.2	Left	245	25	0.1	OL,RE	Bend Installation
Summit	ATWS-4236	46.2	46.2	Right	115	100	0.2	OL	Waterbody Crossing
Summit	ATWS-1984	46.3	46.3	Right	241	50	0.3	OL,RE	Bend Installation
Summit	ATWS-580	46.3	46.4	Left	281	50	0.3	FW, ,RE	Bend Installation and Waterbody Crossing
Summit	ATWS-4490	46.5	46.5	Right	244	50	0.3	FW	Wetland Crossing
Summit	ATWS-2194	46.6	46.6	Right	428	25	0.2	AG,FW	Topsoil Segregation
Summit	ATWS-1370	46.7	46.7	Right	265	25	0.2	AG	Topsoil Segregation
Summit	ATWS-747	46.7	46.8	Right	261	75	0.4	AG,OL	Waterbody, Wetland and Existing Pipeline Crossing and Topsoil Segregation
Summit	ATWS-4402	46.7	46.8	Left	180	90	0.2	OL,RE	Waterbody, Wetland and Driveway Crossing
Summit	ATWS-3183	46.8	46.8	Right	98	75	0.2	AG,ID,OL,RE	Road, Waterbody, Wetland and Existing Pipeline Crossing
Summit	ATWS-121	46.8	46.8	Right	132	75	0.2	ID,FW,OL	Road and Waterbody Crossing
Summit	ATWS-1369	46.9	46.9	Right	287	25	0.2	AG,OL	Topsoil Segregation
Summit	ATWS-4031	47.0	47.0	Right	142	50	0.2	FW	Waterbody Crossing
Summit	ATWS-1411	47.2	47.3	Right	444	25	0.3	AG,FW,OL	Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Summit	ATWS-607	47.3	47.3	Right	314	50	0.4	AG,OL	Bend Installation and Topsoil Segregation
Summit	ATWS-1371	47.3	47.6	Right	1,595	25	0.9	AG,FW,OL	Topsoil Segregation
Summit	ATWS-2503	47.6	47.7	Right	102	25	0.1	AG,OL	Topsoil Segregation
Summit	ATWS-4386	47.7	47.8	Right	580	510	5.8	AG,FW	HDD Entry Location and Spread Move-Around Location
Summit	ATWS-4387	47.7	47.8	Left	505	25	0.3	AG	HDD Entry Location and Spread Move-Around Location
Summit	ATWS-4512	48.1	48.1	Right	120	25	0.1	AG,OL	Access To Hydrostatic Test Water
Summit	ATWS-4032	48.4	48.4	Right	350	100	0.8	AG,OL,RE	HDD Exit Location
Summit	ATWS-3323	48.4	48.5	Right	354	50	0.4	AG,OL,RE	Bend Installation and Topsoil Segregation
Summit	ATWS-1373	48.5	48.7	Right	1,261	25	0.7	AG,OL,RE	Topsoil Segregation
Summit	ATWS-581	48.5	48.7	Left	853	25	0.5	AG,OL,RE	Bend Installation
Summit	ATWS-909	48.6	48.8	Right	819	210	2.6	AG	HDD Pull Back String
Summit	ATWS-124	48.7	48.8	Right	229	75	0.4	AG	Road Crossing
Summit	ATWS-3327	48.7	48.8	Left	477	25	0.3	ID,OL	Road Crossing
Summit	ATWS-3326	48.8	48.9	Left	330	25	0.2	ID,OL,RE	Bend Installation and Road Crossing
Summit	ATWS-3328	48.8	48.8	Right	148	25	0.1	ID,OL,RE	Road Crossing
Summit	ATWS-125	48.8	48.9	Right	181	75	0.3	OL,RE	Road and Waterbody Crossing
Summit	ATWS-2504	48.9	49.0	Right	333	50	0.4	AG,OL	Bend Installation and Waterbody Crossing and Topsoil Segregation
Summit	ATWS-3329	48.9	49.0	Left	433	25	0.2	AG,OL	Bend Installation and Existing Pipeline Crossing
Summit	ATWS-3325	49.0	49.0	Right	272	25	0.2	AG	Topsoil Segregation
Summit	ATWS-3330	49.0	49.0	Left	75	25	0	AG	Existing Pipeline Crossing
Summit	ATWS-2505	49.0	49.1	Right	483	25	0.3	AG	Topsoil Segregation
Summit	ATWS-3184	49.1	49.1	Left	309	25	0.2	AG	Bend Installation
Summit	ATWS-2847	49.1	49.2	Right	385	25	0.2	AG,FW	Topsoil Segregation
Summit	ATWS-4033	49.2	49.2	Right	150	75	0.3	AG,FW	Waterbody Crossing and Topsoil Segregation
Summit	ATWS-4034	49.2	49.2	Left	93	50	0.1	AG,FW	Waterbody Crossing
Summit	ATWS-3233	49.3	49.3	Left	98	75	0.2	OL	Long Bore Pull Back String
Summit	ATWS-3232	49.3	49.3	Right	304	50	0.3	FW,OL,RE	Bend Installation
Summit	ATWS-4237	49.3	49.4	Right	151	25	0.1	FW,OL,RE	Road and Wetland Crossing
Summit	ATWS-2516	49.5	49.5	Right	164	50	0.2	FW,OL,RE	Road Crossing (Long Bore)
Summit	ATWS-2517	49.5	49.6	Right	485	25	0.3	FW	Bend Installation
Summit	ATWS-4465	49.6	49.6	Left	152	25	0.1	FW	Bend Installation and Waterbody Crossing
Summit	ATWS-4467	49.6	49.6	Left	64	25	0	FW	Waterbody Crossing
Summit	ATWS-3185	49.7	49.7	Left	277	25	0.2	FW,OL	Bend Installation
Summit	ATWS-4468	49.7	49.7	Right	200	25	0.1	FW,OL	Wetland and Waterbody Crossing
Summit	ATWS-4535	49.9	49.9	Left	70	25	0	ID,FW	Road Crossing
Summit	ATWS-128	49.9	50.0	Left	454	25	0.3	FW	Bend Installation and Road Crossing
Summit	ATWS-4536	49.9	50.0	Right	210	50	0.2	FW	Road and Wetland Crossing
Summit	ATWS-127	50.0	50.0	Right	150	50	0.2	FW,OL	Waterbody Crossing
Summit	ATWS-3331	50.0	50.0	Left	132	50	0.2	FW,OL	Waterbody Crossing and Existing Pipeline Crossing
Summit	ATWS-3332	50.0	50.0	Left	199	25	0.1	FW,OL	Bend Installation and Existing Pipeline Crossing
Summit	ATWS-3334	50.2	50.2	Right	184	50	0.2	RE	Bend Installation and Topsoil Segregation
Summit	ATWS-3186	50.2	50.3	Right	153	25	0.1	FW,RE	Bend Installation
Summit	ATWS-3187	50.3	50.3	Left	245	25	0.1	RE	Bend Installation
Wayne/Summit	ATWS-129	50.4	50.4	Right	125	75	0.2	RE	Road Crossing
Wayne/Summit	ATWS-3083	50.4	50.4	Left	123	50	0.1	RE	Road Crossing
Wayne	ATWS-130	50.4	50.5	Right	359	75	0.6	AG,ID	Road and Waterbody Crossing
Wayne	ATWS-2942	50.4	50.4	Left	246	50	0.3	AG,ID	Road and Waterbody Crossing
Wayne	ATWS-3335	50.5	50.5	Left	100	50	0.1	AG,OL	Waterbody Crossing
Wayne	ATWS-3336	50.5	50.5	Right	100	50	0.1	AG,OL	Waterbody Crossing
Wayne	ATWS-3338	50.5	50.6	Right	540	25	0.3	AG	Topsoil Segregation
Wayne	ATWS-3337	50.6	50.7	Right	300	50	0.3	AG	Bend Installation and Topsoil Segregation
Wayne	ATWS-4351	50.6	50.6	Left	200	25	0.1	AG	Bend Installation
Wayne	ATWS-1979	50.7	51.0	Right	1,760	25	1	AG,OL	Topsoil Segregation
Wayne	ATWS-168	51.0	51.1	Right	335	125	1	AG	Road Crossing
Wayne	ATWS-169	51.1	51.2	Right	360	125	1	FW,OL	Road Crossing
Wayne	ATWS-1375	51.2	51.3	Right	697	25	0.4	AG,FW	Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Wayne	ATWS-1978	51.3	51.4	Left	685	25	0.4	AG	Bend Installation
Wayne	ATWS-583	51.3	51.4	Right	211	50	0.2	AG	Bend Installation and Topsoil Segregation
Wayne	ATWS-694	51.4	51.4	Left	135	75	0.2	AG,ID,RE	Road and Waterbody Crossing
Wayne	ATWS-3339	51.4	51.5	Right	201	25	0.1	OL	Road and Waterbody Crossing and Topsoil Segregation
Wayne	ATWS-170	51.4	51.5	Left	123	75	0.2	FW	Road and Waterbody Crossing
Wayne	ATWS-3340	51.5	51.6	Right	197	25	0.1	FW,OL	Topsoil Segregation
Wayne	ATWS-749	51.6	51.6	Left	198	25	0.1	FW	Bend Installation
Wayne	ATWS-3225	51.7	51.8	Left	189	25	0.1	AG	Topsoil Segregation
Wayne	ATWS-3223	51.8	51.8	Left	110	50	0.1	AG	Existing Pipeline Crossing
Wayne	ATWS-3224	51.8	51.8	Left	99	50	0.1	AG	Existing Pipeline Crossing
Wayne	ATWS-1377	51.8	52.0	Left	1,103	25	0.6	AG,ID	Topsoil Segregation
Wayne	ATWS-131	52.0	52.0	Right	194	75	0.3	AG,ID	Bend Installation and Road Crossing
Wayne	ATWS-584	52.0	52.1	Left	447	50	0.5	AG,ID	Bend Installation and Road Crossing
Wayne	ATWS-132	52.0	52.1	Right	208	75	0.4	AG,ID	Road Crossing
Wayne	ATWS-1378	52.1	52.1	Right	510	25	0.3	AG	Topsoil Segregation
Wayne	ATWS-1416	52.1	52.2	Right	150	75	0.3	AG	Waterbody and Wetland Crossing and Topsoil Segregation
Wayne	ATWS-1379	52.2	52.4	Right	751	25	0.4	AG	Topsoil Segregation
Wayne	ATWS-4035	52.4	52.4	Left	85	25	0	AG	Existing Pipeline Crossing
Wayne	ATWS-1977	52.4	52.5	Right	312	25	0.2	AG	Topsoil Segregation
Wayne	ATWS-585	52.5	52.6	Right	523	75	0.9	AG,FW	Waterbody and Wetland Crossing
Wayne	ATWS-3753	52.6	52.6	Left	248	25	0.1	OL	Bend Installation and Wetland Crossing
Wayne	ATWS-2513	52.7	52.7	Left	325	50	0.4	AG,FW	Waterbody and Wetland Crossing
Wayne	ATWS-2512	52.7	52.7	Right	191	75	0.3	AG	Waterbody and Wetland Crossing and Topsoil Segregation
Wayne	ATWS-2600	52.8	52.9	Left	139	50	0.2	ID,FW	Road Crossing
Wayne	ATWS-2599	52.8	52.9	Right	149	50	0.2	ID,FW	Road, Waterbody and Wetland Crossing
Wayne	ATWS-3343	52.9	52.9	Left	148	50	0.2	OL,RE	Road Crossing
Wayne	ATWS-2844	53.0	53.0	Left	167	50	0.2	ID,FW,OL	Road Crossing
Wayne	ATWS-2842	53.0	53.0	Right	96	50	0.1	FW	Road Crossing
Wayne	ATWS-2843	53.0	53.1	Right	159	50	0.2	ID,FW,OL	Road Crossing
Wayne	ATWS-3754	53.0	53.1	Left	155	50	0.2	ID,FW,RE	Road Crossing
Wayne	ATWS-3188	53.1	53.2	Left	746	25	0.4	ID,FW,OL	Bend Installation and Driveway Crossing
Wayne	ATWS-2929	53.3	53.4	Right	343	25	0.2	FW,OL	Bend Installation
Wayne	ATWS-3755	53.4	53.5	Left	300	25	0.2	ID,OL	Bend Installation
Wayne	ATWS-2930	53.5	53.5	Right	182	50	0.2	FW,OL	Road Crossing
Wayne	ATWS-2515	53.5	53.5	Left	230	120	0.4	ID,FW,OL,RE	Road Crossing
Wayne	ATWS-2159	53.5	53.6	Left	453	50	0.5	ID,FW,OL	Bend Installation and Road Crossing
Wayne	ATWS-3440	53.5	53.6	Right	218	75	0.4	ID,OL	Bend Installation and Road Crossing
Wayne	ATWS-2514	53.6	53.7	Right	514	50	0.6	ID,FW,OL	Bend Installation and Road Crossing
Wayne	ATWS-3441	53.6	53.7	Left	258	50	0.3	ID,FW,OL	Bend Installation and Road Crossing
Wayne	ATWS-3756	53.7	53.7	Left	212	25	0.1	FW,OL	Bend Installation
Wayne	ATWS-3227	53.8	53.9	Right	307	25	0.2	FW	Bend Installation
Wayne	ATWS-2023	54.0	54.0	Left	291	75	0.5	FW	Road Crossing (Long Bore)
Wayne	ATWS-2055	54.0	54.0	Right	291	75	0.5	FW	Road Crossing (Long Bore)
Wayne	ATWS-4529	54.1	54.1	Right	11	75	0	OL,RE	Road Crossing
Wayne	ATWS-3438	54.1	54.2	Left	406	50	0.5	OL,RE	Road Crossing
Wayne	ATWS-166	54.1	54.2	Right	314	75	0.5	OL	Road Crossing
Wayne	ATWS-753	54.2	54.3	Right	609	25	0.3	FW,OL	Topsoil Segregation
Wayne	ATWS-3439	54.2	54.2	Left	283	25	0.2	OL	Bend Installation
Wayne	ATWS-4399	54.4	54.5	Left	664	25	0.4	AG,RE	Bend Installation
Wayne	ATWS-3347	54.3	54.6	Right	1,379	25	0.8	AG,RE	Topsoil Segregation
Wayne	ATWS-139	54.6	54.6	Right	210	75	0.4	AG,OL	Road Crossing
Wayne	ATWS-2944	54.6	54.6	Left	264	50	0.3	AG,OL	Road Crossing
Wayne	ATWS-140	54.6	54.7	Right	166	50	0.2	AG,ID	Road Crossing
Wayne	ATWS-2943	54.6	54.7	Left	177	50	0.2	AG	Road Crossing
Wayne	ATWS-4398	54.7	54.7	Left	213	25	0.1	AG	Existing Pipeline Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a] Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Wayne	ATWS-4400	54.7	54.7	Right	370	25	0.2	AG,OL	Topsoil Segregation
Wayne	ATWS-1420	54.7	54.8	Right	429	25	0.2	AG	Topsoil Segregation
Wayne	ATWS-3348	54.7	54.8	Left	245	25	0.1	AG	Bend Installation
Wayne	ATWS-1421	54.8	54.9	Right	232	75	0.4	AG,FW,OL	Waterbody Crossing and Topsoil Segregation
Wayne	ATWS-4238	54.9	54.9	Left	100	50	0.1	AG	Waterbody Crossing
Wayne	ATWS-4239	54.9	54.9	Right	100	75	0.2	FW,OL	Waterbody Crossing and Topsoil Segregation
Wayne	ATWS-1382	54.9	55.2	Right	1,606	25	0.9	OL	Topsoil Segregation
Wayne	ATWS-3349	55.2	55.2	Left	75	25	0	OL	Existing Pipeline Crossing
Wayne	ATWS-3350	55.2	55.2	Left	75	25	0	OL	Existing Pipeline Crossing
Wayne	ATWS-141	55.2	55.3	Right	138	75	0.2	OL	Waterbody and Wetland Crossing
Wayne	ATWS-2945	55.2	55.3	Left	193	50	0.2	OL	Waterbody and Wetland Crossing
Wayne	ATWS-608	55.3	55.3	Right	140	75	0.2	AG,OL	Waterbody and Wetland Crossing
Wayne	ATWS-2946	55.3	55.3	Left	131	50	0.2	AG	Waterbody and Wetland Crossing
Wayne	ATWS-1348	55.3	55.4	Right	430	25	0.2	AG	Topsoil Segregation
Wayne	ATWS-2022	55.5	55.6	Right	527	25	0.3	AG	Topsoil Segregation
Wayne	ATWS-3351	55.6	55.6	Right	128	25	0.1	AG,FW	Topsoil Segregation
Wayne	ATWS-4240	55.6	55.6	Left	268	25	0.2	AG	Bend Installation
Wayne	ATWS-2948	55.6	55.7	Right	266	25	0.2	AG,ID,FW,RE	Road Crossing
Wayne	ATWS-2947	55.6	55.7	Left	199	75	0.3	AG,RE	Road Crossing
Wayne	ATWS-2949	55.7	55.8	Left	230	75	0.4	AG,OL	Road and Wetland Crossing
Wayne	ATWS-1423	55.7	55.9	Right	738	50	0.8	AG,OL	Bend Installation and Road and Wetland Crossing
Wayne	ATWS-4036	55.8	55.8	Left	100	25	0.1	AG	Bend Installation
Wayne	ATWS-1349	55.9	56.1	Right	1,314	25	0.8	AG	Topsoil Segregation
Wayne	ATWS-3189	56.1	56.1	Left	314	25	0.2	AG	Bend Installation
Wayne	ATWS-4487	56.2	56.2	Right	88	50	0.1	AG	Parking Area
Wayne	ATWS-1422	56.1	56.3	Right	886	25	0.5	AG	Topsoil Segregation
Wayne	ATWS-3353	56.3	56.3	Right	157	50	0.2	AG,FW	Bend Installation and Topsoil Segregation
Wayne	ATWS-4037	56.3	56.3	Left	200	25	0.1	AG,FW	Bend Installation
Wayne	ATWS-3352	56.3	56.3	Right	153	25	0.1	FW	Bend Installation
Wayne	ATWS-3354	56.4	56.5	Left	698	25	0.4	AG,FW,RE	Bend Installation and Topsoil Segregation
Wayne	ATWS-142	56.5	56.6	Right	274	75	0.5	OL,RE	Road Crossing
Wayne	ATWS-3231	56.5	56.6	Left	188	50	0.2	OL,RE	Road Crossing
Medina	ATWS-143	56.6	56.6	Right	252	75	0.4	AG,ID	Road Crossing
Medina	ATWS-3230	56.6	56.6	Left	176	50	0.2	AG,ID	Road Crossing
Medina	ATWS-4416	56.6	56.7	Right	439	25	0.3	AG	Topsoil Segregation
Medina	ATWS-144	56.7	56.8	Right	352	100	0.8	AG,FW,OL	Rail, Road, Waterbody and Existing Pipeline Crossing
Medina	ATWS-754	56.7	56.8	Left	285	75	0.5	AG	Rail, Road, Waterbody and Existing Pipeline Crossing
Medina	ATWS-755	56.8	56.9	Left	418	75	0.7	AG,ID	Bend Installation and Rail, Road, Waterbody and Existing Pipeline Crossing
Medina	ATWS-145	56.8	56.9	Right	560	75	1	AG,ID	Bend Installation and Rail, Road, Waterbody and Existing Pipeline Crossing
Medina	ATWS-1425	56.9	57.1	Right	1,359	25	0.8	AG	Topsoil Segregation
Medina	ATWS-3355	57.0	57.0	Left	301	25	0.2	AG,OL	Bend Installation
Medina	ATWS-2261	57.1	57.2	Left	336	50	0.4	AG	Bend Installation and Road and Wetland Crossing
Medina	ATWS-146	57.1	57.2	Right	180	75	0.3	,OL	Road and Wetland Crossing
Medina	ATWS-4038	57.2	57.2	Right	106	50	0.1	OL,RE	Road and Wetland Crossing
Medina	ATWS-2237	57.2	57.2	Left	246	50	0.3	OL,RE	Bend Installation, Road and Waterbody Crossing
Medina	ATWS-271	57.3	57.3	Left	382	75	0.7	FW,OL	Road, Waterbody and Wetland Crossing
Wayne	ATWS-3356	57.4	57.4	Left	287	75	0.5	AG	Road, Waterbody and Wetland Crossing
Wayne	ATWS-4445	57.4	57.4	Right	225	30	0.2	AG	Road, Waterbody and Wetland Crossing
Wayne	ATWS-586	57.4	57.5	Left	222	25	0.1	AG	Topsoil Segregation
Wayne	ATWS-1426	57.5	57.6	Right	593	25	0.3	AG	Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Wayne	ATWS-2536	57.6	57.6	Right	237	75	0.3	AG,OL	Bend Installation and Waterbody Crossing and Topsoil Segregation
Wayne	ATWS-2537	57.6	57.6	Left	103	50	0.1	AG	Bend Installation and Waterbody Crossing
Wayne	ATWS-4507	57.6	57.6	Left	59	50	0.1	AG,OL	Bend Installation and Waterbody Crossing
Wayne	ATWS-2306	57.6	57.7	Right	174	75	0.3	AG,ID,OL	Road, Waterbody and Wetland Crossing
Wayne	ATWS-2305	57.7	57.7	Left	222	50	0.3	AG,ID,OL	Road, Waterbody and Wetland Crossing
Medina	ATWS-2304	57.7	57.7	Left	169	50	0.2	AG	Road, Waterbody and Existing Pipeline Crossing
Medina	ATWS-649	57.7	57.7	Right	161	75	0.3	AG	Road, Waterbody and Existing Pipeline Crossing
Medina	ATWS-1351	57.7	58.0	Right	1,450	25	0.8	AG,OL	Topsoil Segregation
Medina	ATWS-2307	57.9	58.0	Left	354	45	0.3	AG,ID,OL	Bend Installation and Road Crossing
Medina	ATWS-2308	58.0	58.0	Right	150	75	0.3	ID,OL,RE	Road Crossing
Medina	ATWS-2309	58.0	58.0	Right	148	75	0.3	AG,ID	Road Crossing
Medina	ATWS-2310	58.0	58.2	Right	437	50	0.6	AG	Bend Installation and Topsoil Segregation
Medina	ATWS-4040	58.1	58.1	Left	275	25	0.2	AG	Bend Installation
Medina	ATWS-614	58.2	58.2	Right	454	25	0.3	AG	Topsoil Segregation
Medina	ATWS-2057	58.3	58.3	Right	192	75	0.3	AG,ID	Road and Wetland Crossing
Medina	ATWS-2056	58.3	58.3	Left	145	50	0.2	AG,ID	Road Crossing
Medina	ATWS-3357	58.3	58.4	Left	213	100	0.5	ID,FW	Road and Wetland Crossing
Medina	ATWS-756	58.4	58.5	Right	405	75	0.7	AG	Bend Installation and Wetland Crossing and Topsoil Segregation
Medina	ATWS-1350	58.5	58.7	Right	1,019	25	0.6	AG	Topsoil Segregation
Medina	ATWS-3257	58.7	58.8	Right	300	50	0.3	AG	Bend Installation and Topsoil Segregation
Medina	ATWS-3260	58.8	58.9	Left	301	25	0.2	AG	Bend Installation
Medina	ATWS-4488	59.1	59.1	Right	650	25	0.4	AG,OW	Access To Hydrostatic Test Water
Medina	ATWS-757	59.1	59.1	Left	369	25	0.2	AG	Bend Installation
Medina	ATWS-4041	58.8	59.2	Right	2,055	25	1.2	AG	Topsoil Segregation
Medina	ATWS-1427	59.3	59.3	Right	308	25	0.1	FW,OL	Topsoil Segregation
Medina	ATWS-3261	59.3	59.4	Left	248	25	0.1	OL,RE	Bend Installation
Medina	ATWS-587	59.4	59.4	Right	371	75	0.6	OL	Bend Installation and Road Crossing
Medina	ATWS-758	59.4	59.4	Left	113	50	0.1	ID,OL,RE	Bend Installation and Road Crossing
Medina	ATWS-1428	59.4	59.5	Left	191	50	0.2	AG,RE	Road Crossing
Medina	ATWS-588	59.4	59.5	Right	159	75	0.3	AG,ID	Road Crossing
Medina	ATWS-1429	59.5	59.6	Right	861	25	0.5	AG	Topsoil Segregation
Medina	ATWS-3262	59.5	59.6	Left	300	25	0.2	AG	Bend Installation
Medina	ATWS-3084	59.6	59.7	Right	203	50	0.2	AG	Bend Installation and Topsoil Segregation
Medina	ATWS-4045	59.6	59.7	Left	170	25	0.1	AG,OL	Bend Installation
Medina	ATWS-1430	59.8	59.8	Right	383	75	0.7	FW,OL	Waterbody and Wetland Crossing and Topsoil Segregation
Medina	ATWS-1431	59.9	60.1	Right	1,186	25	0.7	AG,FW,OL	Topsoil Segregation
Medina	ATWS-3085	60.1	60.1	Left	187	50	0.2	AG,FW	Bend Installation and Topsoil Segregation
Medina	ATWS-4046	60.1	60.1	Left	155	25	0.1	AG	Bend Installation
Medina	ATWS-3360	60.2	60.2	Left	75	25	0	AG	Existing Pipeline Crossing
Medina	ATWS-3361	60.2	60.2	Left	80	25	0	AG	Existing Pipeline Crossing
Medina	ATWS-3087	60.2	60.3	Left	223	50	0.3	AG,ID	Road Crossing
Medina	ATWS-1432	60.2	60.3	Right	139	75	0.2	AG,ID	Road Crossing
Medina	ATWS-3086	60.3	60.3	Left	119	50	0.1	AG	Road Crossing
Medina	ATWS-1352	60.3	60.7	Right	2,054	25	1.2	AG	Topsoil Segregation
Medina	ATWS-4243	60.7	60.7	Left	150	75	0.3	AG,FW	Waterbody and Wetland Crossing
Medina	ATWS-3363	60.8	60.8	Right	171	50	0.2	FW,OL	Waterbody and Existing Pipeline Crossing
Medina	ATWS-3362	60.8	60.8	Left	189	50	0.2	FW	Bend Installation and Existing Pipeline Crossing
Medina	ATWS-4043	60.9	60.9	Left	160	50	0.2	AG	Waterbody Crossing
Medina	ATWS-1433	60.9	60.9	Right	135	75	0.2	AG,OL	Waterbody Crossing and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Medina	ATWS-1434	60.9	61.1	Right	913	25	0.5	AG	Topsoil Segregation
Medina	ATWS-151	61.1	61.2	Right	353	50	0.4	AG	Bend Installation and Topsoil Segregation
Medina	ATWS-4044	61.1	61.2	Left	200	25	0.1	AG	Bend Installation
Medina	ATWS-1435	61.2	61.3	Right	502	25	0.3	AG	Topsoil Segregation
Medina	ATWS-3089	61.3	61.3	Left	185	50	0.2	AG	Road Crossing
Medina	ATWS-152	61.3	61.4	Right	374	75	0.6	AG,ID	Road Crossing
Medina	ATWS-3088	61.3	61.4	Left	479	50	0.5	AG,ID	Road Crossing
Medina	ATWS-274	61.4	61.4	Right	155	75	0.3	AG,ID	Road Crossing
Medina	ATWS-153	61.4	61.4	Right	212	142	0.7	AG,ID	Road Crossing and Access
Medina	ATWS-3090	61.4	61.5	Left	146	50	0.2	AG,ID	Road Crossing
Medina	ATWS-3364	61.4	61.5	Right	124	75	0.2	AG	Road Crossing
Medina	ATWS-2075	61.5	61.5	Right	156	25	0.1	AG	Topsoil Segregation
Medina	ATWS-1353	61.5	61.8	Right	1,293	25	0.7	AG,OL	Topsoil Segregation
Medina	ATWS-2195	61.8	61.8	Right	184	75	0.3	AG	Waterbody and Wetland Crossing
Medina	ATWS-2439	61.8	61.9	Left	135	50	0.2	AG	Waterbody and Wetland Crossing
Medina	ATWS-2440	61.8	61.9	Right	150	75	0.3	AG	Waterbody and Wetland Crossing
Medina	ATWS-2441	61.9	61.9	Left	149	50	0.2	AG	Waterbody and Wetland Crossing
Medina	ATWS-2422	61.9	62.0	Right	1,172	25	0.7	AG	Topsoil Segregation
Medina	ATWS-3365	62.0	62.0	Left	292	25	0.2	AG	Bend Installation
Medina	ATWS-3366	62.0	62.1	Left	300	25	0.2	AG	Bend Installation
Medina	ATWS-4242	62.1	62.2	Right	357	25	0.2	AG	Topsoil Segregation
Medina	ATWS-3091	62.2	62.3	Right	301	50	0.3	AG,FW	Bend Installation and Topsoil Segregation
Medina	ATWS-4047	62.2	62.2	Left	200	25	0.1	AG	Bend Installation
Medina	ATWS-1438	62.3	62.6	Right	1,853	25	1.1	AG,OL	Topsoil Segregation
Medina	ATWS-3092	62.3	62.4	Left	300	25	0.2	AG	Bend Installation
Medina	ATWS-154	62.6	62.6	Right	129	75	0.2	ID,OL	Road Crossing
Medina	ATWS-2950	62.6	62.6	Left	131	50	0.2	ID,OL	Road Crossing
Medina	ATWS-2423	62.6	62.7	Left	183	50	0.2	ID,OL,RE	Road and Wetland Crossing
Medina	ATWS-155	62.6	62.7	Right	182	100	0.4	ID,OL	Road and Wetland Crossing
Medina	ATWS-4491	62.8	62.8	Right	121	50	0.1	OL	Wetland Crossing
Medina	ATWS-4492	62.9	62.9	Right	183	25	0.2	AG,OL	Wetland Crossing
Medina	ATWS-2951	63.0	63.2	Left	1,182	75	2	AG,FW	Bend Installation and Road and Wetland Crossing
Medina	ATWS-759	63.0	63.1	Right	413	50	0.5	AG	Bend Installation and Topsoil Segregation
Medina	ATWS-156	63.1	63.2	Right	472	100	1.1	AG	Road Crossing
Medina	ATWS-157	63.2	63.3	Right	421	75	0.7	AG,FW	Road Crossing
Medina	ATWS-2952	63.2	63.3	Left	424	50	0.5	AG,FW,OL	Road Crossing
Medina	ATWS-3370	63.6	63.7	Right	692	25	0.4	AG	Topsoil Segregation
Medina	ATWS-3369	63.7	63.8	Right	300	50	0.3	AG	Bend Installation and Topsoil Segregation
Medina	ATWS-4048	63.7	63.8	Left	200	25	0.1	AG	Bend Installation
Medina	ATWS-4245	63.8	63.9	Left	75	25	0	AG	Existing Pipeline Crossing
Medina	ATWS-2020	63.8	64.2	Right	1,847	25	1.1	AG	Topsoil Segregation
Medina	ATWS-171	64.1	64.2	Left	578	25	0.3	AG	Bend Installation
Medina	ATWS-2953	64.2	64.2	Left	180	50	0.2	AG	Road Crossing
Medina	ATWS-275	64.2	64.2	Right	250	75	0.4	AG,OL	Road Crossing
Medina	ATWS-2954	64.2	64.3	Left	228	50	0.3	AG	Road Crossing
Medina	ATWS-276	64.2	64.3	Right	171	75	0.3	AG	Road Crossing
Medina	ATWS-1443	64.3	64.4	Right	574	25	0.3	AG	Topsoil Segregation
Medina	ATWS-159	64.4	64.4	Right	229	75	0.4	AG,ID	Bend Installation and Road Crossing
Medina	ATWS-2956	64.4	64.4	Left	153	50	0.2	AG,ID	Road Crossing
Medina	ATWS-158	64.4	64.5	Right	179	75	0.3	AG,ID	Road Crossing
Medina	ATWS-2955	64.4	64.5	Left	158	50	0.2	AG,ID	Road Crossing
Medina	ATWS-1444	64.5	64.5	Right	297	25	0.2	AG	Topsoil Segregation
Medina	ATWS-590	64.5	64.6	Right	167	75	0.3	AG	Wetland Crossing
Medina	ATWS-760	64.6	64.6	Right	125	75	0.2	AG	Wetland Crossing
Medina	ATWS-4397	64.6	64.6	Right	70	25	0	AG	Topsoil Segregation
Medina	ATWS-2155	64.7	64.8	Right	989	25	0.6	AG	Topsoil Segregation
Medina	ATWS-277	65.0	65.1	Left	528	25	0.3	AG,FW	Bend Installation
Medina	ATWS-1354	65.0	65.1	Right	695	25	0.4	AG,FW	Topsoil Segregation
Medina	ATWS-3190	65.1	65.2	Right	433	25	0.2	AG,FW	Topsoil Segregation
Medina	ATWS-696	65.3	65.3	Right	85	50	0.1	FW	Waterbody Crossing
Medina	ATWS-695	65.3	65.3	Right	83	50	0.1	FW	Waterbody Crossing
Medina	ATWS-4246	65.4	65.4	Left	100	50	0.1	FW,OL	Waterbody Crossing
Medina	ATWS-1356	65.4	65.8	Right	2,199	25	1.3	AG,OL	Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Medina	ATWS-278	65.8	65.8	Left	126	50	0.1	ID,FW	Road Crossing
Medina	ATWS-3093	65.8	65.8	Right	226	75	0.4	AG,ID,FW	Road Crossing
Medina	ATWS-279	65.8	65.8	Left	120	50	0.1	AG,ID,RE	Road Crossing
Medina	ATWS-1974	65.8	65.9	Right	87	50	0.1	AG,ID,RE	Road Crossing
Medina	ATWS-2193	65.8	65.9	Left	280	425	2.3	AG,FW,RE	Spoil Storage for Deep Bore Excavation of I-71
Medina	ATWS-160	65.9	66.0	Right	262	90	0.5	OL,RE	Road, Waterbody, Wetland and Existing Pipeline Crossing
Medina	ATWS-2019	65.9	66.0	Left	132	150	0.4	OL	Road, Waterbody, Wetland and Existing Pipeline Crossing
Medina	ATWS-161	66.0	66.1	Right	436	100	1	AG	Road, Waterbody, Wetland and Existing Pipeline Crossing
Medina	ATWS-2957	66.0	66.1	Left	300	75	0.5	AG	Road, Waterbody, Wetland and Existing Pipeline Crossing
Medina	ATWS-654	66.1	66.2	Right	283	75	0.5	AG	Waterbody and Wetland Crossing and Topsoil Segregation
Medina	ATWS-1446	66.3	66.6	Right	1,824	25	1	AG,FW	Topsoil Segregation
Medina	ATWS-3384	66.6	66.6	Left	155	25	0.1	AG	Bend Installation
Medina	ATWS-2959	66.6	66.7	Left	163	50	0.2	AG,ID	Road and Existing Pipeline Crossing
Medina	ATWS-162	66.6	66.7	Right	159	75	0.3	AG	Road and Existing Pipeline Crossing
Medina	ATWS-2958	66.7	66.7	Left	188	50	0.2	AG	Road Crossing
Medina	ATWS-163	66.7	66.7	Right	164	75	0.3	AG	Road Crossing
Medina	ATWS-1357	66.7	67.1	Right	1,937	25	1.1	AG	Topsoil Segregation
Medina	ATWS-164	67.1	67.1	Left	130	50	0.1	AG,ID	Road Crossing
Medina	ATWS-2867	67.1	67.1	Right	132	75	0.2	AG,ID	Road Crossing
Medina	ATWS-2868	67.1	67.1	Right	126	75	0.2	ID,OL,RE	Road and Wetland Crossing and Topsoil Segregation
Medina	ATWS-165	67.1	67.1	Left	125	50	0.1	OL	Road and Wetland Crossing
Medina	ATWS-3383	67.1	67.2	Right	233	50	0.2	OL,RE	Road Crossing and Access
Medina	ATWS-2163	67.2	67.2	Right	123	75	0.2	AG,OL,RE	Driveway Crossing
Medina	ATWS-1447	67.2	67.3	Right	541	25	0.3	AG,OL,RE	Topsoil Segregation
Medina	ATWS-1448	67.3	67.4	Right	234	50	0.3	AG,FW,RE	Bend Installation and Topsoil Segregation
Medina	ATWS-4049	67.3	67.4	Left	174	25	0.1	AG,FW	Bend Installation
Medina	ATWS-280	67.5	67.5	Left	403	125	1.2	AG,FW	Bend Installation and Topsoil Segregation and Wetland Crossing Drag Section
Medina	ATWS-2366	67.5	67.5	Right	149	25	0.1	AG,FW	Bend Installation
Medina	ATWS-4247	67.6	67.7	Left	193	100	0.4	FW,OL	Waterbody and Wetland Crossing and Steep Terrain Construction
Medina	ATWS-4248	67.7	67.8	Left	260	100	0.6	FW	Waterbody and Wetland Crossing and Steep Terrain Construction
Medina	ATWS-4249	67.8	67.8	Left	240	50	0.3	FW	Waterbody and Wetland Crossing and Steep Terrain Construction
Medina	ATWS-172	67.9	67.9	Left	157	25	0.1	FW,OL	Bend Installation
Medina	ATWS-2018	68.0	68.0	Right	380	25	0.2	OL,RE	Topsoil Segregation
Medina	ATWS-3094	68.0	68.1	Right	188	50	0.2	OL,RE	Bend Installation and Topsoil Segregation and Steep Terrain Construction
Medina	ATWS-1450	68.2	68.3	Right	550	75	0.9	AG,ID,FW	Road, Waterbody and Wetland Crossing and Topsoil Segregation
Medina	ATWS-803	68.2	68.3	Left	195	75	0.3	AG,ID	Road Crossing
Medina	ATWS-2284	68.4	68.4	Left	109	100	0.2	AG	Road Crossing (Long Bore)
Medina	ATWS-173	68.4	68.4	Right	315	75	0.5	AG,OL,RE	Road Crossing (Long Bore) and Topsoil Segregation and Waterbody Crossing
Medina	ATWS-1358	68.5	68.6	Right	248	75	0.4	AG,FW	Waterbody Crossing and Topsoil Segregation
Medina	ATWS-4259	68.7	68.7	Left	301	100	0.7	FW,OL	Waterbody Crossing and Topsoil Segregation
Medina	ATWS-2368	68.7	68.7	Right	121	75	0.2	FW,OL	Waterbody Crossing and Topsoil Segregation
Medina	ATWS-4050	68.8	68.8	Left	135	50	0.2	ID,FW	Waterbody Crossing
Medina	ATWS-4052	68.8	68.8	Left	109	75	0.2	FW	Chippewa Rail Trail and Waterbody Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Medina	ATWS-4054	68.8	68.8	Right	173	50	0.2	FW	Chippewa Rail Trail and Waterbody Crossing
Medina	ATWS-4051	68.8	68.9	Left	165	65	0.1	FW,OL	Chippewa Rail Trail Crossing
Medina	ATWS-4053	68.8	68.9	Right	210	50	0.2	FW,OL	Chippewa Rail Trail Crossing
Medina	ATWS-761	68.9	69.1	Right	878	25	0.5	AG,FW,RE	Topsoil Segregation
Medina	ATWS-3388	69.1	69.1	Right	209	25	0.1	RE	Topsoil Segregation
Medina	ATWS-175	69.1	69.2	Right	442	25	0.3	OL,RE	Topsoil Segregation
Medina	ATWS-1451	69.2	69.3	Left	613	25	0.4	ID,FW,OL,RE	Bend Installation and Road Crossing
Medina	ATWS-4537	69.2	69.3	Right	200	25	0.1	OL	Bend Installation
Medina	ATWS-3371	69.3	69.3	Right	265	75	0.5	ID,FW,OL	Road Crossing
Medina	ATWS-3372	69.4	69.5	Left	495	75	0.9	AG,OL	Road and Rail Crossing
Medina	ATWS-3374	69.4	69.5	Right	514	70	0.9	AG	Road and Rail Crossing
Medina	ATWS-281	69.5	69.6	Left	425	260	1.6	OL	Rail Crossing
Medina	ATWS-1452	69.6	69.7	Left	775	75	1.3	OL	Topsoil Segregation and Waterbody Crossing
Medina	ATWS-176	69.7	69.8	Left	868	75	1.5	OL	Waterbody, Wetland and Existing Pipeline Crossing and Topsoil Segregation and Bend Installation
Medina	ATWS-4055	70.0	70.1	Left	603	25	0.3	OL	Bend Installation
Medina	ATWS-1455	70.0	70.2	Right	868	75	1.5	FW,OL	Bend Installation, Wetland Crossing and Topsoil Segregation
Medina	ATWS-1456	70.2	70.3	Right	645	75	1.1	AG,FW	Wetland Crossing and Topsoil Segregation
Medina	ATWS-3376	70.3	70.3	Right	106	25	0.1	AG,OL	Topsoil Segregation
Medina	ATWS-3380	70.5	70.5	Left	201	25	0.1	AG,OL	Bend Installation and Existing Pipeline Crossing
Medina	ATWS-3381	70.5	70.5	Left	49	25	0	OL	Bend Installation and Existing Pipeline Crossing
Medina	ATWS-4538	70.5	70.5	Right	87	25	0	OL	Topsoil Segregation
Medina	ATWS-4477	70.5	70.6	Right	593	25	0.3	AG,OL	Topsoil Segregation
Medina	ATWS-3379	70.6	70.6	Left	238	25	0.1	AG	Wetland and Existing Pipeline Crossing
Medina	ATWS-3378	70.6	70.7	Left	75	25	0	AG	Wetland and Existing Pipeline Crossing
Medina	ATWS-4476	70.6	70.7	Right	572	25	0.3	AG,OL	Topsoil Segregation
Medina	ATWS-2845	70.7	70.8	Left	188	100	0.4	AG,OL	Chippewa Rail Trail, Waterbody, and Wetland Crossing
Medina	ATWS-2373	70.7	70.8	Right	161	75	0.3	AG,OL	Chippewa Rail Trail, Waterbody, and Wetland Crossing
Medina	ATWS-2846	70.8	70.8	Left	211	75	0.4	AG	Chippewa Rail Trail, Waterbody, and Wetland Crossing
Medina	ATWS-2374	70.8	70.9	Right	434	75	0.7	AG,ID,OL	Chippewa Rail Trail, Road, Waterbody, and Wetland Crossing
Medina	ATWS-3095	70.9	70.9	Left	197	50	0.2	AG,ID,OL	Road and Waterbody Crossing
Medina	ATWS-2375	70.9	71.0	Right	218	75	0.4	AG	Road and Waterbody Crossing
Medina	ATWS-3382	70.9	71.0	Left	183	50	0.2	AG	Road and Waterbody Crossing
Medina	ATWS-3387	71.0	71.0	Left	152	25	0.1	AG	Bend Installation
Medina	ATWS-1360	71.0	71.0	Right	356	25	0.2	AG	Topsoil Segregation
Medina	ATWS-3385	71.0	71.1	Right	379	125	1.1	AG	HDD Entry Location
Medina	ATWS-4056	71.4	71.4	Right	350	125	1	AG	HDD Exit Location
Medina	ATWS-3687	71.4	71.6	Right	949	25	0.5	AG	Topsoil Segregation
Medina	ATWS-3686	71.6	71.6	Right	111	75	0.2	AG	Waterbody and Wetland Crossing
Medina	ATWS-3689	71.6	71.6	Left	100	50	0.1	AG	Waterbody and Wetland Crossing
Medina	ATWS-3685	71.6	71.7	Right	100	75	0.2	AG	Waterbody and Wetland Crossing
Medina	ATWS-3688	71.7	71.7	Left	306	50	0.4	AG	Waterbody and Wetland Crossing
Medina	ATWS-1361	71.7	71.8	Right	744	25	0.4	AG,RE	Topsoil Segregation
Medina	ATWS-3391	71.8	71.9	Right	217	50	0.2	AG,RE	Bend Installation and Topsoil Segregation
Medina	ATWS-4057	71.8	71.9	Left	195	25	0.1	AG,RE	Bend Installation
Medina	ATWS-178	71.9	71.9	Left	182	40	0.1	AG,RE	Bend Installation and Road Crossing
Medina	ATWS-3390	71.9	71.9	Right	285	75	0.5	AG,ID,RE	Road Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions[a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected[b]	Existing Land Use[c]	Justification
Mainline (cont.'d)									
Medina	ATWS-179	71.9	71.9	Left	174	50	0.2	AG,ID,OL	Road Crossing
Medina	ATWS-3096	71.9	71.9	Right	154	75	0.3	AG,ID,RE	Road Crossing
Medina	ATWS-4475	71.9	71.9	Right	80	30	0.1	RE	Access To Hydrostatic Test Water
Medina	ATWS-3098	71.9	72.0	Right	405	25	0.2	AG,RE	Topsoil Segregation
Medina	ATWS-3097	72.0	72.1	Right	301	50	0.3	AG	Bend Installation and Topsoil Segregation
Medina	ATWS-4058	72.0	72.1	Left	200	25	0.1	AG	Bend Installation
Medina	ATWS-1460	72.1	72.2	Right	484	75	0.8	AG	Wetland Crossing and Topsoil Segregation
Medina	ATWS-3728	72.1	72.1	Left	300	25	0.2	AG	Bend Installation
Medina	ATWS-3730	72.4	72.4	Right	469	50	0.5	FW	Wetland Crossing
Medina	ATWS-3729	72.5	72.5	Right	362	25	0.2	FW	Wetland Crossing and Equipment Movement
Medina	ATWS-3393	72.5	72.5	Left	157	25	0.1	FW	Bend Installation
Medina	ATWS-181	72.5	72.5	Left	139	75	0.2	ID,FW,OL	Road and Wetland Crossing
Medina	ATWS-3392	72.5	72.6	Right	218	75	0.4	ID,FW,OL	Road and Wetland Crossing
Medina	ATWS-180	72.5	72.6	Left	247	50	0.3	ID,RE	Bend Installation and Road Crossing
Medina	ATWS-283	72.7	72.7	Left	223	75	0.4	RE	Rail and Wetland Crossing
Medina	ATWS-4059	72.8	72.8	Left	151	60	0.1	FW,RE	Rail and Wetland Crossing
Medina	ATWS-182	72.8	72.9	Left	232	75	0.4	OL	Rail and Wetland Crossing
Medina	ATWS-3731	72.9	72.9	Left	133	50	0.2	FW	Waterbody Crossing
Medina	ATWS-3732	72.9	72.9	Left	106	75	0.2	AG,FW	Waterbody Crossing
Medina	ATWS-183	72.9	73.1	Left	674	25	0.4	AG,FW	Topsoil Segregation
Medina	ATWS-763	73.1	73.1	Left	108	25	0.1	AG	Topsoil Segregation
Medina	ATWS-2216	73.1	73.2	Right	281	25	0.2	AG	Bend Installation
Medina	ATWS-2217	73.1	73.2	Left	304	25	0.2	AG	Topsoil Segregation
Medina	ATWS-2218	73.2	73.2	Left	118	75	0.2	AG,FW	Waterbody and Wetland Crossing and Topsoil Segregation
Medina	ATWS-2219	73.2	73.3	Left	286	25	0.2	AG,FW,OL	Bend Installation
Medina	ATWS-3735	73.2	73.2	Right	252	25	0.1	FW,OL	Bend Installation and Waterbody and Wetland Crossing and Equipment Movement
Medina	ATWS-3734	73.3	73.3	Right	62	25	0	FW,OL	Waterbody and Wetland Crossing and Equipment Movement
Medina	ATWS-3733	73.3	73.3	Right	108	25	0.1	FW	Bend Installation and Waterbody and Wetland Crossing and Equipment Movement
Medina	ATWS-3737	73.4	73.4	Left	158	25	0.1	OL	Bend Installation and Waterbody and Wetland Crossing
Medina	ATWS-2014	73.4	73.5	Left	154	75	0.3	OL	Waterbody and Existing Pipeline Crossing
Medina	ATWS-284	73.5	73.6	Left	720	100	1.7	OL	Waterbody, Rail and Existing Pipeline Crossing
Medina	ATWS-285	73.7	73.7	Right	252	75	0.4	FW,OL,RE	Road, Rail and Existing Pipeline Crossing
Medina	ATWS-3736	73.7	73.8	Left	270	50	0.2	AG,RE	Road Crossing
Medina	ATWS-1461	73.7	73.8	Right	512	75	0.9	AG,OL,RE	Road and Wetland Crossing
Medina	ATWS-1463	73.9	73.9	Right	165	75	0.3	AG	Wetland Crossing and Topsoil Segregation
Medina	ATWS-1464	74.0	74.0	Right	243	75	0.4	AG,FW,OL,RE	Wetland Crossing and Topsoil Segregation
Medina	ATWS-1465	74.0	74.1	Right	320	25	0.2	AG	Topsoil Segregation
Medina	ATWS-2960	74.1	74.1	Left	172	50	0.2	AG,ID,FW	Road Crossing
Medina	ATWS-184	74.1	74.1	Right	160	75	0.3	AG,ID	Road Crossing
Medina	ATWS-185	74.1	74.2	Left	148	50	0.2	AG,ID	Road Crossing
Medina	ATWS-1345	74.2	74.7	Right	2,815	25	1.6	AG,FW,RE	Topsoil Segregation
Medina	ATWS-4060	74.2	74.2	Left	148	25	0.1	AG	Bend Installation
Medina	ATWS-4493	74.7	74.8	Right	510	25	0.3	AG	Topsoil Segregation
Medina	ATWS-4494	74.8	75.0	Right	626	25	0.4	AG	Topsoil Segregation
Medina	ATWS-3099	74.9	74.9	Left	299	25	0.2	AG	Bend Installation
Medina	ATWS-2961	75.0	75.0	Right	249	75	0.4	AG,ID	Bend Installation and Road Crossing
Medina	ATWS-186	75.0	75.0	Left	174	50	0.2	AG,ID	Bend Installation and Road Crossing
Medina	ATWS-187	75.0	75.0	Left	133	75	0.2	AG,ID	Road Crossing
Medina	ATWS-3739	75.0	75.1	Right	178	25	0.1	AG	Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a] Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Medina	ATWS-3738	75.0	75.1	Left	121	25	0.1	AG	Existing Pipeline Crossing
Medina	ATWS-4543	75.1	75.1	Left	145	75	0.1	AG,OL	Existing Pipeline and Waterbody Crossing
Medina	ATWS-3100	75.1	75.1	Right	70	75	0.1	AG	Waterbody Crossing
Medina	ATWS-2731	75.1	75.1	Right	75	75	0.1	AG,OL	Waterbody Crossing
Medina	ATWS-3101	75.1	75.1	Left	80	50	0.1	AG,OL	Waterbody Crossing
Medina	ATWS-1467	75.1	75.3	Right	844	25	0.5	AG	Topsoil Segregation
Medina	ATWS-2388	75.3	75.3	Right	229	50	0.3	AG	Bend Installation and Topsoil Segregation
Medina	ATWS-3102	75.3	75.3	Left	171	25	0.1	AG	Existing Pipeline Crossing
Medina	ATWS-2393	75.3	75.3	Right	249	25	0.1	AG	Topsoil Segregation
Medina	ATWS-2392	75.3	75.4	Right	281	50	0.3	AG	Bend Installation and Topsoil Segregation
Medina	ATWS-3741	75.4	75.4	Right	214	75	0.4	AG	Wetland Crossing and Topsoil Segregation
Medina	ATWS-2732	75.4	75.4	Left	100	50	0.1	AG	Wetland Crossing
Medina	ATWS-2396	75.4	75.5	Left	296	75	0.5	AG,FW,OL	Rail, Waterbody and Wetland Crossing
Medina	ATWS-2397	75.4	75.5	Right	355	90	0.7	AG,FW,OL	Rail, Waterbody and Wetland Crossing
Medina	ATWS-2399	75.5	75.6	Left	554	100	1.3	AG	Rail Crossing
Medina	ATWS-2398	75.5	75.6	Right	157	75	0.3	AG	Rail Crossing
Medina	ATWS-2400	75.6	75.7	Right	420	25	0.2	AG	Topsoil Segregation
Medina	ATWS-2632	75.7	75.8	Right	406	75	0.7	AG,FW	Waterbody and Wetland Crossing and Topsoil Segregation
Medina	ATWS-3742	75.9	75.9	Left	225	25	0.1	FW,OL	Bend Installation and Topsoil Segregation
Medina	ATWS-3743	75.9	75.9	Right	110	25	0.1	OL	Topsoil Segregation
Medina	ATWS-2633	76.0	76.0	Left	164	25	0.1	AG,FW	Existing Pipeline and Waterbody Crossing
Medina	ATWS-2634	76.0	76.1	Left	198	25	0.1	AG,FW	Existing Pipeline Crossing
Medina	ATWS-2405	76.1	76.2	Left	398	25	0.2	AG	Bend Installation
Medina	ATWS-2401	76.2	76.3	Right	486	25	0.3	AG	Topsoil Segregation
Medina	ATWS-4061	76.3	76.3	Left	140	25	0.1	AG,FW	Bend Installation and Waterbody and Wetland Crossing
Medina	ATWS-2592	76.3	76.3	Left	98	75	0.2	ID,FW,OL	Road, Waterbody and Wetland Crossing
Medina	ATWS-2591	76.3	76.3	Right	123	75	0.1	ID,OL	Road, Waterbody and Wetland Crossing
Medina	ATWS-2593	76.3	76.4	Right	133	50	0.2	ID,OL,RE	Road Crossing
Medina	ATWS-2962	76.3	76.4	Left	88	75	0.2	ID,FW,OL	Road Crossing
Medina	ATWS-2407	76.5	76.6	Right	656	25	0.4	AG	Topsoil Segregation
Medina	ATWS-3745	76.5	76.6	Left	330	25	0.2	AG	Bend Installation and Existing Pipeline Crossing
Medina	ATWS-2411	76.6	76.8	Right	1,159	25	0.7	AG,FW,RE	Topsoil Segregation
Medina	ATWS-3744	76.6	76.6	Left	75	25	0	AG	Existing Pipeline Crossing
Medina	ATWS-4062	76.6	76.7	Left	200	25	0.1	AG	Bend Installation
Medina	ATWS-4064	76.8	76.8	Left	51	25	0	AG	Farm Road Crossing
Medina	ATWS-4063	76.8	76.8	Left	50	25	0	AG	Farm Road Crossing
Medina	ATWS-2412	76.8	76.9	Right	151	25	0.1	AG	Topsoil Segregation
Medina	ATWS-2413	76.9	76.9	Right	194	75	0.3	AG,OL	Bend Installation and Waterbody and Wetland Crossing
Medina	ATWS-4065	76.9	76.9	Left	185	25	0.1	AG	Bend Installation
Medina	ATWS-3398	77.0	77.0	Right	112	50	0.1	OL	Waterbody and Wetland Crossing
Medina	ATWS-3397	77.0	77.0	Left	100	50	0.1	OL	Waterbody and Wetland Crossing
Medina	ATWS-2417	77.0	77.0	Right	161	75	0.3	ID,OL	Road, Waterbody and Wetland Crossing
Medina	ATWS-3396	77.0	77.0	Left	135	50	0.2	ID,OL	Road, Waterbody and Wetland Crossing
Medina	ATWS-2415	77.0	77.1	Right	211	75	0.4	AG,ID,FW,OL	Road Crossing
Medina	ATWS-3399	77.0	77.1	Left	208	50	0.2	AG,ID,FW,OL	Road Crossing
Medina	ATWS-2416	77.1	77.3	Right	1,485	25	0.9	AG	Topsoil Segregation
Medina	ATWS-3746	77.3	77.4	Left	300	25	0.2	AG	Bend Installation
Medina	ATWS-2419	77.4	77.4	Right	238	25	0.1	AG	Topsoil Segregation
Medina	ATWS-4504	77.4	77.4	Right	141	75	0.2	AG	Wetland Crossing
Medina	ATWS-3747	77.5	77.5	Right	142	25	0.1	AG,FW	Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Medina	ATWS-2421	77.5	77.6	Right	250	50	0.3	AG,FW	Bend Installation and Topsoil Segregation
Medina	ATWS-4066	77.5	77.5	Left	200	25	0.1	AG	Bend Installation
Medina	ATWS-2389	77.6	77.6	Right	177	25	0.1	AG	Topsoil Segregation
Medina	ATWS-4469	77.6	77.6	Right	242	50	0.3	AG	Wetland Crossing
Medina	ATWS-4466	77.6	77.7	Right	96	25	0.1	AG	Topsoil Segregation
Medina	ATWS-2387	77.7	77.8	Right	432	25	0.2	AG	Topsoil Segregation
Medina	ATWS-2390	77.8	77.8	Right	115	50	0.1	AG,FW	Bend Installation and Waterbody and Wetland Crossing
Medina	ATWS-3400	77.8	77.8	Left	128	25	0.1	AG/FW	Existing Pipeline Crossing
Medina	ATWS-3401	77.8	77.8	Left	64	25	0	AG	Existing Pipeline Crossing
Medina	ATWS-2597	77.8	77.9	Right	366	25	0.2	AG	Topsoil Segregation
Medina	ATWS-3170	77.8	77.8	Left	99	50	0.1	AG	Bend Installation and Waterbody and Wetland Crossing
Medina	ATWS-3169	77.8	77.9	Left	138	25	0.1	AG	Bend Installation
Medina	ATWS-2594	77.9	77.9	Right	295	25	0.2	AG	Topsoil Segregation
Medina	ATWS-3748	77.9	77.9	Left	100	25	0.1	AG	Bend Installation
Medina	ATWS-2964	77.9	78.0	Left	148	50	0.2	AG	Road and Waterbody Crossing
Medina	ATWS-2932	77.9	78.0	Right	158	75	0.3	AG	Road and Waterbody Crossing
Medina	ATWS-2931	78.0	78.0	Right	166	75	0.3	AG,ID,OL	Road and Waterbody Crossing
Medina	ATWS-2963	78.0	78.0	Left	160	50	0.2	AG,ID,OL	Road and Waterbody Crossing
Medina	ATWS-4067	78.0	78.0	Right	181	25	0.1	AG	Topsoil Segregation
Medina	ATWS-2596	78.0	78.2	Right	806	25	0.5	AG	Topsoil Segregation
Medina	ATWS-2598	78.2	78.3	Right	512	25	0.3	AG,OL	Topsoil Segregation
Medina	ATWS-1481	78.3	78.3	Right	211	50	0.2	AG	Bend Installation and Wetland Crossing and Topsoil Segregation
Medina	ATWS-4068	78.3	78.4	Left	122	25	0.1	AG	Bend Installation and Wetland Crossing
Medina	ATWS-1484	78.3	78.9	Right	2,797	25	1.6	AG,OL	Topsoil Segregation
Medina	ATWS-3749	78.6	78.6	Left	75	25	0	AG	Existing Pipeline Crossing
Medina	ATWS-3750	78.6	78.7	Left	75	25	0	AG	Existing Pipeline Crossing
Medina	ATWS-3405	78.9	78.9	Left	130	50	0.1	AG	Waterbody Crossing
Medina	ATWS-3403	78.9	78.9	Right	130	75	0.2	AG,OL	Waterbody Crossing
Medina	ATWS-3404	78.9	78.9	Right	169	75	0.3	AG,OL	Waterbody Crossing
Medina	ATWS-3406	78.9	78.9	Left	128	50	0.1	AG,OL,RE	Waterbody Crossing
Medina	ATWS-1485	78.9	79.0	Right	528	25	0.3	AG	Topsoil Segregation
Medina	ATWS-3103	79.0	79.1	Left	122	50	0.1	AG,ID	Waterbody Crossing
Medina	ATWS-195	79.0	79.1	Right	163	75	0.3	AG,ID	Waterbody Crossing
Medina	ATWS-3407	79.1	79.1	Left	180	50	0.2	AG,RE	Waterbody Crossing
Medina	ATWS-196	79.1	79.1	Right	134	75	0.2	AG,OL,RE	Waterbody Crossing
Medina	ATWS-1486	79.1	79.2	Right	339	25	0.2	AG	Topsoil Segregation
Medina	ATWS-764	79.2	79.2	Right	315	50	0.4	AG,OL	Bend Installation and Topsoil Segregation
Medina	ATWS-4069	79.2	79.2	Left	200	25	0.1	AG	Bend Installation
Medina	ATWS-2058	79.2	79.3	Right	635	25	0.4	AG	Topsoil Segregation
Medina	ATWS-3751	79.3	79.3	Left	212	25	0.1	AG	Bend Installation
Medina	ATWS-2013	79.3	79.5	Right	827	25	0.5	AG	Topsoil Segregation
Medina	ATWS-1487	79.5	79.6	Right	380	25	0.2	AG	Topsoil Segregation
Medina	ATWS-765	79.6	79.6	Right	173	75	0.3	AG,ID,OL	Road Crossing
Medina	ATWS-2965	79.6	79.6	Left	127	50	0.1	AG,ID,OL	Road Crossing
Medina	ATWS-2966	79.6	79.7	Left	222	50	0.3	AG,ID,OL	Road Crossing
Medina	ATWS-766	79.6	79.7	Right	176	75	0.3	AG,ID,OL	Road Crossing
Medina	ATWS-3105	79.7	79.7	Right	321	25	0.2	AG	Topsoil Segregation
Medina	ATWS-3104	79.7	79.8	Right	307	50	0.4	AG	Bend Installation and Topsoil Segregation
Medina	ATWS-1347	79.8	80.3	Right	2,995	25	1.7	AG,OL	Topsoil Segregation
Medina	ATWS-767	80.1	80.1	Left	320	25	0.2	AG,FW,OL	Bend Installation
Medina	ATWS-3752	80.4	80.4	Left	252	25	0.1	AG,FW,OL	Bend Installation
Lorain	ATWS-1489	80.6	80.7	Right	760	75	1.3	AG	Wetland Crossing and Topsoil Segregation
Lorain	ATWS-3758	80.7	81.0	Right	1,239	25	0.7	AG	Topsoil Segregation
Lorain	ATWS-4070	81.0	81.0	Right	250	75	0.4	AG	Wetland Crossing and Topsoil Segregation
Lorain	ATWS-1335	81.1	81.2	Right	369	25	0.2	AG,OL	Topsoil Segregation
Lorain	ATWS-197	81.2	81.2	Right	153	75	0.3	AG,ID,OL	Road Crossing
Lorain	ATWS-2934	81.2	81.2	Left	174	50	0.2	AG,OL	Road Crossing
Lorain	ATWS-198	81.2	81.2	Right	172	75	0.3	AG,ID,OL	Road Crossing
Lorain	ATWS-2933	81.2	81.2	Left	137	50	0.2	AG,ID,OL	Road Crossing
Lorain	ATWS-1490	81.2	81.3	Right	637	25	0.4	AG	Topsoil Segregation
Lorain	ATWS-3759	81.3	81.4	Left	100	50	0.1	AG	Waterbody Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Lorain	ATWS-2542	81.3	81.4	Right	100	75	0.2	AG	Waterbody Crossing
Lorain	ATWS-2541	81.4	81.4	Right	100	75	0.2	AG	Waterbody Crossing
Lorain	ATWS-2424	81.4	81.4	Left	297	25	0.2	AG	Bend Installation
Lorain	ATWS-199	81.4	81.5	Right	391	25	0.2	AG	Topsoil Segregation
Lorain	ATWS-3107	81.6	81.6	Right	207	25	0.1	AG	Topsoil Segregation
Lorain	ATWS-3106	81.6	81.7	Right	313	50	0.4	AG	Bend Installation and Topsoil Segregation
Lorain	ATWS-4071	81.6	81.7	Left	200	25	0.1	AG	Bend Installation
Lorain	ATWS-1336	81.7	82.0	Right	1,477	25	0.8	AG,OL	Topsoil Segregation
Lorain	ATWS-3760	82.0	82.0	Right	185	25	0.1	AG,FW	Topsoil Segregation
Lorain	ATWS-1337	82.1	82.4	Right	1,455	25	0.8	AG,FW	Topsoil Segregation
Lorain	ATWS-3761	82.4	82.5	Right	444	50	0.5	AG	Bend Installation and Topsoil Segregation
Lorain	ATWS-2729	82.5	82.6	Right	561	25	0.3	AG,OL	Topsoil Segregation
Lorain	ATWS-2243	82.5	82.6	Left	324	50	0.4	AG,ID,OL	Bend Installation and Road and Wetland Crossing
Lorain	ATWS-2242	82.6	82.6	Right	163	75	0.3	AG,ID,OL	Road and Wetland Crossing
Lorain	ATWS-201	82.6	82.6	Left	128	50	0.1	OL	Road and Wetland Crossing
Lorain	ATWS-768	82.6	82.6	Right	59	75	0.1	OL,RE	Road and Wetland Crossing
Lorain	ATWS-594	82.7	82.7	Right	182	75	0.3	ID,FW,OL	Road and Wetland Crossing
Lorain	ATWS-593	82.7	82.8	Right	333	75	0.6	AG,FW	Road and Wetland Crossing
Lorain	ATWS-4072	82.7	82.8	Left	333	25	0.2	AG,ID	Road and Wetland Crossing
Lorain	ATWS-595	82.9	83.0	Right	260	75	0.4	AG	Wetland Crossing and Topsoil Segregation
Lorain	ATWS-288	83.0	83.1	Right	660	75	1.1	AG	Wetland Crossing and Topsoil Segregation
Lorain	ATWS-769	83.2	83.2	Right	240	50	0.3	AG	Bend Installation and Topsoil Segregation
Lorain	ATWS-4073	83.2	83.2	Left	200	25	0.1	AG	Bend Installation
Lorain	ATWS-1338	83.2	83.3	Right	396	25	0.2	AG	Topsoil Segregation
Lorain	ATWS-770	83.3	83.3	Left	191	25	0.1	AG,FW	Bend Installation
Lorain	ATWS-3767	83.3	83.3	Right	201	75	0.3	AG,FW	Wetland Crossing and Topsoil Segregation
Lorain	ATWS-4267	83.4	83.4	Right	112	75	0.2	AG,FW	Wetland Crossing and Topsoil Segregation
Lorain	ATWS-3762	83.4	83.4	Left	130	25	0.1	FW	Bend Installation
Lorain	ATWS-289	83.4	83.5	Right	149	50	0.2	FW	Wetland Crossing
Lorain	ATWS-3764	83.5	83.6	Right	278	25	0.2	FW	Bend Installation and Wetland Crossing and Equipment Movement
Lorain	ATWS-596	83.6	83.6	Right	253	50	0.3	FW	Wetland Crossing
Lorain	ATWS-771	83.6	83.7	Left	300	25	0.2	FW,OL	Bend Installation
Lorain	ATWS-657	83.9	83.9	Right	150	75	0.3	ID,RE	Road Crossing
Lorain	ATWS-3408	83.9	83.9	Left	152	50	0.1	ID,RE	Road Crossing
Lorain	ATWS-2967	83.9	83.9	Left	177	50	0.2	AG,ID,OL	Road Crossing
Lorain	ATWS-658	83.9	83.9	Right	169	75	0.3	AG,ID,OL	Road Crossing
Lorain	ATWS-1339	83.9	84.2	Right	1,210	25	0.7	AG,FW	Topsoil Segregation
Lorain	ATWS-3766	84.1	84.2	Left	325	25	0.2	AG	Bend Installation
Lorain	ATWS-1492	84.2	84.3	Right	491	25	0.3	AG	Waterbody and Wetland Crossing and Topsoil Segregation
Lorain	ATWS-3768	84.4	84.4	Left	198	25	0.1	FW	Bend Installation and Waterbody and Wetland Crossing
Lorain	ATWS-699	84.4	84.5	Right	149	50	0.2	OL	Waterbody and Wetland Crossing and Topsoil Segregation
Lorain	ATWS-3769	84.5	84.5	Left	76	25	0	AG	Bend Installation
Lorain	ATWS-2730	84.5	84.7	Right	979	25	0.6	AG,ID,FW,RE	Topsoil Segregation
Lorain	ATWS-202	84.6	84.7	Left	164	75	0.3	AG,ID	Road Crossing
Lorain	ATWS-203	84.7	84.7	Left	151	75	0.3	AG,ID,OL	Road Crossing
Lorain	ATWS-2144	84.7	84.7	Right	146	50	0.2	AG,ID,OL,RE	Road Crossing
Lorain	ATWS-1340	84.7	85.0	Right	1,349	25	0.8	AG	Topsoil Segregation
Lorain	ATWS-4075	85.0	85.0	Right	246	50	0.3	AG,FW	Waterbody and Wetland Crossing and Topsoil Segregation
Lorain	ATWS-1494	85.0	85.0	Left	204	50	0.2	AG	Waterbody and Wetland Crossing
Lorain	ATWS-3770	85.1	85.1	Left	131	25	0.1	OL	Bend Installation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Lorain	ATWS-204	85.2	85.4	Right	758	75	1.3	AG,FW	Wetland Crossing and Topsoil Segregation
Lorain	ATWS-1341	85.4	85.7	Right	1,684	25	1	AG	Topsoil Segregation
Lorain	ATWS-1495	85.7	85.8	Right	508	75	0.9	AG,FW	Waterbody and Wetland Crossing and Topsoil Segregation
Lorain	ATWS-1497	85.9	85.9	Right	231	25	0.1	AG	Bend Installation
Lorain	ATWS-597	85.9	85.9	Right	204	75	0.4	AG	Road Crossing
Lorain	ATWS-1496	85.9	85.9	Left	197	25	0.1	AG,ID,FW,OL	Road, Waterbody and Wetland Crossing
Lorain	ATWS-4076	85.9	85.9	Right	61	75	0.1	AG,ID,OL	Road Crossing
Lorain	ATWS-3409	85.9	86.0	Right	99	75	0.2	ID,OL	Road, Waterbody and Wetland Crossing
Lorain	ATWS-1498	86.0	86.0	Left	378	75	0.7	AG,OL	Bend Installation and Road, Waterbody and Wetland Crossing
Lorain	ATWS-1342	86.0	86.1	Right	655	25	0.4	AG	Topsoil Segregation
Lorain	ATWS-3771	86.1	86.3	Right	299	187	1.3	AG	HDD Pull Back String
Lorain	ATWS-4495	86.1	86.1	Left	75	25	0	AG	Existing Pipeline Crossing
Lorain	ATWS-910	86.2	86.4	Left	748	25	0.4	AG,FW	HDD Pull Back String
Lorain	ATWS-3772	86.2	86.3	Right	489	25	0.3	AG,FW	Topsoil Segregation
Lorain	ATWS-4379	86.3	86.4	Right	402	25	0.2	AG,FW,OW	Access To Hydrostatic Test Water
Lorain	ATWS-4489	86.4	86.4	Right	70	55	0.1	AG	Access To Hydrostatic Test Water
Lorain	ATWS-911	86.4	86.6	Left	617	100	1.4	AG	HDD Exit Location
Lorain	ATWS-772	86.9	87.0	Left	750	125	1.9	AG	HDD Entry Location
Lorain	ATWS-2025	86.9	86.9	Right	117	25	0.1	AG	HDD Entry Location and Topsoil Segregation
Lorain	ATWS-3773	87.0	87.1	Right	311	75	0.5	AG,FW	Rail, Road and Waterbody Crossing
Lorain	ATWS-205	87.1	87.1	Right	254	75	0.4	AG,ID	Rail, Road and Waterbody Crossing
Lorain	ATWS-1501	87.1	87.3	Right	638	25	0.4	AG	Topsoil Segregation
Lorain	ATWS-3774	87.3	87.3	Right	137	75	0.2	AG,OL	Waterbody Crossing
Lorain	ATWS-3410	87.3	87.3	Right	125	75	0.2	AG,OL	Waterbody Crossing
Lorain	ATWS-1343	87.3	87.5	Right	578	25	0.3	AG	Topsoil Segregation
Lorain	ATWS-2168	87.5	87.5	Right	372	25	0.2	AG	Topsoil Segregation
Lorain	ATWS-4499	87.5	87.7	Right	494	75	0.8	AG	Wetland Crossing
Lorain	ATWS-773	87.7	87.8	Left	280	25	0.2	OL	Bend Installation
Lorain	ATWS-2733	87.8	87.8	Right	369	75	0.6	AG,FW,OL	Bend Installation and Topsoil Segregation
Lorain	ATWS-3775	87.8	87.9	Left	300	25	0.2	AG	Bend Installation
Lorain	ATWS-1502	87.8	88.0	Right	809	25	0.5	AG	Topsoil Segregation
Lorain	ATWS-3411	88.0	88.0	Right	120	75	0.2	AG	Waterbody Crossing
Lorain	ATWS-3413	88.0	88.0	Left	75	25	0	AG	Waterbody Crossing
Lorain	ATWS-3412	88.0	88.1	Right	100	75	0.2	AG,FW	Waterbody Crossing
Lorrain	ATWS-4463	88.1	88.1	Right	171	25	0.1	AG	Topsoil Segregation
Lorain	ATWS-1503	88.1	88.2	Right	236	25	0.1	AG	Topsoil Segregation
Lorain	ATWS-3108	88.2	88.2	Left	98	50	0.1	AG	Road Crossing
Lorain	ATWS-206	88.2	88.2	Right	86	75	0.1	AG,RE	Road Crossing
Lorain	ATWS-3109	88.2	88.2	Left	124	50	0.1	AG	Road Crossing
Lorain	ATWS-207	88.2	88.2	Right	124	75	0.2	AG	Road Crossing
Lorain	ATWS-703	88.2	88.3	Right	469	50	0.5	AG	Bend Installation and Topsoil Segregation
Lorain	ATWS-4268	88.2	88.3	Left	200	25	0.1	AG	Bend Installation
Lorain	ATWS-1344	88.3	88.4	Right	696	25	0.4	AG,OL	Topsoil Segregation
Lorain	ATWS-3420	88.4	88.5	Right	122	50	0.1	OL	Existing Pipeline Crossing and Topsoil Segregation
Lorain	ATWS-3776	88.5	88.5	Left	82	50	0.1	OL	Wetland Crossing
Lorain	ATWS-1505	88.5	88.5	Right	186	75	0.3	OL	Wetland and Existing Pipeline Crossing and Topsoil Segregation
Lorain	ATWS-4403	88.5	88.6	Right	254	25	0.1	FW	Bend Installation
Lorain	ATWS-4449	88.5	88.6	Left	107	25	0.1	OL	Existing Pipeline Crossing
Lorain	ATWS-290	88.8	89.0	Right	962	75	1.7	AG,FW	Waterbody and Wetland Crossing and Topsoil Segregation
Lorain	ATWS-1295	89.0	89.1	Right	605	25	0.3	AG	Topsoil Segregation
Lorain	ATWS-3423	89.1	89.1	Right	100	50	0.1	AG	Existing Pipeline Crossing and Topsoil Segregation
Lorain	ATWS-3422	89.1	89.1	Right	100	50	0.1	AG,OL	Existing Pipeline Crossing and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Lorain	ATWS-3425	89.1	89.2	Right	342	25	0.2	AG,OL,RE	Topsoil Segregation
Lorain	ATWS-3431	89.2	89.2	Right	153	50	0.2	AG,RE	Road and Waterbody Crossing
Lorain	ATWS-701	89.3	89.3	Right	235	75	0.4	AG	Road and Waterbody Crossing
Lorain	ATWS-700	89.3	89.3	Right	92	75	0.2	AG	Waterbody Crossing
Lorain	ATWS-3778	89.3	89.5	Right	1,029	25	0.6	AG	Topsoil Segregation
Lorain	ATWS-3777	89.5	89.6	Right	150	50	0.2	AG	Existing Pipeline Crossing and Topsoil Segregation
Lorain	ATWS-2170	89.6	89.8	Right	1,072	25	0.6	AG,OL	Topsoil Segregation
Lorain	ATWS-3780	89.8	89.8	Left	297	25	0.2	AG	Bend Installation
Lorain	ATWS-1296	89.8	89.9	Right	959	25	0.6	AG,OL	Topsoil Segregation
Lorain	ATWS-3426	89.9	90.0	Right	238	75	0.4	AG,FW	Waterbody Crossing
Lorain	ATWS-3779	89.9	90.0	Left	238	25	0.1	AG	Bend Installation
Lorain	ATWS-4500	90.0	90.0	Left	204	50	0.2	AG,FW	Waterbody Crossing
Lorain	ATWS-209	90.1	90.1	Left	100	50	0.1	AG,FW	Waterbody Crossing
Lorain	ATWS-2727	90.1	90.1	Right	150	75	0.3	AG	Waterbody Crossing
Lorain	ATWS-3417	90.1	90.2	Right	861	25	0.5	AG	Topsoil Segregation
Lorain	ATWS-3430	90.2	90.2	Left	411	25	0.2	AG	Bend Installation
Lorain	ATWS-2726	90.2	90.3	Right	219	75	0.4	AG,ID	Road Crossing
Lorain	ATWS-702	90.2	90.3	Left	205	50	0.2	AG,ID	Road Crossing
Lorain	ATWS-210	90.3	90.3	Left	200	50	0.2	AG,ID	Road Crossing
Lorain	ATWS-1294	90.5	90.6	Left	632	25	0.4	AG	Bend Installation
Lorain	ATWS-4534	90.6	90.7	Left	380	25	0.2	AG	Bend Installation
Lorain	ATWS-2734	90.8	91.0	Left	672	25	0.4	AG,OL	Bend Installation
Lorain	ATWS-3416	90.4	91.2	Right	4,059	25	2.3	AG,OL,RE	Topsoil Segregation
Lorain	ATWS-3418	91.2	91.2	Left	203	50	0.2	AG	Bend Installation and Waterbody Crossing
Lorain	ATWS-3428	91.2	91.2	Left	166	25	0.1	AG	Bend Installation
Lorain	ATWS-774	91.2	91.3	Right	75	50	0.1	AG	Waterbody Crossing
Lorain	ATWS-1297	91.3	91.3	Left	75	50	0.1	AG	Waterbody Crossing
Lorain	ATWS-211	91.3	91.4	Right	340	75	0.6	AG,ID	Road Crossing
Lorain	ATWS-2735	91.3	91.4	Left	363	50	0.4	AG,ID,FW	Road Crossing
Lorain	ATWS-659	91.3	91.4	Right	448	75	0.8	AG,ID	Road and Waterbody Crossing
Lorain	ATWS-292	91.4	91.4	Right	163	75	0.3	FW,OL	Bend Installation and Waterbody and Wetland Crossing and Topsoil Segregation
Lorain	ATWS-2059	91.4	91.4	Left	140	75	0.2	AG	Bend Installation and Existing Pipeline Crossing
Lorain	ATWS-3781	91.4	91.4	Left	193	50	0.2	AG,ID	Road Crossing
Lorain	ATWS-3782	91.4	91.5	Left	225	100	0.5	AG	Bend Installation and Topsoil Segregation
Lorain	ATWS-2736	91.5	91.7	Left	1,292	25	0.7	AG	Topsoil Segregation
Lorain	ATWS-777	91.7	91.8	Left	294	100	0.7	AG,FW	Waterbody Crossing and Topsoil Segregation
Lorain	ATWS-1298	91.8	92.1	Right	1,774	25	1	AG	Waterbody Crossing and Topsoil Segregation
Lorain	ATWS-776	91.8	91.9	Left	321	100	0.7	AG	Bend Installation and Waterbody Crossing
Lorain	ATWS-4354	91.8	92.2	Left	1,521	130	3.3	AG,FW,OL	HDD Pull Back String
Lorain	ATWS-4417	92.0	92.1	Left	532	120	0.8	AG	HDD Pull Back String
Lorain	ATWS-778	92.1	92.2	Right	409	125	1.2	AG	HDD Exit Location
Lorain	ATWS-4473	92.4	92.4	Right	146	185	0.5	AG,ID,FW,OL	Access To Hydrostatic Test Water
Lorain	ATWS-779	92.5	92.6	Left	511	100	1.2	AG,OL	HDD Entry Location and Wetland Crossing
Lorain	ATWS-4385	92.5	92.5	Right	230	75	0.4	AG,OL	HDD Entry Location and Wetland Crossing
Lorain	ATWS-780	92.6	92.7	Right	320	75	0.5	AG,OL	Waterbody, Wetland and Existing Pipeline Crossing and Topsoil Segregation
Lorain	ATWS-1512	92.7	92.7	Left	249	25	0.1	AG	Existing Pipeline Crossing
Lorain	ATWS-4448	92.7	92.8	Left	210	25	0.1	AG,OL	Bend Installation
Lorain	ATWS-1299	92.8	93.0	Right	1,359	25	0.8	AG,OL	Topsoil Segregation
Lorain	ATWS-782	93.0	93.0	Left	162	25	0.1	AG	Bend Installation
Lorain	ATWS-2173	93.0	93.3	Right	1,534	25	0.9	AG	Topsoil Segregation
Lorain	ATWS-783	93.3	93.4	Right	209	50	0.2	AG	Bend Installation and Topsoil Segregation
Lorain	ATWS-4269	93.3	93.4	Left	204	25	0.1	AG	Bend Installation
Lorain	ATWS-1513	93.4	93.4	Right	187	75	0.3	AG,ID,OL	Road Crossing
Lorain	ATWS-2968	93.4	93.4	Left	169	75	0.3	AG,ID,OL	Road Crossing
Lorain	ATWS-4077	93.4	93.4	Left	230	50	0.3	ID,FW,OL	Road and Waterbody Crossing
Lorain	ATWS-213	93.4	93.4	Right	197	75	0.3	ID,OL	Road and Waterbody Crossing

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a] Length (ft.)	Approximate Dimensions [a] Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Lorain	ATWS-214	93.4	93.5	Right	435	75	0.7	ID,OL	Bend Installation and Road Crossing
Lorain	ATWS-660	93.5	93.5	Left	291	25	0.2	ID,OL	Bend Installation and Road Crossing
Lorain	ATWS-1514	93.5	93.6	Right	319	25	0.2	OL	Topsoil Segregation
Lorain	ATWS-215	93.6	93.6	Left	301	25	0.2	AG,FW,OL,RE	Bend Installation
Lorain	ATWS-1970	93.6	93.6	Left	88	50	0.1	AG	Existing Pipeline Crossing
Lorain	ATWS-784	93.6	93.7	Left	515	50	0.6	AG	Bend Installation and Topsoil Segregation
Lorain	ATWS-4078	93.7	93.7	Right	260	25	0.1	AG,FW	Bend Installation
Lorain	ATWS-1300	93.7	94.1	Left	1,865	25	1.1	AG	Topsoil Segregation
Lorain	ATWS-785	94.1	94.2	Left	562	75	1	AG,FW	Wetland Crossing and Topsoil Segregation
Lorain	ATWS-1893	94.3	94.3	Left	77	25	0	FW	Existing Pipeline Crossing
Lorain	ATWS-786	94.4	94.4	Left	205	25	0.1	FW	Bend Installation
Lorain	ATWS-1301	94.4	94.5	Right	631	25	0.4	AG	Topsoil Segregation
Lorain	ATWS-216	94.6	94.6	Right	151	75	0.3	AG,ID,RE	Road Crossing
Lorain	ATWS-1304	94.7	95.1	Right	1,913	25	1.1	AG	Topsoil Segregation
Lorain	ATWS-1515	95.1	95.2	Right	474	25	0.3	AG	Topsoil Segregation
Lorain	ATWS-3110	95.2	95.2	Right	300	50	0.3	AG	Bend Installation and Topsoil Segregation
Lorain	ATWS-3111	95.2	95.3	Right	388	25	0.2	AG	Topsoil Segregation
Lorain	ATWS-4270	95.3	95.4	Right	250	75	0.4	AG,FW	Road Crossing
Lorain	ATWS-3783	95.4	95.5	Right	295	75	0.5	AG	Road and Wetland Crossing
Lorain	ATWS-3784	95.5	95.5	Right	232	25	0.1	AG,FW	Topsoil Segregation
Lorain	ATWS-2178	95.5	95.5	Left	66	50	0.1	AG,FW	Wetland Crossing
Lorain	ATWS-1302	95.5	95.5	Right	192	25	0.1	AG	Topsoil Segregation
Lorain	ATWS-802	95.5	95.6	Left	190	25	0.1	AG	Bend Installation
Lorain	ATWS-2176	95.6	95.6	Right	327	25	0.2	AG	Topsoil Segregation
Lorain	ATWS-787	95.8	96.0	Right	1,492	75	2	AG,OL	Wetland Crossing and Topsoil Segregation
Lorain	ATWS-4404	96.0	96.1	Right	345	125	1	AG	Waterbody and Wetland Crossing and Topsoil Segregation
Lorain	ATWS-4406	96.3	96.3	Right	120	50	0.2	FW	Abandoned Rail, Waterbody and Wetland Crossing
Lorain	ATWS-4405	96.3	96.3	Left	150	50	0.2	FW,OL	Abandoned Rail, Waterbody and Wetland Crossing
Lorain	ATWS-4407	96.3	96.4	Right	190	50	0.2	AG,FW	Abandoned Rail and Existing Pipeline Crossing
Lorain	ATWS-3785	96.3	96.4	Left	155	50	0.2	AG,FW	Abandoned Rail and Existing Pipeline Crossing
Lorain	ATWS-2704	96.4	96.5	Right	411	50	0.5	AG	Bend Installation and Topsoil Segregation
Lorain	ATWS-3786	96.4	96.4	Left	100	50	0.1	AG	Existing Pipeline Crossing
Lorain	ATWS-2738	96.4	96.5	Left	283	50	0.3	AG	Bend Installation and Topsoil Segregation
Lorain	ATWS-2875	96.5	96.7	Left	1,249	25	0.7	AG,OL	Topsoil Segregation
Lorain	ATWS-2870	96.7	96.7	Left	194	75	0.3	AG,ID	Road and Wetland Crossing
Lorain	ATWS-2871	96.7	96.8	Left	236	75	0.4	AG,ID,OL	Road and Wetland Crossing
Lorain	ATWS-3787	96.8	97.1	Left	1,410	25	0.8	AG	Topsoil Segregation
Lorain	ATWS-2701	97.1	97.1	Left	332	50	0.4	AG	Bend Installation and Topsoil Segregation
Lorain	ATWS-2872	97.1	97.3	Right	963	25	0.6	AG	Topsoil Segregation
Lorain	ATWS-3433	97.3	97.3	Left	219	50	0.3	AG	Waterbody and Wetland Crossing
Lorain	ATWS-2739	97.3	97.3	Right	138	75	0.2	AG,FW	Waterbody and Wetland Crossing
Lorain	ATWS-2746	97.3	97.4	Right	210	75	0.4	AG	Waterbody and Wetland Crossing
Lorain	ATWS-3112	97.3	97.4	Left	100	50	0.1	AG	Waterbody and Wetland Crossing
Lorain	ATWS-2703	97.4	97.5	Right	638	25	0.4	AG	Topsoil Segregation
Lorain	ATWS-2699	97.5	97.5	Right	279	50	0.3	AG	Bend Installation and Topsoil Segregation
Lorain	ATWS-4079	97.5	97.5	Left	200	25	0.1	AG	Bend Installation
Lorain	ATWS-2700	97.5	97.6	Right	452	25	0.3	AG	Topsoil Segregation
Lorain	ATWS-2460	97.6	97.7	Left	181	50	0.2	AG,ID,OL	Road Crossing
Lorain	ATWS-2449	97.6	97.7	Right	176	75	0.3	AG,ID,OL	Road Crossing
Lorain	ATWS-2448	97.7	97.7	Right	161	75	0.3	AG,ID	Road Crossing
Lorain	ATWS-2459	97.7	97.7	Left	157	50	0.2	AG,ID	Road Crossing
Lorain	ATWS-2450	97.7	97.9	Right	1,233	25	0.7	AG	Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Lorain	ATWS-2698	97.9	98.0	Right	410	125	1.2	AG	Bend Installation and Topsoil Segregation
Lorain	ATWS-4080	98.0	98.0	Left	200	25	0.1	AG	Bend Installation
Lorain	ATWS-2697	98.0	98.1	Right	212	50	0.2	AG	Road and Existing Pipeline Crossing
Lorain	ATWS-3788	98.1	98.1	Left	212	75	0.4	AG	Road Crossing
Lorain	ATWS-2695	98.1	98.2	Right	287	125	0.8	AG	Road Crossing
Lorain	ATWS-3789	98.1	98.2	Left	260	50	0.3	AG	Road Crossing
Lorain	ATWS-2693	98.2	98.3	Right	527	25	0.3	AG	Road Crossing
Lorain	ATWS-2696	98.3	98.3	Left	100	50	0.1	AG	Existing Pipeline and Waterbody Crossing
Lorain	ATWS-2747	98.3	98.3	Right	96	75	0.2	AG	Existing Pipeline and Waterbody Crossing
Lorain	ATWS-3434	98.3	98.4	Right	148	75	0.3	AG	Waterbody Crossing
Lorain	ATWS-2694	98.4	98.4	Left	140	50	0.2	AG	Waterbody and Wetland Crossing
Lorain	ATWS-3113	98.4	98.4	Right	161	75	0.3	AG	Waterbody and Wetland Crossing
Lorain	ATWS-2707	98.4	98.5	Right	140	50	0.2	AG	Road Crossing
Lorain	ATWS-2711	98.5	98.6	Right	313	75	0.5	AG, OL	Road Crossing
Lorain	ATWS-3790	98.6	98.8	Right	1,385	25	0.8	AG,OL	Topsoil Segregation
Lorain	ATWS-2706	98.8	98.9	Right	170	75	0.3	OL	Waterbody Crossing
Lorain	ATWS-2969	98.9	99.0	Right	115	75	0.2	AG	Waterbody Crossing
Lorain	ATWS-4082	99.0	99.0	Right	254	25	0.1	AG	Topsoil Segregation
Lorain	ATWS-4083	99.0	99.1	Left	566	25	0.3	AG	Bend Installation
Lorain	ATWS-2458	99.0	99.2	Right	1,141	25	0.7	AG	Topsoil Segregation
Lorain	ATWS-2444	99.1	99.2	Left	266	25	0.2	AG,RE	Bend Installation
Lorain	ATWS-2461	99.1	99.2	Left	166	50	0.2	AG,ID,OL	Road Crossing
Lorain	ATWS-2457	99.1	99.2	Right	210	75	0.4	AG,ID,OL	Road Crossing
Lorain	ATWS-2462	99.2	99.2	Left	209	50	0.2	AG	Bend Installation and Road and Existing Pipeline Crossing
Lorain	ATWS-2456	99.2	99.2	Right	95	75	0.2	AG,ID,OL,RE	Road and Existing Pipeline Crossing
Lorain	ATWS-2455	99.2	99.3	Left	147	25	0.1	AG	Bend Installation
Lorain	ATWS-3791	99.2	99.3	Right	134	75	0.2	AG,FW,OL	Waterbody Crossing
Lorain	ATWS-3792	99.3	99.3	Left	106	100	0.2	OL	Waterbody Crossing
Lorain	ATWS-2443	99.3	99.3	Right	170	75	0.3	AG	Waterbody Crossing
Lorain	ATWS-3793	99.3	99.4	Left	254	50	0.3	AG,FW	Waterbody Crossing
Lorain	ATWS-3435	99.3	99.4	Right	290	25	0.2	AG	Topsoil Segregation
Lorain	ATWS-2438	99.4	99.5	Left	320	25	0.2	AG	Bend Installation
Lorain	ATWS-2442	99.4	99.6	Right	962	25	0.6	AG	Topsoil Segregation
Lorain	ATWS-2454	99.6	99.9	Right	1,410	25	0.8	AG	Topsoil Segregation
Lorain	ATWS-3114	99.9	99.9	Right	392	50	0.4	AG	Bend Installation and Topsoil Segregation
Lorain	ATWS-4084	99.9	99.9	Left	200	25	0.1	AG	Bend Installation
Lorain	ATWS-2919	99.9	100.0	Left	116	75	0.2	AG	Road Crossing
Lorain	ATWS-2453	99.9	100.0	Right	162	75	0.3	AG,ID,OL	Road Crossing
Lorain	ATWS-2437	100.0	100.0	Right	158	75	0.3	AG,ID,OL	Road Crossing
Lorain	ATWS-2463	100.0	100.0	Left	152	75	0.3	AG,ID,OL	Road Crossing
Lorain	ATWS-3437	100.0	100.0	Right	212	25	0.1	AG	Topsoil Segregation
Lorain	ATWS-3436	100.0	100.1	Right	306	50	0.4	AG	Bend Installation and Topsoil Segregation
Lorain	ATWS-2435	100.1	100.3	Right	809	25	0.5	AG	Topsoil Segregation
Lorain	ATWS-2433	100.3	100.3	Left	238	25	0.1	AG,FW	Bend Installation
Lorain	ATWS-2434	100.3	100.4	Right	593	25	0.3	AG	Topsoil Segregation
Lorain	ATWS-4086	100.4	100.4	Right	277	75	0.5	AG	Wetland Crossing and Topsoil Segregation
Lorain	ATWS-2432	100.6	100.6	Right	133	75	0.2	ID,FW	Road Crossing
Lorain	ATWS-2970	100.6	100.6	Left	126	50	0.1	ID,FW	Road Crossing
Lorain	ATWS-2445	100.6	100.6	Left	169	75	0.3	ID,OL,RE	Road Crossing
Lorain	ATWS-3795	100.6	100.6	Right	98	50	0.1	ID,OL,RE	Road Crossing
Lorain	ATWS-2430	100.6	100.8	Right	680	25	0.4	AG,OL	Topsoil Segregation
Lorain	ATWS-4089	101.0	101.3	Left	1,528	25	0.9	AG,OL	Wetland Crossing and Topsoil Segregation
Lorain	ATWS-4088	101.1	101.2	Right	1,241	50	1.4	AG,OL	Topsoil Segregation
Lorain	ATWS-2465	101.3	101.3	Left	153	75	0.3	AG	Road and Waterbody Crossing
Lorain	ATWS-2428	101.3	101.3	Right	155	50	0.2	AG	Road and Waterbody Crossing
Huron	ATWS-2464	101.3	101.3	Left	164	50	0.2	AG,ID	Road and Waterbody Crossing
Huron	ATWS-2451	101.3	101.3	Right	158	75	0.3	AG,ID	Road and Waterbody Crossing
Huron	ATWS-2452	101.3	101.6	Right	1,311	25	0.8	AG	Topsoil Segregation
Huron	ATWS-2705	101.6	101.6	Right	307	50	0.4	AG,FW	Bend Installation and Waterbody Crossing and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a] Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Huron	ATWS-4090	101.6	101.6	Left	200	25	0.1	AG	Bend Installation
Huron	ATWS-2427	101.7	101.8	Right	864	25	0.5	AG	Topsoil Segregation
Huron	ATWS-2447	101.8	101.9	Right	287	75	0.5	AG,FW	Waterbody and Wetland Crossing and Topsoil Segregation
Huron	ATWS-2425	101.9	102.0	Left	407	25	0.2	AG	Bend Installation
Huron	ATWS-2784	101.9	102.2	Right	1,370	25	0.8	AG,OL	Topsoil Segregation
Huron	ATWS-4091	102.2	102.2	Right	300	75	0.5	AG	Wetland Crossing and Topsoil Segregation
Huron	ATWS-4092	102.2	102.3	Right	293	25	0.2	AG,FW	Topsoil Segregation
Huron	ATWS-2785	102.3	102.3	Left	225	75	0.4	AG	Road, Waterbody and Wetland Crossing
Huron	ATWS-2781	102.3	102.4	Right	120	75	0.2	ID,FW,OL	Road, Waterbody and Wetland Crossing
Huron	ATWS-2820	102.4	102.4	Left	221	75	0.4	AG,ID,FW,OL	Road, Waterbody and Wetland Crossing
Huron	ATWS-2780	102.4	102.4	Right	267	75	0.5	AG,ID,OL	Road Crossing
Huron	ATWS-2782	102.4	102.5	Right	554	25	0.3	AG	Topsoil Segregation
Huron	ATWS-3115	102.5	102.6	Right	304	50	0.3	AG	Bend Installation and Topsoil Segregation
Huron	ATWS-2783	102.6	102.9	Right	1,909	25	1.1	AG	Topsoil Segregation
Huron	ATWS-3444	102.9	103.0	Left	168	50	0.2	AG	Waterbody Crossing
Huron	ATWS-2802	102.9	103.0	Right	131	75	0.2	AG	Waterbody Crossing
Huron	ATWS-2801	103.0	103.0	Right	121	75	0.2	AG	Waterbody Crossing
Huron	ATWS-3445	103.0	103.0	Left	100	50	0.1	AG,OL	Waterbody Crossing
Huron	ATWS-2800	103.0	103.1	Right	628	25	0.4	AG	Topsoil Segregation
Huron	ATWS-3446	103.0	103.0	Left	196	25	0.1	AG	Bend Installation
Huron	ATWS-2815	103.2	103.3	Right	602	25	0.3	AG	Topsoil Segregation
Huron	ATWS-2816	103.3	103.4	Right	641	25	0.4	AG	Topsoil Segregation
Huron	ATWS-2797	103.4	103.7	Right	1,462	25	0.8	AG	Topsoil Segregation
Huron	ATWS-2798	103.7	103.7	Right	324	50	0.4	AG	Bend Installation and Topsoil Segregation
Huron	ATWS-4093	103.7	103.7	Left	200	25	0.1	AG	Bend Installation
Huron	ATWS-2799	103.7	103.9	Right	668	25	0.4	AG	Topsoil Segregation
Huron	ATWS-2821	103.9	103.9	Left	207	50	0.2	AG,ID,OL	Road Crossing
Huron	ATWS-2805	103.9	103.9	Right	161	75	0.3	AG,ID,OL	Road Crossing
Huron	ATWS-2809	103.9	103.9	Right	212	75	0.4	AG,ID	Road Crossing
Huron	ATWS-2822	103.9	103.9	Left	164	50	0.2	AG,ID	Road Crossing
Huron	ATWS-2810	103.9	104.0	Right	335	25	0.2	AG	Topsoil Segregation
Huron	ATWS-2803	104.0	104.1	Right	506	75	0.9	AG	HDD Entry Location
Huron	ATWS-2804	104.0	104.1	Left	506	75	0.9	AG	HDD Entry Location
Huron/Erie	ATWS-2811	104.6	104.7	Right	543	75	0.9	AG,ID,OL	HDD Exit Location
Huron	ATWS-2812	104.7	104.7	Left	397	75	0.7	AG,OL	HDD Exit Location
Huron/Erie	ATWS-3796	104.7	105.2	Left	2,641	25	1.4	AG,FW	HDD Pull Back String
Erie	ATWS-2795	104.8	104.9	Right	762	25	0.4	AG,FW	Topsoil Segregation
Erie	ATWS-2796	104.9	105.2	Right	1,252	25	0.7	AG	Topsoil Segregation
Erie	ATWS-2794	105.2	105.2	Right	316	50	0.4	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-2814	105.2	105.2	Left	296	100	0.7	AG	Bend Installation and HDD Pull Back String
Erie	ATWS-4355	105.2	105.3	Left	502	100	1.2	AG,OL	HDD Pull Back String
Erie	ATWS-2793	105.2	105.8	Right	3,319	25	1.9	AG,OL	Topsoil Segregation
Erie	ATWS-3116	105.5	105.6	Left	300	25	0.2	AG	Bend Installation
Erie	ATWS-2792	105.7	105.8	Left	442	25	0.3	AG,OL	Bend Installation
Erie	ATWS-2819	105.8	105.9	Left	251	50	0.3	ID,OL	Road, Waterbody and Wetland Crossing
Erie	ATWS-2791	105.8	105.9	Right	254	75	0.4	ID,OL	Road, Waterbody and Wetland Crossing
Erie	ATWS-2818	105.9	106.0	Left	227	50	0.3	AG	Road, Waterbody and Wetland Crossing
Erie	ATWS-2790	105.9	106.0	Right	209	75	0.4	AG,FW,RE	Road, Waterbody and Wetland Crossing
Erie	ATWS-3447	106.0	106.0	Right	278	50	0.3	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-2789	106.0	106.1	Right	172	75	0.3	AG,ID	Bend Installation and Road Crossing
Erie	ATWS-2824	106.0	106.1	Left	141	50	0.2	AG,ID	Road Crossing
Erie	ATWS-2788	106.1	106.1	Right	188	75	0.3	AG	Road Crossing
Erie	ATWS-2823	106.1	106.1	Left	175	50	0.2	AG,ID	Road Crossing
Erie	ATWS-2786	106.1	106.2	Right	332	25	0.2	AG	Topsoil Segregation
Erie	ATWS-3797	106.1	106.3	Right	1,156	50	1.3	AG	Wetland Crossing Drag Section
Erie	ATWS-2787	106.2	106.3	Right	392	25	0.2	AG	Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Erie	ATWS-1534	106.2	106.3	Left	406	50	0.5	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-2859	106.3	106.4	Left	247	75	0.4	AG	Wetland Crossing and Topsoil Segregation
Erie	ATWS-1535	106.9	107.1	Left	1,153	75	2	AG	Wetland Crossing and Topsoil Segregation
Erie	ATWS-3118	107.1	107.1	Left	202	50	0.2	AG	Bend Installation and Existing Pipeline Crossing
Erie	ATWS-795	107.1	107.2	Right	445	50	0.5	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-1536	107.2	107.5	Right	1,969	25	1.1	AG	Topsoil Segregation
Erie	ATWS-3119	107.4	107.4	Left	283	50	0.3	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-3798	107.5	107.6	Left	298	25	0.2	AG,OL	Bend Installation and Road Crossing
Erie	ATWS-711	107.5	107.6	Right	178	75	0.3	AG,ID,OL	Road Crossing
Erie	ATWS-3448	107.6	107.6	Left	180	50	0.2	AG,ID,OL	Road Crossing
Erie	ATWS-712	107.6	107.6	Right	157	75	0.3	AG,ID,OL	Road Crossing
Erie	ATWS-3121	107.6	107.8	Right	798	25	0.5	AG,OL	Topsoil Segregation
Erie	ATWS-3120	107.8	107.9	Right	480	50	0.6	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-4094	107.8	107.8	Left	200	25	0.1	AG	Bend Installation
Erie	ATWS-1537	107.9	108.4	Right	2,665	25	1.5	AG	Topsoil Segregation
Erie	ATWS-713	108.0	108.0	Left	253	25	0.1	AG	Bend Installation
Erie	ATWS-4271	108.3	108.3	Left	100	25	0.1	AG	Existing Pipeline Crossing
Erie	ATWS-714	108.4	108.5	Right	462	50	0.5	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-4095	108.4	108.5	Left	477	25	0.3	AG	Bend Installation
Erie	ATWS-1538	108.5	108.6	Right	770	25	0.4	AG	Topsoil Segregation
Erie	ATWS-2973	108.6	108.6	Left	115	75	0.2	AG,ID	Road Crossing
Erie	ATWS-716	108.6	108.6	Right	139	50	0.2	AG,ID	Road Crossing
Erie	ATWS-2972	108.6	108.7	Left	166	75	0.3	AG,ID	Road Crossing
Erie	ATWS-715	108.6	108.7	Right	139	50	0.2	AG,ID,OL	Road Crossing
Erie	ATWS-1317	108.7	109.1	Right	2,417	25	1.4	AG	Topsoil Segregation
Erie	ATWS-797	108.7	108.8	Left	313	25	0.2	AG	Bend Installation
Erie	ATWS-3800	108.8	108.9	Left	300	25	0.2	AG	Bend Installation
Erie	ATWS-798	109.1	109.2	Right	314	50	0.4	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-4096	109.1	109.2	Left	200	25	0.1	AG	Bend Installation
Erie	ATWS-1539	109.2	109.4	Right	1,048	25	0.6	AG	Topsoil Segregation
Erie	ATWS-1540	109.4	109.5	Right	262	75	0.5	AG	Wetland Crossing and Topsoil Segregation
Erie	ATWS-1320	109.5	109.7	Right	1,272	25	0.7	AG,OL	Topsoil Segregation
Erie	ATWS-3200	109.7	109.8	Right	186	75	0.3	AG,FW	Wetland Crossing and Topsoil Segregation
Erie	ATWS-2082	109.8	110.0	Right	1,281	25	0.7	AG	Topsoil Segregation
Erie	ATWS-3197	110.0	110.1	Right	448	75	0.8	AG	HDD Exit Location
Erie	ATWS-4356	110.0	110.1	Left	448	50	0.5	AG	HDD Exit Location
Erie	ATWS-3196	110.3	110.4	Right	543	250	2.3	AG	HDD Entry Location
Erie	ATWS-3195	110.3	110.4	Left	308	50	0.4	AG	HDD Entry Location and Bend Installation
Erie	ATWS-2827	110.4	110.6	Right	1,059	25	0.6	AG	Topsoil Segregation
Erie	ATWS-3122	110.5	110.6	Left	625	25	0.4	AG	Bend Installation
Erie	ATWS-1542	110.6	111.0	Right	1,970	25	1.1	AG,OL	Topsoil Segregation
Erie	ATWS-3123	110.7	110.9	Left	714	25	0.4	AG	Bend Installation and Wetland Crossing
Erie	ATWS-4097	110.9	111.0	Left	200	25	0.1	AG	Bend Installation
Erie	ATWS-1543	111.0	111.1	Right	533	25	0.3	AG,OL	Topsoil Segregation
Erie	ATWS-2779	111.1	111.1	Right	187	75	0.3	AG,ID	Road Crossing
Erie	ATWS-317	111.1	111.1	Left	238	75	0.4	AG,ID	Road Crossing
Erie	ATWS-318	111.2	111.2	Right	254	75	0.4	AG	Road Crossing
Erie	ATWS-1319	111.2	111.3	Right	614	25	0.4	AG	Topsoil Segregation
Erie	ATWS-2826	111.2	111.2	Left	191	25	0.1	AG,RE	Bend Installation
Erie	ATWS-804	111.3	111.4	Left	213	25	0.1	AG	Bend Installation
Erie	ATWS-547	111.3	111.4	Right	263	75	0.5	AG	Wetland Crossing and Topsoil Segregation
Erie	ATWS-4098	111.4	111.4	Left	200	25	0.1	AG,OL	Bend Installation
Erie	ATWS-805	111.4	111.5	Right	209	50	0.2	AG,OL	Bend Installation and Topsoil Segregation
Erie	ATWS-1318	111.5	111.5	Right	438	25	0.3	AG	Topsoil Segregation
Erie	ATWS-2083	111.5	111.6	Right	410	25	0.2	AG	Topsoil Segregation
Erie	ATWS-4099	111.6	111.7	Right	300	75	0.5	AG,FW	Wetland Crossing and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Erie	ATWS-1544	112.0	112.0	Right	155	25	0.1	OL	Bend Installation
Erie	ATWS-4460	112.0	112.0	Left	95	25	0.1	OL	Bend Installation
Erie	ATWS-319	112.0	112.1	Right	201	75	0.3	OL	Road Crossing
Erie	ATWS-1888	112.0	112.1	Left	168	50	0.2	OL	Road Crossing
Erie	ATWS-4461	112.1	112.1	Left	149	50	0.2	ID,OL,RE	Road Crossing
Erie	ATWS-3124	112.1	112.2	Left	142	50	0.2	OL,RE	Bend Installation and Road Crossing
Erie	ATWS-321	112.1	112.2	Right	265	75	0.5	OL	Bend Installation and Road Crossing
Erie	ATWS-1321	112.2	112.8	Right	3,441	25	2	AG,FW,OL	Topsoil Segregation
Erie	ATWS-4100	112.4	112.4	Left	200	25	0.1	AG	Bend Installation
Erie	ATWS-720	112.6	112.6	Left	308	25	0.2	AG	Bend Installation
Erie	ATWS-3802	112.8	112.9	Right	470	50	0.5	AG,FW,OL	Wetland Crossing and Topsoil Segregation
Erie	ATWS-807	113.0	113.1	Left	298	50	0.3	OL,RE	Bend Installation and Road, Waterbody and Wetland Crossing
Erie	ATWS-296	113.0	113.1	Right	205	75	0.4	OL	Bend Installation and Road, Waterbody and Wetland Crossing
Erie	ATWS-3452	113.1	113.1	Right	240	50	0.3	ID,OL,RE	Bend Installation and Road Crossing
Erie	ATWS-295	113.1	113.1	Left	275	75	0.5	ID,OL,RE	Bend Installation and Road and Waterbody Crossing
Erie	ATWS-3804	113.1	113.1	Right	160	25	0.1	OL,RE	Waterbody Crossing and Topsoil Segregation
Erie	ATWS-3803	113.2	113.2	Left	130	75	0.2	FW	Waterbody and Wetland Crossing
Erie	ATWS-809	113.3	113.5	Left	805	75	1.4	AG,FW	Waterbody and Wetland Crossing and Topsoil Segregation
Erie	ATWS-721	113.4	113.5	Right	235	25	0.1	AG	Bend Installation
Erie	ATWS-3805	113.5	113.5	Right	160	50	0.2	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-3806	113.5	113.5	Left	146	25	0.1	AG	Bend Installation
Erie	ATWS-1322	113.5	113.8	Right	1,223	25	0.7	AG	Topsoil Segregation
Erie	ATWS-623	113.6	113.7	Left	354	25	0.2	AG	Bend Installation
Erie	ATWS-241	113.8	113.8	Right	176	75	0.3	AG	Road Crossing
Erie	ATWS-2975	113.8	113.8	Left	181	50	0.2	AG	Road Crossing
Erie	ATWS-3807	113.8	113.8	Left	160	50	0.2	ID,FW	Road, Waterbody and Wetland Crossing
Erie	ATWS-242	113.8	113.8	Right	159	50	0.2	ID,FW	Road, Waterbody and Wetland Crossing
Erie	ATWS-4101	113.9	114.0	Right	489	50	0.6	AG,FW	Waterbody and Wetland Crossing
Erie	ATWS-808	114.0	114.0	Left	215	25	0.1	AG	Bend Installation
Erie	ATWS-1547	114.0	114.1	Right	491	75	0.8	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-1323	114.1	114.2	Right	426	25	0.2	AG	Topsoil Segregation
Erie	ATWS-1548	114.2	114.2	Right	241	75	0.4	AG,FW	Bend Installation and Waterbody and Wetland Crossing and Topsoil Segregation
Erie	ATWS-4102	114.2	114.2	Left	200	25	0.1	AG	Bend Installation
Erie	ATWS-1549	114.3	114.4	Right	598	25	0.3	AG,FW	Topsoil Segregation
Erie	ATWS-1550	114.5	114.6	Right	286	25	0.2	AG	Topsoil Segregation
Erie	ATWS-2971	114.6	114.6	Left	202	50	0.2	AG,ID	Road Crossing
Erie	ATWS-297	114.6	114.6	Right	228	75	0.4	AG,ID	Road Crossing
Erie	ATWS-722	114.6	114.7	Left	275	25	0.2	AG,ID,RE	Bend Installation
Erie	ATWS-4103	114.6	114.6	Right	46	75	0.1	AG,ID	Road Crossing
Erie	ATWS-521	114.6	114.7	Right	209	75	0.4	AG	Bend Installation and Road Crossing
Erie	ATWS-1324	114.7	115.0	Right	1,657	25	1	AG	Topsoil Segregation
Erie	ATWS-243	115.0	115.0	Right	161	75	0.3	AG	Road Crossing
Erie	ATWS-2974	115.0	115.0	Left	189	50	0.2	AG,ID	Road Crossing
Erie	ATWS-244	115.0	115.0	Right	154	75	0.3	AG,ID	Road Crossing
Erie	ATWS-2976	115.0	115.0	Left	151	50	0.2	AG,ID,RE	Road Crossing
Erie	ATWS-1551	115.0	115.2	Right	831	25	0.5	AG	Topsoil Segregation
Erie	ATWS-3453	115.1	115.1	Left	303	25	0.2	AG	Bend Installation
Erie	ATWS-3808	115.2	115.3	Right	300	50	0.3	AG	Bend Installation and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Erie	ATWS-1552	115.3	115.3	Right	498	75	0.9	AG	Waterbody and Wetland Crossing and Topsoil Segregation
Erie	ATWS-1553	115.5	115.7	Right	1,148	75	2	AG,FW	Waterbody and Wetland Crossing and Topsoil Segregation
Erie	ATWS-245	115.8	115.8	Right	290	75	0.4	AG,FW,OL	Rail and Waterbody Crossing
Erie	ATWS-4441	115.8	115.9	Left	256	45	0.2	AG	Rail Crossing
Erie	ATWS-4442	115.9	115.9	Right	145	25	0.1	RE	Topsoil Segregation
Erie	ATWS-4443	115.9	115.9	Right	337	75	0.6	AG,RE	Rail Crossing
Erie	ATWS-246	115.9	116.0	Right	108	75	0.2	FW,RE	Rail and Waterbody Crossing
Erie	ATWS-247	116.2	116.3	Right	186	75	0.3	AG,OL	Road Crossing
Erie	ATWS-248	116.3	116.4	Right	310	75	0.6	OL	Road, Waterbody and Wetland Crossing
Erie	ATWS-4393	116.3	116.3	Right	194	50	0.2	AG,OL	Remote Blow-off
Erie	ATWS-4533	116.3	116.3	Right	165	75	0.3	AG,ID,OL	Road Crossing
Erie	ATWS-3809	116.5	116.5	Right	153	25	0.1	FW	Rail Trail, Waterbody and Wetland Crossing
Erie	ATWS-3810	116.5	116.5	Left	196	50	0.2	FW,OL	Rail Trail, Waterbody and Wetland Crossing
Erie	ATWS-1968	116.5	116.6	Right	407	75	0.7	FW	Rail Trail, Waterbody and Wetland Crossing
Erie	ATWS-810	116.7	116.8	Right	409	100	0.9	AG	HDD Entry Location
Erie	ATWS-2828	117.2	117.3	Left	390	25	0.2	AG	HDD Exit Location
Erie	ATWS-811	117.2	117.3	Right	390	100	0.9	AG	HDD Exit Location
Erie	ATWS-4104	117.3	117.4	Right	503	25	0.3	AG	Topsoil Segregation
Erie	ATWS-3812	117.3	117.4	Left	432	50	0.5	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-1554	117.4	117.8	Right	2,103	100	4.8	AG,FW,OL,OW	HDD Pull Back String
Erie	ATWS-4106	117.4	117.5	Left	130	25	0.1	AG	Topsoil Segregation
Erie	ATWS-3813	117.4	117.5	Right	267	25	0.2	AG	Bend Installation
Erie	ATWS-4105	117.5	117.5	Left	200	50	0.2	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-2767	117.5	117.6	Left	491	25	0.3	AG	Topsoil Segregation
Erie	ATWS-2765	117.6	117.6	Left	202	75	0.3	AG,OL	Waterbody Crossing
Erie	ATWS-2766	117.6	117.7	Left	202	75	0.3	AG	Waterbody Crossing
Erie	ATWS-2768	117.7	117.9	Left	1,432	25	0.8	AG	Topsoil Segregation
Erie	ATWS-3456	117.9	118.0	Left	313	50	0.4	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-3455	118.0	118.1	Left	358	25	0.2	AG	Topsoil Segregation
Erie	ATWS-2770	118.1	118.1	Right	175	75	0.3	AG,ID	Road Crossing
Erie	ATWS-249	118.1	118.1	Left	212	50	0.2	AG,ID	Road Crossing
Erie	ATWS-2769	118.1	118.2	Right	209	50	0.2	ID,OL,RE	Road and Existing Pipeline Crossing
Erie	ATWS-250	118.1	118.2	Left	195	75	0.3	OL	Road and Existing Pipeline Crossing
Erie	ATWS-3814	118.2	118.2	Right	211	25	0.1	OL	Topsoil Segregation
Erie	ATWS-2772	118.3	118.4	Left	538	50	0.6	AG,OL	Bend Installation and Waterbody and Wetland Crossing
Erie	ATWS-3815	118.3	118.4	Right	471	50	0.5	AG,OL	Bend Installation and Waterbody and Wetland Crossing
Erie	ATWS-814	118.5	118.7	Left	1,064	25	0.6	AG	Topsoil Segregation
Erie	ATWS-2778	118.7	118.8	Left	174	75	0.3	AG,ID,OL	Road Crossing
Erie	ATWS-2777	118.7	118.8	Left	212	75	0.4	AG,ID,OL	Road and Waterbody Crossing
Erie	ATWS-3816	118.9	119.0	Left	100	50	0.1	FW	Waterbody Crossing
Erie	ATWS-3817	119.0	119.0	Left	118	50	0.1	AG,FW	Waterbody Crossing
Erie	ATWS-2776	119.0	119.1	Left	665	25	0.4	AG	Topsoil Segregation
Erie	ATWS-2775	119.1	119.2	Left	312	50	0.4	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-2773	119.2	119.2	Left	149	75	0.3	AG	Road Crossing
Erie	ATWS-251	119.2	119.2	Right	165	75	0.3	AG	Road Crossing
Erie	ATWS-2774	119.2	119.3	Left	206	75	0.4	AG,ID	Road Crossing
Erie	ATWS-252	119.2	119.2	Right	193	75	0.3	AG,ID	Road Crossing
Erie	ATWS-2860	119.2	119.3	Right	514	25	0.3	AG	Topsoil Segregation
Erie	ATWS-3818	119.3	119.4	Left	300	25	0.2	AG	Bend Installation
Erie	ATWS-2853	119.4	119.4	Right	193	50	0.2	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-2857	119.4	119.5	Left	453	25	0.3	AG,ID,OL	Bend Installation
Erie	ATWS-2854	119.4	119.5	Right	434	125	1.2	AG,ID,OL	Road Crossing
Erie	ATWS-2856	119.5	119.5	Left	275	75	0.5	AG,ID,OL	Road Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions[a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected[b]	Existing Land Use[c]	Justification
Mainline (cont.'d)									
Erie	ATWS-2855	119.5	119.6	Right	447	125	1.3	AG,ID,OL	Road Crossing
Erie	ATWS-2850	119.6	119.9	Right	1,800	25	1	AG	Topsoil Segregation
Erie	ATWS-2848	119.9	120.0	Right	134	75	0.2	AG	Waterbody Crossing
Erie	ATWS-3819	120.0	120.0	Left	175	50	0.2	AG	Waterbody Crossing
Erie	ATWS-2849	120.0	120.0	Right	200	75	0.3	AG	Waterbody Crossing
Erie	ATWS-2851	120.0	120.1	Right	500	25	0.3	AG,OL	Topsoil Segregation
Erie	ATWS-2852	120.1	120.2	Left	321	25	0.2	AG,OL	Bend Installation
Erie	ATWS-1561	120.1	120.3	Right	1,057	25	0.6	AG,OL	Topsoil Segregation
Erie	ATWS-3820	120.3	120.4	Left	308	50	0.4	AG	Bend Installation and Waterbody Crossing and Topsoil Segregation
Erie	ATWS-2064	120.4	120.4	Right	205	75	0.4	AG,OL	Road, Waterbody and Wetland Crossing
Erie	ATWS-3821	120.4	120.4	Left	121	50	0.1	FW,OL	Road, Waterbody and Wetland Crossing
Erie	ATWS-821	120.4	120.4	Right	186	75	0.3	ID,OL	Road, Waterbody and Wetland Crossing
Erie	ATWS-3824	120.5	120.5	Left	161	50	0.2	OL	Road, Waterbody and Wetland Crossing
Erie	ATWS-3457	120.5	120.5	Right	148	75	0.3	OL	Road, Waterbody and Wetland Crossing
Erie	ATWS-3822	120.5	120.6	Left	175	75	0.3	AG,OL	Road and Wetland Crossing
Erie	ATWS-3823	120.6	120.7	Left	499	25	0.3	AG	Topsoil Segregation
Erie	ATWS-1562	120.7	120.7	Right	376	25	0.2	AG	Topsoil Segregation
Erie	ATWS-2166	120.7	120.8	Right	475	25	0.3	AG	Topsoil Segregation
Erie	ATWS-819	120.7	120.8	Left	231	25	0.1	AG	Bend Installation
Erie	ATWS-822	120.8	120.9	Right	269	75	0.5	AG,ID,OL	Road, Waterbody and Wetland Crossing
Erie	ATWS-2979	120.8	120.9	Left	190	50	0.2	AG,ID,OL	Road, Waterbody and Wetland Crossing
Erie	ATWS-2980	120.9	120.9	Left	252	50	0.3	AG	Road, Waterbody and Wetland Crossing
Erie	ATWS-823	120.9	120.9	Right	173	75	0.3	AG	Road, Waterbody and Wetland Crossing
Erie	ATWS-2825	120.9	121.0	Right	666	25	0.4	AG	Topsoil Segregation
Erie	ATWS-1563	121.0	121.1	Right	351	50	0.4	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-4107	121.1	121.1	Left	201	25	0.1	AG	Bend Installation
Erie	ATWS-3443	121.1	122.0	Right	4,384	25	2.5	AG	Topsoil Segregation
Erie	ATWS-3458	122.0	122.0	Right	157	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Erie	ATWS-256	122.0	122.1	Right	213	75	0.4	AG,OL	Road and Waterbody Crossing
Erie	ATWS-257	122.1	122.1	Right	379	75	0.7	AG,ID,OL	Road and Waterbody Crossing
Erie	ATWS-825	122.1	122.2	Right	158	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Erie	ATWS-2181	122.2	122.5	Right	1,706	25	1	AG	Topsoil Segregation
Erie	ATWS-1966	122.5	123.0	Right	2,816	25	1.6	AG	Topsoil Segregation
Erie	ATWS-826	122.6	122.7	Left	694	25	0.4	AG	Bend Installation
Erie	ATWS-827	122.7	122.8	Left	609	25	0.3	AG	Bend Installation
Erie	ATWS-3459	123.0	123.1	Right	100	75	0.2	AG	Waterbody Crossing
Erie	ATWS-3825	123.0	123.1	Left	87	50	0.1	AG	Waterbody Crossing
Erie	ATWS-3826	123.1	123.1	Left	112	50	0.1	AG	Waterbody Crossing
Erie	ATWS-3460	123.1	123.1	Right	101	75	0.2	AG	Waterbody Crossing
Erie	ATWS-1565	123.1	123.2	Right	702	25	0.4	AG	Topsoil Segregation
Erie	ATWS-2984	123.2	123.2	Left	132	50	0.2	AG	Road Crossing
Erie	ATWS-300	123.2	123.2	Right	136	75	0.2	AG	Road Crossing
Erie	ATWS-2983	123.2	123.3	Left	139	50	0.2	AG,ID	Road Crossing
Erie	ATWS-258	123.2	123.3	Right	136	75	0.2	AG,ID	Road Crossing
Erie	ATWS-1566	123.3	123.5	Right	1,378	25	0.8	AG	Topsoil Segregation
Erie	ATWS-4434	123.4	123.4	Left	34	25	0	FW,OL	Access To Hydrostatic Test Water
Erie	ATWS-4433	123.4	123.4	Left	99	25	0.1	AG	Access To Hydrostatic Test Water
Erie	ATWS-3827	123.5	123.6	Left	150	100	0.3	AG,FW,OL	Abandoned Rail and Wetland Crossing
Erie	ATWS-301	123.5	123.6	Right	145	75	0.2	AG,FW	Abandoned Rail and Wetland Crossing and Topsoil Segregation
Erie	ATWS-3828	123.6	123.6	Left	196	96	0.3	AG	Abandoned Rail and Wetland Crossing
Erie	ATWS-302	123.6	123.6	Right	147	75	0.3	AG,OL	Abandoned Rail and Wetland Crossing and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Erie	ATWS-1567	123.6	124.0	Right	1,998	25	1.1	AG	Topsoil Segregation
Erie	ATWS-545	124.0	124.0	Right	120	75	0.2	AG	Road and Waterbody Crossing
Erie	ATWS-3829	124.0	124.0	Left	100	85	0.2	AG	Road and Waterbody Crossing
Erie	ATWS-3830	124.0	124.1	Left	122	50	0.1	AG	Road and Waterbody Crossing
Erie	ATWS-546	124.0	124.1	Right	111	75	0.2	AG	Road and Waterbody Crossing
Erie	ATWS-1568	124.1	124.8	Right	3,773	25	2.2	AG	Topsoil Segregation
Erie	ATWS-259	124.3	124.3	Left	304	25	0.2	AG	Bend Installation
Erie	ATWS-260	124.8	124.8	Right	157	75	0.3	AG,ID	Road Crossing
Erie	ATWS-2988	124.8	124.8	Left	152	50	0.2	AG,ID	Road Crossing
Erie	ATWS-2989	124.8	124.8	Left	158	50	0.2	AG,ID	Road Crossing
Erie	ATWS-261	124.8	124.9	Right	148	75	0.5	AG,ID	Road Crossing
Erie	ATWS-4272	124.9	124.9	Left	200	25	0.1	AG	Bend Installation
Erie	ATWS-3831	124.9	124.9	Right	358	50	0.3	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-1331	124.9	125.4	Right	2,472	25	1.4	AG	Topsoil Segregation
Erie	ATWS-3832	125.2	125.3	Left	300	25	0.2	AG	Bend Installation
Erie	ATWS-4273	125.4	125.4	Left	200	25	0.1	AG	Bend Installation
Erie	ATWS-2182	125.4	125.7	Right	1,515	25	0.9	AG	Topsoil Segregation
Erie	ATWS-828	125.8	125.8	Right	101	75	0.2	AG	Road, Waterbody and Wetland Crossing
Erie	ATWS-3833	125.8	125.8	Left	133	25	0.1	ID,RE	Road and Waterbody Crossing
Erie	ATWS-829	125.9	125.9	Left	410	75	0.7	AG,OL	Road and Waterbody Crossing
Erie	ATWS-2837	125.9	125.9	Right	179	75	0.2	OL	Road and Waterbody Crossing
Erie	ATWS-2836	125.9	126.2	Right	1,438	25	0.8	AG	Topsoil Segregation
Erie	ATWS-1570	126.1	126.1	Left	314	25	0.2	AG	Bend Installation
Erie	ATWS-2835	126.2	126.2	Left	165	50	0.2	AG,ID,OL	Road Crossing
Erie	ATWS-2834	126.2	126.3	Right	231	75	0.4	AG,ID,OL	Road Crossing
Erie	ATWS-2833	126.2	126.3	Left	228	50	0.3	AG,ID,OL	Road Crossing
Erie	ATWS-2832	126.3	126.3	Right	165	75	0.3	AG,ID,OL,RE	Road Crossing
Erie	ATWS-3834	126.3	126.4	Left	432	25	0.2	AG	Topsoil Segregation
Erie	ATWS-1571	126.4	126.6	Right	1,389	25	0.8	AG	Topsoil Segregation
Erie	ATWS-263	126.6	126.7	Right	169	75	0.3	AG	Road Crossing
Erie	ATWS-2990	126.6	126.7	Left	221	50	0.3	AG,OL,RE	Road Crossing
Erie	ATWS-264	126.7	126.7	Right	423	75	0.7	AG,ID	Road Crossing
Erie	ATWS-2991	126.7	126.7	Left	369	75	0.6	AG,ID	Road Crossing
Erie	ATWS-2183	126.7	126.8	Right	462	25	0.3	AG	Topsoil Segregation
Erie	ATWS-3461	126.8	126.9	Left	304	25	0.2	AG	Bend Installation
Erie	ATWS-3836	126.8	127.0	Right	826	25	0.5	AG	Topsoil Segregation
Erie	ATWS-3835	127.0	127.1	Right	300	50	0.3	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-4108	127.0	127.0	Left	200	25	0.1	AG	Bend Installation
Erie	ATWS-1334	127.1	127.4	Right	1,632	25	0.9	AG,OL	Topsoil Segregation
Erie	ATWS-4274	127.3	127.4	Left	210	25	0.1	AG	Bend Installation
Erie	ATWS-265	127.4	127.4	Right	178	75	0.3	AG	Waterbody Crossing
Erie	ATWS-266	127.4	127.4	Right	151	75	0.3	AG,RE	Waterbody Crossing
Erie	ATWS-1572	127.4	127.6	Right	980	25	0.6	AG	Topsoil Segregation
Erie	ATWS-832	127.6	127.7	Right	169	75	0.3	AG,ID,FW	Bend Installation and Road Crossing
Erie	ATWS-267	127.7	127.7	Left	141	75	0.2	AG,ID,FW	Road Crossing
Erie	ATWS-1574	127.7	127.9	Right	1,216	25	0.7	AG,ID,OL,RE	Topsoil Segregation
Erie	ATWS-268	127.7	127.7	Left	112	75	0.2	AG,ID,RE	Road Crossing
Erie	ATWS-4109	127.7	127.7	Left	99	25	0.1	AG	Bend Installation
Erie	ATWS-1965	127.8	127.9	Left	429	25	0.2	AG,OL	Bend Installation
Erie	ATWS-3464	127.9	127.9	Left	91	50	0.1	AG,OL	Waterbody Crossing
Erie	ATWS-835	127.9	127.9	Right	155	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Erie	ATWS-3837	127.9	128.0	Left	100	50	0.1	AG	Waterbody Crossing
Erie	ATWS-834	127.9	128.0	Right	121	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Erie	ATWS-1332	128.0	128.1	Right	654	25	0.4	AG	Topsoil Segregation
Erie	ATWS-3838	128.1	128.1	Left	148	50	0.2	AG	Waterbody Crossing
Erie	ATWS-2830	128.1	128.1	Right	165	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Erie	ATWS-1333	128.1	128.2	Right	543	25	0.3	AG	Topsoil Segregation
Erie	ATWS-837	128.2	128.2	Left	175	25	0.1	AG	Bend Installation and Waterbody Crossing
Erie	ATWS-304	128.2	128.3	Right	397	125	1.1	AG	Rail and Road Crossing
Erie	ATWS-2992	128.3	128.3	Left	93	50	0.1	AG	Rail and Road Crossing
Erie	ATWS-305	128.4	128.4	Right	197	75	0.3	ID,FW	Rail and Road Crossing
Erie	ATWS-307	128.9	128.9	Right	146	75	0.3	AG	Road Crossing
Erie	ATWS-1576	128.9	129.2	Right	1,645	25	0.9	AG	Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Erie	ATWS-3465	129.2	129.2	Right	150	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Erie	ATWS-3466	129.3	129.3	Right	289	75	0.5	AG,OL	Waterbody Crossing and Topsoil Segregation
Erie	ATWS-3839	129.3	129.4	Right	300	50	0.3	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-1289	129.4	130.0	Right	3,237	25	1.9	AG	Topsoil Segregation
Erie	ATWS-568	129.7	129.7	Left	305	25	0.2	AG	Bend Installation
Erie	ATWS-3841	130.0	130.0	Right	153	50	0.2	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-308	130.0	130.1	Right	126	75	0.2	AG	Bend Installation and Road Crossing
Erie	ATWS-4506	130.0	130.1	Right	70	75	0.1	AG,ID,OL	Road Crossing
Erie	ATWS-309	130.1	130.1	Right	245	75	0.4	AG,ID	Road Crossing
Erie	ATWS-1577	130.1	130.4	Right	1,788	25	1	AG,FW	Topsoil Segregation
Erie	ATWS-1963	130.4	130.5	Left	239	25	0.1	AG	Topsoil Segregation
Erie	ATWS-838	130.4	130.4	Left	99	50	0.1	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-1964	130.4	130.4	Right	470	25	0.3	AG	Topsoil Segregation
Erie	ATWS-3467	130.5	130.6	Right	317	50	0.4	AG,RE	Bend Installation and Topsoil Segregation
Erie	ATWS-4112	130.6	130.6	Left	286	25	0.2	AG,RE	Bend Installation
Erie	ATWS-3843	130.6	130.7	Left	814	25	0.5	AG,RE	Topsoil Segregation
Erie	ATWS-2074	130.7	130.8	Left	147	75	0.3	AG,ID	Road Crossing
Erie	ATWS-310	130.8	130.8	Right	136	75	0.2	AG,ID,RE	Road Crossing
Erie	ATWS-3842	130.8	130.8	Left	228	50	0.3	ID,FW	Bend Installation and Road Crossing
Erie	ATWS-311	130.8	130.8	Right	141	50	0.2	ID,FW	Bend Installation and Road Crossing
Erie	ATWS-4275	130.8	131.0	Right	754	25	0.4	AG	Topsoil Segregation
Erie	ATWS-839	131.0	131.0	Left	264	50	0.3	AG	Bend Installation and Topsoil Segregation
Erie	ATWS-4276	131.0	131.5	Left	2,337	25	1.3	AG	Topsoil Segregation
Sandusky/Erie	ATWS-2993	131.5	131.5	Left	228	75	0.4	AG,ID	Road Crossing
Sandusky	ATWS-3844	131.5	131.5	Left	148	75	0.3	AG,ID	Road Crossing
Sandusky	ATWS-1579	131.5	132.6	Right	5,666	25	3.3	AG	Topsoil Segregation
Sandusky	ATWS-3845	131.8	131.9	Left	300	25	0.2	AG	Bend Installation
Sandusky	ATWS-566	132.6	132.7	Left	235	125	0.7	AG,OL	Road Crossing
Sandusky	ATWS-567	132.6	132.7	Right	653	100	1.5	AG,OL	Bend Installation and Road Crossing
Sandusky	ATWS-636	132.7	132.7	Right	215	50	0.2	AG	Bore Pull Back String
Sandusky	ATWS-270	132.7	132.8	Right	395	75	0.7	AG,OL	Bend Installation and Road Crossing
Sandusky	ATWS-637	132.7	132.8	Left	678	260	2.1	AG	Bend Installation and Road Crossing
Sandusky	ATWS-1581	133.3	133.3	Right	2,617	25	1.5	AG,OL	Topsoil Segregation
Sandusky	ATWS-3847	133.3	133.3	Left	416	100	1	AG,OL	Road and Wetland Crossing
Sandusky	ATWS-543	133.4	133.4	Left	267	50	0.3	AG,ID,RE	Road and Wetland Crossing
Sandusky	ATWS-1580	133.4	133.5	Right	572	25	0.3	AG,ID	Topsoil Segregation
Sandusky	ATWS-4113	133.4	133.4	Left	151	25	0.1	AG	Bend Installation
Sandusky	ATWS-3513	133.5	133.5	Left	209	50	0.2	AG	Road Crossing
Sandusky	ATWS-272	133.5	133.5	Right	165	75	0.3	AG	Road Crossing
Sandusky	ATWS-273	133.5	133.6	Right	407	75	0.7	AG,ID	Road Crossing
Sandusky	ATWS-2540	133.5	133.6	Left	209	50	0.2	AG,ID	Road Crossing
Sandusky	ATWS-1582	133.6	133.9	Right	1,510	25	0.9	AG	Topsoil Segregation
Sandusky	ATWS-3514	133.8	133.8	Left	300	25	0.2	AG	Bend Installation
Sandusky	ATWS-842	134.1	134.1	Right	145	75	0.2	AG,ID	Road Crossing
Sandusky	ATWS-2551	134.1	134.1	Left	149	50	0.2	AG,ID	Road Crossing
Sandusky	ATWS-1584	134.1	134.3	Right	610	25	0.3	AG	Topsoil Segregation
Sandusky	ATWS-503	134.3	134.3	Right	103	75	0.2	AG,OL	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-2994	134.3	134.3	Left	112	50	0.1	AG,OL	Waterbody Crossing
Sandusky	ATWS-2995	134.3	134.3	Left	98	50	0.1	AG,OL	Waterbody Crossing
Sandusky	ATWS-3510	134.3	134.6	Right	1,514	25	0.9	AG,OL	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-3515	134.6	134.6	Right	300	50	0.3	AG	Bend Installation and Topsoil Segregation
Sandusky	ATWS-4114	134.6	134.6	Left	200	25	0.1	AG	Bend Installation
Sandusky	ATWS-1291	134.6	135.3	Right	3,579	25	2.1	AG,FW	Topsoil Segregation
Sandusky	ATWS-3516	134.7	134.8	Left	300	25	0.2	AG	Bend Installation
Sandusky	ATWS-2523	135.2	135.3	Left	589	25	0.3	AG	Bend Installation
Sandusky	ATWS-2861	135.3	135.3	Right	96	75	0.2	AG	Waterbody Crossing and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Sandusky	ATWS-843	135.3	135.3	Left	105	50	0.1	AG	Waterbody Crossing
Sandusky	ATWS-2862	135.3	135.4	Right	335	75	0.6	AG	Road and Waterbody Crossing
Sandusky	ATWS-845	135.3	135.4	Left	324	50	0.4	AG,OL	Road and Waterbody Crossing
Sandusky	ATWS-2865	135.4	135.4	Right	165	75	0.3	AG,ID	Road and Waterbody Crossing
Sandusky	ATWS-846	135.4	135.4	Left	163	50	0.2	AG,ID	Road and Waterbody Crossing
Sandusky	ATWS-3846	135.4	135.9	Right	2,457	25	1.4	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-3848	135.9	135.9	Left	225	75	0.4	AG	Waterbody Crossing
Sandusky	ATWS-847	136.0	136.0	Left	242	75	0.4	AG	Waterbody Crossing
Sandusky	ATWS-3849	136.0	136.4	Right	2,031	25	1.2	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-848	136.4	136.4	Left	194	50	0.2	AG	Road and Waterbody Crossing
Sandusky	ATWS-2923	136.4	136.4	Right	196	75	0.3	AG	Road and Waterbody Crossing
Sandusky	ATWS-849	136.4	136.5	Left	204	50	0.2	AG,ID,OL	Road and Waterbody Crossing
Sandusky	ATWS-2922	136.4	136.5	Right	204	50	0.2	AG,ID,OL	Road Crossing
Sandusky	ATWS-3851	136.5	136.9	Right	2,192	25	1.3	AG	Topsoil Segregation
Sandusky	ATWS-3850	136.9	136.9	Right	200	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-1962	136.9	136.9	Left	200	50	0.2	AG,OL	Waterbody Crossing
Sandusky	ATWS-2603	136.9	136.9	Left	98	50	0.1	AG	Waterbody Crossing
Sandusky	ATWS-3852	136.9	136.9	Right	96	50	0.1	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-3853	136.9	137.4	Right	2,288	25	1.3	AG	Topsoil Segregation
Sandusky	ATWS-2998	137.4	137.4	Right	203	75	0.3	AG,ID	Road Crossing
Sandusky	ATWS-2521	137.4	137.4	Left	202	50	0.2	AG,ID	Road Crossing
Sandusky	ATWS-2999	137.4	137.5	Right	227	75	0.4	AG,ID	Bend Installation and Road and Wetland Crossing
Sandusky	ATWS-2522	137.4	137.5	Left	497	50	0.6	AG,ID	Bend Installation and Road Crossing
Sandusky	ATWS-3000	137.5	137.5	Right	231	75	0.4	AG,ID	Road Crossing
Sandusky	ATWS-3519	137.5	137.7	Left	829	50	1	AG,ID	Bend Installation and Road Crossing
Sandusky	ATWS-3854	137.5	137.6	Right	494	25	0.3	AG	Topsoil Segregation
Sandusky	ATWS-1241	137.7	138.0	Left	1,665	25	1	AG	Topsoil Segregation
Sandusky	ATWS-852	138.0	138.0	Left	172	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-853	138.0	138.1	Left	169	75	0.3	AG,FW	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-1240	138.1	138.2	Left	703	25	0.4	AG	Topsoil Segregation
Sandusky	ATWS-3520	138.2	138.3	Left	678	75	1.2	AG	Wetland Crossing and Topsoil Segregation
Sandusky	ATWS-1242	138.4	138.6	Left	602	25	0.3	AG,FW	Topsoil Segregation
Sandusky	ATWS-855	138.6	138.6	Left	174	75	0.3	AG,ID	Road Crossing
Sandusky	ATWS-3521	138.6	138.6	Left	186	75	0.3	ID,OL	Road and Wetland Crossing
Sandusky	ATWS-3522	138.6	138.6	Right	166	25	0.1	OL	Road, Waterbody and Wetland Crossing
Sandusky	ATWS-856	138.7	138.7	Left	470	75	0.8	AG,FW	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-3524	138.7	138.8	Left	292	25	0.2	AG	Topsoil Segregation
Sandusky	ATWS-3523	138.8	138.9	Left	300	50	0.3	AG,OL	Bend Installation and Topsoil Segregation
Sandusky	ATWS-1243	138.9	139.0	Left	954	25	0.5	AG	Topsoil Segregation
Sandusky	ATWS-3856	139.0	139.1	Right	225	50	0.3	AG	Waterbody and Wetland Crossing and Topsoil Segregation
Sandusky	ATWS-3525	139.0	139.1	Left	125	75	0.2	AG	Waterbody and Wetland Crossing
Sandusky	ATWS-3855	139.1	139.1	Right	86	50	0.1	AG	Waterbody and Wetland Crossing and Topsoil Segregation
Sandusky	ATWS-857	139.1	139.1	Left	95	75	0.2	AG,OL	Waterbody and Wetland Crossing
Sandusky	ATWS-1589	139.1	139.2	Left	717	25	0.4	AG,OL	Topsoil Segregation
Sandusky	ATWS-858	139.1	139.2	Right	304	25	0.2	AG,OL	Bend Installation
Sandusky	ATWS-553	139.2	139.3	Left	367	75	0.6	AG	Road and Wetland Crossing
Sandusky	ATWS-2838	139.2	139.3	Right	242	75	0.4	AG,ID,OL	Road and Wetland Crossing
Sandusky	ATWS-2839	139.3	139.4	Right	438	75	0.8	AG,ID	Road and Wetland Crossing
Sandusky	ATWS-313	139.3	139.4	Left	213	75	0.4	AG,ID	Road and Wetland Crossing
Sandusky	ATWS-3527	139.4	139.4	Left	277	25	0.2	AG	Topsoil Segregation
Sandusky	ATWS-3526	139.4	139.5	Left	300	50	0.3	AG	Bend Installation and Topsoil Segregation
Sandusky	ATWS-3528	139.5	139.6	Left	589	25	0.3	AG	Topsoil Segregation
Sandusky	ATWS-859	139.6	139.6	Left	159	75	0.3	AG,ID	Road Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Sandusky	ATWS-860	139.6	139.7	Left	163	75	0.3	AG,ID	Road Crossing
Sandusky	ATWS-1591	139.7	139.8	Left	486	25	0.3	AG	Topsoil Segregation
Sandusky	ATWS-861	139.8	139.8	Left	261	75	0.4	AG,FW	Waterbody and Wetland Crossing and Topsoil Segregation
Sandusky	ATWS-1592	139.9	140.0	Left	345	75	0.6	AG,FW	Waterbody and Wetland Crossing and Topsoil Segregation
Sandusky	ATWS-1593	140.0	140.1	Left	741	25	0.4	AG	Topsoil Segregation
Sandusky	ATWS-862	140.1	140.1	Left	170	75	0.3	AG	Road Crossing
Sandusky	ATWS-863	140.1	140.2	Left	164	75	0.3	AG,ID	Road Crossing
Sandusky	ATWS-3534	140.2	140.2	Left	122	25	0.1	AG	Topsoil Segregation
Sandusky	ATWS-3533	140.2	140.3	Left	300	50	0.3	AG	Bend Installation and Topsoil Segregation
Sandusky	ATWS-1244	140.3	140.5	Left	1,195	25	0.7	AG	Topsoil Segregation
Sandusky	ATWS-3529	140.5	140.5	Left	165	75	0.3	AG,FW	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-3530	140.5	140.5	Right	129	25	0.1	AG,FW	Waterbody Crossing
Sandusky	ATWS-3531	140.5	140.6	Left	149	75	0.3	AG,FW	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-2874	140.6	140.6	Right	228	25	0.1	AG	Bend Installation
Sandusky	ATWS-315	140.6	140.7	Left	549	50	0.6	AG	Bend Installation and Road Crossing
Sandusky	ATWS-1594	140.6	140.7	Right	350	75	0.6	AG	Road Crossing
Sandusky	ATWS-2506	140.7	140.7	Left	435	50	0.5	AG,ID	Road Crossing
Sandusky	ATWS-2280	140.7	140.7	Right	151	75	0.3	AG,ID	Road Crossing
Sandusky	ATWS-2829	140.7	140.8	Right	367	75	0.6	AG	Road and Existing Pipeline Crossing
Sandusky	ATWS-3858	140.8	1408.0	Left	376	25	0.2	AG	Existing Pipeline Crossing
Sandusky	ATWS-1961	140.8	141.1	Right	1,835	25	1.1	AG	Topsoil Segregation
Sandusky	ATWS-3535	141.1	141.2	Left	179	50	0.2	AG	Waterbody Crossing
Sandusky	ATWS-864	141.1	141.2	Right	265	75	0.5	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-2507	141.2	141.3	Left	532	50	0.6	AG	Waterbody Crossing and Road Crossing
Sandusky	ATWS-865	141.2	141.3	Right	534	75	0.9	AG	Waterbody Crossing and Road Crossing
Sandusky	ATWS-2508	141.3	141.3	Left	265	50	0.3	AG,ID	Road Crossing
Sandusky	ATWS-2281	141.3	141.3	Right	158	75	0.3	AG,ID	Road Crossing
Sandusky	ATWS-1246	141.3	141.6	Right	1,249	25	0.7	AG	Topsoil Segregation
Sandusky	ATWS-3859	141.6	141.6	Right	157	100	0.4	AG,ID,OL	Road and Wetland Crossing
Sandusky	ATWS-2509	141.6	141.6	Left	220	50	0.3	AG,OL	Road and Wetland Crossing
Sandusky	ATWS-866	141.6	141.7	Right	477	75	0.8	AG,ID,FW,OL	Road, Waterbody and Wetland Crossing
Sandusky	ATWS-2510	141.6	141.7	Left	265	50	0.3	AG,ID,OL	Road, Waterbody and Wetland Crossing
Sandusky	ATWS-3537	141.7	141.8	Left	329	50	0.4	AG,FW	Waterbody Crossing
Sandusky	ATWS-868	141.7	141.8	Right	283	75	0.5	AG,FW	Waterbody Crossing
Sandusky	ATWS-1595	141.8	141.8	Right	392	25	0.2	AG	Topsoil Segregation
Sandusky	ATWS-2511	141.8	141.9	Left	183	50	0.2	AG,OL	Road Crossing
Sandusky	ATWS-870	141.8	141.9	Right	291	75	0.5	AG,OL	Road Crossing
Sandusky	ATWS-2518	141.9	141.9	Left	263	50	0.3	AG,ID,OL	Road Crossing
Sandusky	ATWS-869	141.9	141.9	Right	155	75	0.3	AG,ID,OL	Road Crossing
Sandusky	ATWS-1248	141.9	142.6	Right	3,861	25	2.2	AG	Topsoil Segregation
Sandusky	ATWS-3538	142.3	142.4	Left	299	25	0.2	AG	Bend Installation
Sandusky	ATWS-323	142.6	142.7	Right	167	75	0.3	AG	Road and Waterbody Crossing
Sandusky	ATWS-2519	142.7	142.7	Left	226	50	0.3	AG	Road and Waterbody Crossing
Sandusky	ATWS-324	142.7	142.8	Right	290	75	0.5	AG	Road and Waterbody Crossing
Sandusky	ATWS-2520	142.7	142.8	Left	203	50	0.2	AG,ID	Road and Waterbody Crossing
Sandusky	ATWS-1596	142.8	143.0	Right	1,135	25	0.7	AG	Topsoil Segregation
Sandusky	ATWS-3539	143.0	143.0	Left	93	50	0.1	AG	Waterbody Crossing
Sandusky	ATWS-872	143.0	143.0	Right	127	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-3540	143.0	143.0	Left	142	50	0.2	AG	Waterbody Crossing
Sandusky	ATWS-873	143.0	143.0	Right	102	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-1597	143.0	143.2	Right	986	25	0.6	AG	Topsoil Segregation
Sandusky	ATWS-2478	143.2	143.2	Left	165	100	0.4	AG,OL	Road Crossing
Sandusky	ATWS-325	143.2	143.2	Right	189	75	0.3	AG,OL	Road Crossing
Sandusky	ATWS-2477	143.3	143.3	Left	360	50	0.6	AG,ID	Road Crossing and Waterbody Crossing
Sandusky	ATWS-326	143.3	143.3	Right	306	75	0.5	AG,ID	Road Crossing and Waterbody Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Sandusky	ATWS-3542	143.3	143.4	Right	95	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-3541	143.3	143.4	Left	92	50	0.1	AG	Waterbody Crossing
Sandusky	ATWS-1247	143.4	143.7	Right	1,719	25	1	AG	Topsoil Segregation
Sandusky	ATWS-3543	143.5	143.5	Left	300	25	0.2	AG	Bend Installation
Sandusky	ATWS-3545	143.7	143.7	Left	180	50	0.2	AG	Waterbody Crossing
Sandusky	ATWS-3546	143.7	143.7	Right	200	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-3544	143.7	143.8	Left	200	50	0.2	AG	Waterbody Crossing
Sandusky	ATWS-599	143.7	143.8	Right	183	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-1601	143.8	143.9	Right	710	25	0.4	AG	Topsoil Segregation
Sandusky	ATWS-2291	143.9	143.9	Left	184	100	0.4	AG,ID	Road Crossing
Sandusky	ATWS-386	143.9	143.9	Right	185	75	0.3	AG	Road Crossing
Sandusky	ATWS-2292	143.9	144.0	Left	246	50	0.3	AG,ID	Road Crossing
Sandusky	ATWS-387	144.0	144.0	Right	179	75	0.3	AG	Road Crossing
Sandusky	ATWS-1602	144.0	144.4	Right	2,175	25	1.2	AG	Topsoil Segregation
Sandusky	ATWS-389	144.4	144.4	Right	202	75	0.3	AG,ID,OL	Road Crossing
Sandusky	ATWS-2403	144.4	144.4	Left	158	50	0.2	AG	Road Crossing
Sandusky	ATWS-2402	144.4	144.5	Left	236	50	0.3	AG,ID,OL	Road Crossing
Sandusky	ATWS-388	144.4	144.5	Right	196	75	0.3	AG,ID,OL	Road Crossing
Sandusky	ATWS-3860	144.5	144.6	Right	767	25	0.4	AG	Topsoil Segregation
Sandusky	ATWS-1603	144.6	144.8	Right	395	125	1.1	AG	Bend Installation and Road Crossing
Sandusky	ATWS-2524	144.6	144.8	Left	742	75	1.3	AG	Bend Installation and Road Crossing
Sandusky	ATWS-2525	144.8	144.9	Left	161	115	0.4	AG,OL	Bend Installation and Road Crossing
Sandusky	ATWS-3038	144.8	144.9	Right	773	125	2.1	AG,OL	Bend Installation and Road Crossing
Sandusky	ATWS-3547	144.9	145.0	Right	300	50	0.3	AG	Bend Installation and Topsoil Segregation
Sandusky	ATWS-4278	144.9	145.0	Left	200	25	0.1	AG	Bend Installation
Sandusky	ATWS-2526	145.0	145.2	Right	1,239	25	0.7	AG	Topsoil Segregation
Sandusky	ATWS-2472	145.1	145.7	Left	2,194	100	5	AG,OL	HDD Pull Back String
Sandusky	ATWS-3549	145.1	145.2	Left	415	50	0.5	AG,ID,OL	Bend Installation and Road Crossing
Sandusky	ATWS-3037	145.2	145.2	Right	140	75	0.2	AG	Road Crossing
Sandusky	ATWS-3079	145.2	145.2	Right	5	75	0	ID	Road Crossing
Sandusky	ATWS-3035	145.2	145.3	Right	183	75	0.3	AG,ID,OL	Road Crossing
Sandusky	ATWS-2530	145.2	145.3	Left	179	40	0.2	AG,ID,OL,RE	Road Crossing
Sandusky	ATWS-3036	145.3	145.6	Right	1,825	25	1	AG	Topsoil Segregation
Sandusky	ATWS-2553	145.6	145.8	Left	910	285	2.5	AG	HDD Exit Location
Sandusky	ATWS-3684	145.6	145.8	Right	805	125	2.3	AG	HDD Exit Location
Sandusky	ATWS-2474	146.2	146.4	Right	466	150	1.6	OL	HDD Entry Location
Sandusky	ATWS-4353	146.2	146.4	Left	624	125	1.8	OL	HDD Entry Location
Sandusky	ATWS-3862	146.3	146.4	Right	246	100	0.6	OL,OW	Waterbody Crossing
Sandusky	ATWS-3863	146.4	146.4	Left	208	75	0.4	OL	Waterbody Crossing
Sandusky	ATWS-2475	164.4	164.4	Left	176	75	0.3	AG	Waterbody Crossing
Sandusky	ATWS-3864	146.4	146.4	Right	170	100	0.4	AG,OL	Waterbody Crossing
Sandusky	ATWS-4542	146.4	146.5	Right	264	50	0.3	AG	Topsoil Segregation
Sandusky	ATWS-2882	146.5	146.6	Right	573	25	0.2	AG,ID	Topsoil Segregation
Sandusky	ATWS-3551	146.5	146.6	Left	480	50	0.6	AG,ID	Bend Installation and Road Crossing
Sandusky	ATWS-2884	146.6	146.6	Left	184	50	0.2	AG,OL	Road Crossing
Sandusky	ATWS-3554	146.6	146.6	Right	182	75	0.3	AG,OL	Road Crossing
Sandusky	ATWS-4118	146.6	146.7	Right	767	25	0.4	AG	Topsoil Segregation
Sandusky	ATWS-3556	146.6	146.7	Left	300	25	0.2	AG	Bend Installation
Sandusky	ATWS-4117	146.7	146.7	Right	120	75	0.2	AG	Topsoil Segregation and Waterbody Crossing
Sandusky	ATWS-4116	146.7	146.7	Left	184	50	0.2	AG	Waterbody Crossing
Sandusky	ATWS-4119	146.7	146.7	Right	100	75	0.2	AG,OL	Topsoil Segregation and Waterbody Crossing
Sandusky	ATWS-2885	146.7	147.1	Right	2,032	25	1.2	AG	Topsoil Segregation
Sandusky	ATWS-3865	147.1	147.2	Left	309	100	0.7	AG,OL	Bend Installation and Road Crossing
Sandusky	ATWS-3557	147.1	147.2	Right	491	125	1.4	AG,OL	Bend Installation and Road Crossing
Sandusky	ATWS-3559	147.2	147.3	Left	397	100	0.9	AG,OL	Bend Installation and Road and Wetland Crossing
Sandusky	ATWS-3558	147.2	147.3	Right	386	125	1.1	AG,OL	Road and Wetland Crossing
Sandusky	ATWS-2889	147.3	147.4	Right	440	25	0.3	AG	Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions[a] Length (ft.)	Width (ft.)	ATWS Acres Affected[b]	Existing Land Use[c]	Justification
Mainline (cont.'d)									
Sandusky	ATWS-3560	147.4	147.4	Right	283	50	0.3	AG	Bend Installation and Topsoil Segregation
Sandusky	ATWS-4120	147.4	147.4	Left	184	25	0.1	AG	Bend Installation
Sandusky	ATWS-880	147.4	147.5	Left	148	50	0.2	AG,RE	Road, Waterbody and Existing Pipeline Crossing
Sandusky	ATWS-505	147.4	147.5	Right	178	75	0.3	AG,ID	Road, Waterbody and Existing Pipeline Crossing
Sandusky	ATWS-2890	147.5	147.5	Left	259	50	0.3	AG,ID	Road and Waterbody Crossing
Sandusky	ATWS-504	147.5	147.5	Right	187	75	0.3	AG	Road and Waterbody Crossing
Sandusky	ATWS-1605	147.5	147.6	Right	134	25	0.1	AG	Topsoil Segregation
Sandusky	ATWS-392	147.6	147.6	Right	222	90	0.5	AG	Rail and Waterbody Crossing
Sandusky	ATWS-3561	147.6	147.6	Left	205	75	0.4	AG	Rail and Waterbody Crossing
Sandusky	ATWS-3562	147.6	147.7	Left	200	75	0.3	AG	Rail and Waterbody Crossing
Sandusky	ATWS-393	147.6	147.7	Right	178	75	0.3	AG	Rail and Waterbody Crossing
Sandusky	ATWS-3564	147.7	147.7	Right	112	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-3563	147.7	147.7	Left	165	50	0.2	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-3566	147.7	147.8	Right	167	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-3565	147.7	147.8	Left	109	50	0.1	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-1606	147.8	148.1	Right	1,678	25	1	AG	Topsoil Segregation
Sandusky	ATWS-4121	148.1	148.1	Left	125	25	0.1	AG	Existing Pipeline Crossing
Sandusky	ATWS-4279	148.1	148.2	Right	506	25	0.3	AG	Topsoil Segregation
Sandusky	ATWS-394	148.2	148.3	Right	375	75	0.6	AG,ID,OL	Bend Installation and Road Crossing
Sandusky	ATWS-4122	148.2	148.2	Left	151	25	0.1	AG	Bend Installation
Sandusky	ATWS-3568	148.2	148.3	Left	199	50	0.2	AG,OL	Road Crossing
Sandusky	ATWS-3569	148.3	148.3	Left	212	50	0.2	AG,ID,OL	Road Crossing
Sandusky	ATWS-395	148.3	148.3	Right	211	75	0.4	AG,ID,OL	Road Crossing
Sandusky	ATWS-2466	148.3	148.7	Right	2,285	25	1.3	AG	Topsoil Segregation
Sandusky	ATWS-3570	148.7	148.8	Right	100	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-3571	148.7	148.8	Left	100	50	0.1	AG	Waterbody Crossing
Sandusky	ATWS-3572	148.8	148.8	Right	100	75	0.2	AG,OL	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-3573	148.8	148.8	Left	100	50	0.1	AG	Waterbody Crossing
Sandusky	ATWS-1608	148.8	149.3	Right	2,945	25	1.7	AG	Topsoil Segregation
Sandusky	ATWS-882	149.3	149.4	Left	143	50	0.2	AG	Waterbody Crossing
Sandusky	ATWS-2569	149.3	149.4	Right	120	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-881	149.4	149.4	Right	153	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-3574	149.4	149.4	Left	166	50	0.2	AG	Waterbody Crossing
Sandusky	ATWS-1609	149.4	149.6	Right	974	25	0.6	AG	Topsoil Segregation
Sandusky	ATWS-3575	149.4	149.5	Left	300	25	0.2	AG	Bend Installation
Sandusky	ATWS-883	149.6	149.6	Right	162	75	0.3	AG,ID	Road Crossing
Sandusky	ATWS-2981	149.6	149.6	Left	174	50	0.2	AG,ID	Road Crossing
Sandusky	ATWS-884	149.6	149.7	Right	187	75	0.3	AG,ID	Road Crossing
Sandusky	ATWS-2982	149.6	149.7	Left	172	50	0.2	AG,ID	Road Crossing
Sandusky	ATWS-1251	149.7	150.3	Right	3,129	25	1.8	AG,ID,RE	Topsoil Segregation
Sandusky	ATWS-330	150.2	150.3	Left	179	75	0.3	AG,ID	Road Crossing
Sandusky	ATWS-2891	150.3	150.3	Right	184	75	0.3	AG,ID	Road Crossing
Sandusky	ATWS-331	150.3	150.3	Left	182	50	0.2	AG,ID	Road Crossing
Sandusky	ATWS-1659	150.3	150.5	Right	1,163	25	0.7	AG	Topsoil Segregation
Sandusky	ATWS-3576	150.5	150.6	Right	300	50	0.3	AG	Bend Installation and Topsoil Segregation
Sandusky	ATWS-4280	150.5	150.6	Left	200	25	0.1	AG	Bend Installation
Sandusky	ATWS-1660	150.6	150.7	Right	539	25	0.3	AG	Topsoil Segregation
Sandusky	ATWS-332	150.7	150.7	Right	195	75	0.3	AG,ID	Road Crossing
Sandusky	ATWS-2986	150.7	150.7	Left	167	25	0.1	AG,ID	Road Crossing
Sandusky	ATWS-2985	150.7	150.8	Left	183	25	0.1	AG,ID	Road Crossing
Sandusky	ATWS-333	150.7	150.8	Right	155	75	0.3	AG,ID	Road Crossing
Sandusky	ATWS-1610	150.8	151.1	Right	1,783	25	1	AG	Topsoil Segregation
Sandusky	ATWS-506	151.1	151.1	Right	126	75	0.2	AG	Wetland Crossing and Topsoil Segregation
Sandusky	ATWS-2987	151.1	151.1	Right	107	75	0.2	AG	Wetland Crossing and Topsoil Segregation
Sandusky	ATWS-1250	151.1	151.2	Right	286	25	0.2	AG	Topsoil Segregation
Sandusky	ATWS-527	151.2	151.3	Right	346	125	1	AG	Rails To Trails and Wetland Crossing and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions[a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected[b]	Existing Land Use[c]	Justification
Mainline (cont.'d)									
Sandusky	ATWS-528	151.3	151.4	Right	200	85	0.3	AG	Rails To Trails and Wetland Crossing and Topsoil Segregation
Sandusky	ATWS-4281	151.4	151.4	Right	400	125	1.1	AG	Rails To Trails and Wetland Crossing and Topsoil Segregation
Sandusky	ATWS-1957	151.4	151.5	Right	296	25	0.2	AG,OL	Topsoil Segregation
Sandusky	ATWS-1611	151.6	151.7	Right	496	25	0.3	AG,FW	Topsoil Segregation
Sandusky	ATWS-334	151.7	151.7	Right	205	75	0.4	AG,ID	Road Crossing
Sandusky	ATWS-335	151.7	151.8	Right	346	75	0.4	AG,ID,FW	Road Crossing
Sandusky	ATWS-1252	151.9	152.2	Right	1,696	25	1	AG	Topsoil Segregation
Sandusky	ATWS-628	152.2	152.2	Right	274	75	0.5	AG,FW	Wetland Crossing
Sandusky	ATWS-1253	152.3	152.7	Right	2,147	25	1.2	AG,FW,OL	Topsoil Segregation
Sandusky	ATWS-336	152.7	152.7	Right	236	75	0.4	ID,OL	Road Crossing
Sandusky	ATWS-337	152.7	152.8	Right	228	75	0.4	AG	Road Crossing and Waterbody Crossing
Sandusky	ATWS-1612	152.8	153.2	Right	2,194	25	1.3	AG	Topsoil Segregation
Sandusky	ATWS-1662	153.2	153.2	Right	200	75	0.3	AG,FW	Waterbody Crossing and Wetland Crossing
Sandusky	ATWS-1661	153.4	153.4	Right	180	75	0.3	OL	Waterbody and Wetland Crossing and Topsoil Segregation
Sandusky	ATWS-1613	153.4	153.7	Right	1,625	25	0.9	AG,OL	Topsoil Segregation
Sandusky	ATWS-338	153.7	153.8	Right	216	75	0.4	AG,ID	Road Crossing
Sandusky	ATWS-339	153.8	153.8	Right	135	75	0.2	AG	Road Crossing and Waterbody Crossing
Sandusky	ATWS-1614	153.8	153.9	Right	361	25	0.2	AG	Topsoil Segregation
Sandusky	ATWS-891	153.9	153.9	Right	405	50	0.5	AG	Bend Installation and Topsoil Segregation
Sandusky	ATWS-4123	153.9	153.9	Left	125	50	0.1	AG	Existing Pipeline Crossing
Sandusky	ATWS-2892	153.9	154.0	Right	288	50	0.3	AG	Bend Installation and Topsoil Segregation
Sandusky	ATWS-600	154.0	154.2	Right	827	25	0.5	AG	Topsoil Segregation
Sandusky	ATWS-340	154.2	154.2	Right	531	125	1.5	AG,ID,RE	Bend Installation and Road Crossing
Sandusky	ATWS-892	154.2	154.2	Left	378	50	0.4	AG,ID	Bend Installation and Road Crossing
Sandusky	ATWS-341	154.2	154.3	Right	284	125	0.8	AG,ID,RE	Bend Installation and Road Crossing
Sandusky	ATWS-1954	154.2	154.3	Left	504	50	0.6	AG,ID	Bend Installation and Road Crossing
Sandusky	ATWS-1615	154.3	154.4	Right	478	25	0.3	AG,RE	Topsoil Segregation
Sandusky	ATWS-4363	154.4	154.4	Left	100	50	0.1	AG	Waterbody Crossing
Sandusky	ATWS-342	154.4	154.4	Right	114	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-3580	154.4	154.5	Left	118	50	0.1	AG	Waterbody Crossing
Sandusky	ATWS-671	154.5	154.5	Right	124	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-1616	154.5	154.6	Right	554	25	0.3	AG	Road Crossing and Waterbody Crossing
Sandusky	ATWS-4124	154.6	154.7	Right	489	25	0.3	AG	Topsoil Segregation
Sandusky	ATWS-1953	154.7	154.7	Left	325	50	0.4	AG,ID	Road Crossing and Waterbody Crossing
Sandusky	ATWS-617	154.7	154.7	Right	199	75	0.3	AG,ID	Road Crossing and Waterbody Crossing
Sandusky	ATWS-343	154.7	154.8	Right	288	75	0.5	AG	Road Crossing and Waterbody Crossing
Sandusky	ATWS-3001	154.7	154.8	Left	208	50	0.2	AG,ID	Road Crossing and Waterbody Crossing
Sandusky	ATWS-1256	154.8	155.1	Right	1,852	25	1.1	AG	Topsoil Segregation
Sandusky	ATWS-601	155.1	155.2	Left	325	50	0.4	AG,OL	Waterbody Crossing
Sandusky	ATWS-2894	155.1	155.2	Right	150	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-2893	155.2	155.2	Right	285	75	0.5	AG,OL	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-529	155.2	155.2	Left	124	50	0.1	AG,OL	Waterbody Crossing
Sandusky	ATWS-2171	155.2	155.3	Right	374	25	0.2	AG	Topsoil Segregation
Sandusky	ATWS-1617	155.3	155.6	Right	1,244	25	0.7	AG,OL	Topsoil Segregation
Sandusky	ATWS-885	155.6	155.6	Right	90	35	0	AG	Bend Installation and Wetland Crossing and Topsoil Segregation
Sandusky	ATWS-4282	155.6	155.7	Left	412	25	0.2	AG,FW	Bend Installation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Sandusky	ATWS-4414	155.6	155.7	Right	137	50	0.1	AG	Bend Installation and Topsoil Segregation
Sandusky	ATWS-1618	155.7	155.9	Right	1,441	25	0.8	AG,ID,RE	Topsoil Segregation
Sandusky	ATWS-886	155.8	155.9	Left	584	50	0.7	AG,ID,RE	Bend Installation and Road Crossing
Sandusky	ATWS-2896	155.9	156.0	Left	417	50	0.5	AG	Bend Installation and Road and Waterbody Crossing
Sandusky	ATWS-669	155.9	156.0	Right	261	75	0.4	AG	Bend Installation and Road and Waterbody Crossing
Sandusky	ATWS-1257	156.0	156.1	Right	509	25	0.3	AG	Topsoil Segregation
Sandusky	ATWS-1952	156.1	156.1	Left	228	50	0.3	AG	Existing Pipeline Crossing
Sandusky	ATWS-2879	156.1	156.1	Right	114	50	0.1	AG	Existing Pipeline Crossing
Sandusky	ATWS-2880	156.1	156.2	Right	225	50	0.3	AG	Existing Pipeline Crossing
Sandusky	ATWS-1951	156.1	156.2	Left	112	50	0.1	AG	Existing Pipeline Crossing
Sandusky	ATWS-2881	156.2	156.2	Right	398	25	0.2	AG	Topsoil Segregation
Sandusky	ATWS-1664	156.2	156.3	Right	404	75	0.7	AG,FW	Bend Installation and Wetland Crossing and Topsoil Segregation
Sandusky	ATWS-887	156.2	156.3	Left	264	50	0.3	AG,FW	Bend and Wetland Crossing
Sandusky	ATWS-888	156.5	156.6	Left	465	50	0.5	AG,FW	Bend Installation and Waterbody Crossing
Sandusky	ATWS-1255	156.5	156.6	Right	469	75	0.8	AG,FW	Bend Installation and Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-4364	156.6	156.6	Right	100	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-4365	156.6	156.6	Left	100	50	0.1	AG	Waterbody Crossing
Sandusky	ATWS-1950	156.6	156.8	Right	1,369	25	0.8	AG	Topsoil Segregation
Sandusky	ATWS-4366	156.8	156.9	Left	106	50	0.1	AG	Waterbody Crossing
Sandusky	ATWS-889	156.8	156.9	Right	100	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-890	156.9	156.9	Right	101	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-4367	156.9	156.9	Left	100	50	0.1	AG	Waterbody Crossing
Sandusky	ATWS-1254	156.9	157.1	Right	927	25	0.5	AG	Topsoil Segregation
Sandusky	ATWS-893	157.1	157.1	Right	288	75	0.5	AG,ID,OL	Road Crossing
Sandusky	ATWS-2996	157.1	157.1	Left	128	50	0.1	AG,ID,OL	Road and Wetland Crossing
Sandusky	ATWS-895	157.1	157.3	Right	670	75	1.2	AG,ID,FW	Road and Wetland Crossing
Sandusky	ATWS-2997	157.1	157.2	Left	158	50	0.2	AG	Road and Wetland Crossing
Sandusky	ATWS-4125	157.6	157.6	Right	152	75	0.2	ID,FW	Road and Wetland Crossing
Sandusky	ATWS-2877	157.6	157.7	Right	154	75	0.3	AG,ID,RE	Road and Wetland Crossing
Sandusky	ATWS-2878	157.7	157.7	Right	100	25	0.1	AG	Topsoil Segregation
Sandusky	ATWS-2876	157.7	157.8	Right	341	75	0.6	AG,OL,RE	Bend Installation and Existing Pipeline Crossing and Topsoil Segregation
Sandusky	ATWS-1258	157.7	157.8	Left	284	50	0.3	AG	Bend Installation and Existing Pipeline Crossing and Topsoil Segregation
Sandusky	ATWS-554	157.8	157.8	Left	181	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-555	157.8	157.9	Left	411	75	0.7	AG,FW,OL	Waterbody and Wetland Crossing and Topsoil Segregation
Sandusky	ATWS-4127	158.1	158.2	Right	235	25	0.1	FW,OL	Road and Wetland Crossing
Sandusky	ATWS-1948	158.1	158.2	Left	170	75	0.3	ID,FW	Road and Wetland Crossing
Sandusky	ATWS-347	158.2	158.2	Left	289	75	0.5	AG,ID,FW,OL	Road and Wetland Crossing
Sandusky	ATWS-4128	158.2	158.2	Right	218	25	0.1	FW,OL	Road and Wetland Crossing
Sandusky	ATWS-1259	158.2	158.5	Left	1,479	25	0.8	AG	Topsoil Segregation
Sandusky	ATWS-348	158.5	158.6	Left	420	125	1.2	AG,OL	Waterbody and Wetland Crossing and Topsoil Segregation
Sandusky	ATWS-4129	158.6	158.6	Right	126	25	0.1	OL	Waterbody and Wetland Crossing
Sandusky	ATWS-899	158.6	158.7	Left	410	75	0.7	AG,OL	Waterbody Crossing
Sandusky	ATWS-4130	158.7	158.8	Left	375	125	1.1	AG,OL	Road, Waterbody and Wetland Crossing
Sandusky	ATWS-1260	158.8	159.0	Left	888	25	0.5	AG	Topsoil Segregation
Sandusky	ATWS-4501	159.0	159.0	Left	15	75	0	AG,ID	Road Crossing
Sandusky	ATWS-901	159.0	159.0	Left	124	75	0.2	AG	Road Crossing
Sandusky	ATWS-900	159.0	159.0	Left	156	75	0.3	AG,ID	Road Crossing
Sandusky	ATWS-1941	159.0	159.3	Left	1,378	25	0.8	AG	Topsoil Segregation
Sandusky	ATWS-1943	159.4	159.4	Left	97	50	0.1	AG	Existing Pipeline Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Sandusky	ATWS-349	159.4	159.4	Left	262	125	0.8	AG	Bend Installation and Rail Crossing
Sandusky	ATWS-902	159.4	159.5	Left	390	125	1.1	FW	Rail Crossing
Sandusky	ATWS-3587	159.5	159.6	Left	261	25	0.2	FW,OL	Bend Installation
Sandusky	ATWS-904	159.7	159.7	Left	150	75	0.3	FW	Road Crossing
Sandusky	ATWS-903	159.7	159.8	Left	680	75	1.2	AG,ID,FW	Road and Wetland Crossing
Sandusky	ATWS-350	160.2	160.3	Left	395	125	1.1	OL	Road Crossing
Sandusky	ATWS-351	160.2	160.3	Left	403	75	0.7	AG,ID	Road Crossing
Sandusky	ATWS-1262	160.3	160.6	Left	1,597	25	0.9	AG	Road Crossing
Sandusky	ATWS-3672	160.6	160.7	Left	278	75	0.5	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-3671	160.8	160.9	Left	168	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-1939	160.9	161.0	Left	1,013	25	0.6	AG	Topsoil Segregation
Sandusky	ATWS-352	161.0	161.1	Left	250	75	0.4	AG,ID	Road Crossing
Sandusky	ATWS-353	161.1	161.1	Left	201	75	0.3	AG,ID	Road Crossing
Sandusky	ATWS-1263	161.1	161.2	Left	584	25	0.3	AG	Topsoil Segregation
Sandusky	ATWS-530	161.2	161.3	Left	122	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-531	161.3	161.3	Left	124	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Sandusky	ATWS-1938	161.3	161.8	Left	2,455	25	1.4	AG	Topsoil Segregation
Sandusky	ATWS-906	161.8	161.8	Left	293	50	0.3	AG	Bend Installation and Topsoil Segregation
Sandusky	ATWS-2174	161.8	161.8	Left	273	25	0.2	AG	Topsoil Segregation
Sandusky	ATWS-3670	161.9	161.9	Right	167	50	0.2	AG,OL	Road and Waterbody Crossing
Sandusky	ATWS-907	161.9	161.9	Left	162	75	0.3	AG,OL	Road and Waterbody Crossing
Sandusky	ATWS-908	161.9	161.9	Left	176	75	0.3	AG,ID	Road Crossing
Sandusky	ATWS-3609	161.9	161.9	Right	169	50	0.2	AG,ID,OL	Road Crossing
Sandusky	ATWS-1937	161.9	162.3	Left	1,781	25	1	AG,OL	Topsoil Segregation
Sandusky	ATWS-4352	162.0	162.3	Left	1,908	100	4.3	AG,OL	HDD Pull Back String
Sandusky	ATWS-3579	162.3	162.4	Right	473	75	0.8	AG,ID,OL	HDD Exit Location
Sandusky	ATWS-915	162.3	162.4	Left	620	165	0.9	AG,OL	HDD Exit Location
Sandusky	ATWS-4527	162.4	162.4	Right	102	25	0.1	AG	Access To Hydrostatic Test Water
Sandusky	ATWS-4132	162.6	162.7	Right	504	100	1.2	AG,ID	HDD Entry Location
Sandusky	ATWS-4133	162.6	162.7	Left	537	50	0.6	AG,ID	HDD Entry Location
Sandusky	ATWS-4134	162.7	162.9	Right	823	60	1.1	AG	Wetland Crossing Drag Section
Sandusky	ATWS-1934	162.7	162.9	Left	727	25	0.4	AG	Topsoil Segregation
Sandusky	ATWS-4135	162.8	162.8	Right	100	55	0.1	AG	Access To Wetland Crossing Drag Section
Sandusky	ATWS-354	163.0	163.0	Right	163	125	0.5	OL	Road, Wetland and Existing Pipeline Crossing
Sandusky	ATWS-4136	163.1	163.1	Right	200	100	0.5	AG	Road and Wetland Crossing
Sandusky	ATWS-1265	163.1	163.2	Right	317	25	0.2	AG	Topsoil Segregation
Sandusky	ATWS-3471	163.2	163.2	Right	190	50	0.2	AG	Existing Pipeline Crossing
Sandusky	ATWS-918	163.2	163.3	Right	219	50	0.3	AG	Existing Pipeline Crossing
Sandusky	ATWS-1267	163.5	163.6	Right	449	75	0.8	AG	Wetland Crossing and Topsoil Segregation
Sandusky	ATWS-920	163.6	163.7	Right	515	180	1	AG,OL,RE	Bend Installation and Road and Wetland Crossing
Wood	ATWS-921	163.7	163.8	Left	440	75	0.8	AG,ID,OL	Road, Waterbody and Wetland Crossing
Wood	ATWS-4137	163.7	163.8	Right	314	70	0.3	OL	Waterbody and Existing Pipeline Crossing
Wood	ATWS-923	163.8	163.9	Right	148	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Wood	ATWS-3581	163.8	163.8	Left	108	50	0.1	AG,OL	Waterbody Crossing
Wood	ATWS-1271	163.9	164.0	Right	688	25	0.4	AG	Topsoil Segregation
Wood	ATWS-2244	164.0	164.1	Right	583	25	0.3	AG	Topsoil Segregation
Wood	ATWS-2245	164.1	164.2	Right	665	25	0.4	AG,FW	Topsoil Segregation
Wood	ATWS-2246	164.2	164.3	Right	375	25	0.2	AG	Topsoil Segregation
Wood	ATWS-2220	164.3	164.4	Right	329	50	0.4	AG	Bend Installation and Topsoil Segregation
Wood	ATWS-4138	164.3	164.4	Left	200	25	0.1	AG	Bend Installation
Wood	ATWS-2224	164.4	164.4	Right	175	25	0.1	AG	Topsoil Segregation
Wood	ATWS-924	164.4	164.5	Right	193	75	0.3	AG,ID,OL	Road Crossing
Wood	ATWS-3583	164.4	164.5	Left	231	50	0.3	AG,ID,OL	Road Crossing
Wood	ATWS-2223	164.5	164.5	Right	171	70	0.3	FW,OL	Road Crossing
Wood	ATWS-3582	164.5	164.5	Left	135	50	0.2	ID,OL	Road Crossing
Wood	ATWS-3193	164.6	164.6	Left	319	25	0.2	FW,OL	Bend Installation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Wood	ATWS-1273	164.7	164.7	Left	155	50	0.2	AG,FW	Waterbody and Wetland Crossing
Wood	ATWS-356	164.8	164.9	Left	477	75	0.8	ID,FW	Road and Wetland Crossing
Wood	ATWS-357	165.0	165.0	Left	220	75	0.4	AG,ID,OL	Road Crossing
Wood	ATWS-1933	165.0	165.4	Left	2,116	25	1.2	AG,OL	Topsoil Segregation
Wood	ATWS-926	165.4	165.5	Left	290	50	0.3	AG	Bend Installation and Topsoil Segregation
Wood	ATWS-1932	165.5	165.5	Left	121	75	0.2	AG	Wetland and Existing Pipeline Crossing
Wood	ATWS-3604	165.5	165.5	Right	133	50	0.2	AG	Wetland and Existing Pipeline Crossing and Topsoil Segregation
Wood	ATWS-933	165.5	165.5	Left	104	75	0.2	AG	Wetland and Existing Pipeline Crossing
Wood	ATWS-3584	165.5	165.5	Right	95	50	0.1	AG	Wetland and Existing Pipeline Crossing and Topsoil Segregation
Wood	ATWS-4140	165.5	165.5	Left	111	25	0.1	AG	Topsoil Segregation
Wood	ATWS-927	165.5	165.6	Right	313	25	0.2	AG	Bend Installation
Wood	ATWS-4139	165.5	165.6	Left	200	50	0.2	AG	Bend Installation and Topsoil Segregation
Wood	ATWS-4141	165.6	165.6	Left	123	25	0.1	AG	Topsoil Segregation
Wood	ATWS-2897	165.6	165.6	Right	114	50	0.1	AG,OL	Topsoil Segregation and Waterbody Crossing
Wood	ATWS-928	165.6	165.6	Left	117	75	0.2	AG	Waterbody Crossing
Wood	ATWS-2898	165.6	165.6	Right	94	75	0.2	AG,OL	Topsoil Segregation and Waterbody Crossing
Wood	ATWS-929	165.6	165.6	Left	115	75	0.2	AG,OL	Waterbody Crossing
Wood	ATWS-1270	165.6	165.7	Left	352	25	0.2	AG	Bend Installation and Wetland Crossing and Topsoil Segregation
Wood	ATWS-930	165.8	165.9	Left	566	75	1	AG	Wetland Crossing and Topsoil Segregation
Wood	ATWS-1272	165.9	166.0	Left	670	25	0.4	AG,OL	Topsoil Segregation
Wood	ATWS-931	166.0	166.1	Left	181	75	0.3	OL	Road Crossing
Wood	ATWS-932	166.1	166.1	Left	186	75	0.3	ID,FW	Road Crossing
Wood	ATWS-934	166.3	166.5	Left	865	75	1.5	AG,OL	Waterbody and Wetland Crossing and Topsoil Segregation
Wood	ATWS-1275	166.5	166.5	Left	202	75	0.3	AG,FW	Waterbody and Wetland Crossing
Wood	ATWS-2903	166.7	166.8	Left	250	75	0.3	AG,FW,OL	Rail and Wetland Crossing
Wood	ATWS-4142	166.8	166.9	Left	395	125	1.1	AG	Rail, Waterbody and Wetland Crossing and Topsoil Segregation
Wood	ATWS-2902	166.9	167.1	Left	921	25	0.5	AG	Topsoil Segregation
Wood	ATWS-939	167.1	167.1	Left	290	50	0.3	AG	Bend Installation and Topsoil Segregation
Wood	ATWS-1929	167.1	167.1	Left	114	25	0.1	AG	Topsoil Segregation
Wood	ATWS-358	167.1	167.2	Right	175	50	0.2	AG,ID	Road Crossing
Wood	ATWS-3585	167.1	167.2	Left	172	75	0.3	AG	Road Crossing
Wood	ATWS-3586	167.2	167.2	Left	189	75	0.3	AG,ID	Road Crossing
Wood	ATWS-359	167.2	167.2	Right	187	50	0.2	AG,ID	Road Crossing
Wood	ATWS-940	167.2	167.3	Right	360	25	0.2	AG,OL	Bend Installation
Wood	ATWS-4143	167.2	167.2	Left	195	50	0.2	AG	Bend Installation and Topsoil Segregation
Wood	ATWS-1928	167.2	167.3	Left	245	25	0.1	AG	Topsoil Segregation
Wood	ATWS-941	167.3	167.3	Right	88	50	0.1	AG,OL	Waterbody Crossing
Wood	ATWS-4368	167.3	167.3	Left	319	75	0.5	AG,FW,OL	Waterbody Crossing and Topsoil Segregation
Wood	ATWS-942	167.3	167.5	Right	588	50	0.7	AG,FW,OL	Waterbody Crossing
Wood	ATWS-3588	167.4	167.4	Left	163	75	0.3	AG,FW,OL	Bend Installation and Waterbody Crossing
Wood	ATWS-3589	167.4	167.5	Left	483	50	0.6	AG,OL	Bend Installation and Topsoil Segregation
Wood	ATWS-1927	167.5	167.6	Left	819	25	0.5	AG	Topsoil Segregation
Wood	ATWS-3592	167.6	167.7	Left	295	50	0.3	AG	Bend Installation and Topsoil Segregation
Wood	ATWS-3591	167.7	167.8	Left	286	25	0.2	AG	Topsoil Segregation
Wood	ATWS-2904	167.7	167.7	Right	88	50	0.1	AG	Existing Pipeline Crossing
Wood	ATWS-943	167.7	167.8	Right	326	75	0.3	AG,ID	Bend Installation and Road and Waterbody Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a] Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Wood	ATWS-4144	167.8	167.8	Left	192	50	0.2	AG	Bend Installation and Topsoil Segregation
Wood	ATWS-360	167.8	167.8	Left	252	75	0.4	AG,ID	Road and Waterbody Crossing
Wood	ATWS-944	167.8	167.9	Left	287	75	0.5	AG	Road and Waterbody Crossing
Wood	ATWS-1926	167.9	168.2	Left	1,552	25	0.9	AG	Topsoil Segregation
Wood	ATWS-532	168.2	168.2	Left	128	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Wood	ATWS-361	168.3	168.4	Left	532	75	0.9	AG,ID,OL	Bend Installation and Road and Waterbody Crossing
Wood	ATWS-2899	168.4	168.4	Left	369	75	0.6	AG	Bend Installation and Road and Waterbody Crossing
Wood	ATWS-4145	168.4	168.5	Left	416	25	0.2	AG	Topsoil Segregation
Wood	ATWS-1276	168.4	168.5	Right	555	75	1	AG	Bend Installation and Topsoil Segregation
Wood	ATWS-1278	168.5	169.4	Right	4,413	25	2.5	AG	Topsoil Segregation
Wood	ATWS-363	169.4	169.4	Right	172	75	0.3	AG,RE	Road Crossing
Wood	ATWS-364	169.4	169.4	Right	190	75	0.3	AG,ID	Road Crossing
Wood	ATWS-1924	169.4	169.9	Right	2,288	25	1.3	AG	Topsoil Segregation
Wood	ATWS-4146	169.9	170.0	Right	800	75	1.4	AG	Wetland Crossing and Topsoil Segregation
Wood	ATWS-1280	170.2	170.4	Right	1,336	25	0.8	AG,FW	Topsoil Segregation
Wood	ATWS-366	170.4	170.4	Right	170	75	0.3	AG	Road and Waterbody Crossing
Wood	ATWS-367	170.4	170.5	Right	216	75	0.4	AG	Road and Waterbody Crossing
Wood	ATWS-2538	170.5	170.6	Right	337	50	0.4	AG	Existing Pipeline Crossing
Wood	ATWS-2539	170.6	170.6	Right	127	50	0.1	AG	Existing Pipeline Crossing
Wood	ATWS-1921	170.6	170.7	Right	533	25	0.3	AG	Topsoil Segregation
Wood	ATWS-1923	170.7	170.8	Right	200	25	0.1	AG,RE	Topsoil Segregation
Wood	ATWS-368	170.8	170.8	Right	191	75	0.3	AG,OL	Road and Waterbody Crossing
Wood	ATWS-369	170.8	170.9	Right	297	75	0.4	AG,ID	Road and Waterbody Crossing
Wood	ATWS-1920	170.9	171.1	Right	1,191	25	0.7	AG	Topsoil Segregation
Wood	ATWS-533	171.1	171.1	Right	129	75	0.2	AG,OL	Waterbody Crossing and Topsoil Segregation
Wood	ATWS-534	171.1	171.2	Right	230	75	0.4	AG,OL	Waterbody Crossing and Topsoil Segregation
Wood	ATWS-1919	171.2	172.5	Right	7,209	25	4.1	AG,OL	Topsoil Segregation
Wood	ATWS-370	172.5	172.6	Right	258	75	0.4	AG,ID	Road and Wetland Crossing
Wood	ATWS-371	172.6	172.6	Right	185	75	0.3	AG	Road and Wetland Crossing
Wood	ATWS-1918	172.6	173.0	Right	1,795	25	1	AG,OL	Topsoil Segregation
Wood	ATWS-2177	173.0	173.3	Right	1,555	25	0.9	AG,FW,OL	Topsoil Segregation
Wood	ATWS-946	173.4	173.5	Right	163	50	0.2	FW	Road Crossing
Wood	ATWS-947	173.5	173.5	Right	179	75	0.3	ID,OL,RE	Road Crossing
Wood	ATWS-4147	173.6	173.8	Right	630	75	1.1	FW,OL	Wetland Crossing
Wood	ATWS-372	173.9	173.9	Right	208	125	0.6	OL	Rail and Wetland Crossing
Wood	ATWS-373	174.0	174.0	Right	300	125	0.9	AG	Rail and Waterbody Crossing
Wood	ATWS-1917	174.0	174.2	Right	978	25	0.6	AG	Topsoil Segregation
Wood	ATWS-3595	174.2	174.2	Right	99	50	0.1	AG	Existing Pipeline Crossing
Wood	ATWS-4148	174.2	174.3	Left	280	25	0.2	AG	Bend Installation and Existing Pipeline Crossing
Wood	ATWS-3594	174.2	174.3	Right	510	50	0.6	AG	Bend Installation
Wood	ATWS-3593	174.3	174.4	Right	644	25	0.4	AG	Topsoil Segregation
Wood	ATWS-374	174.4	174.5	Right	165	75	0.3	AG,ID	Road and Waterbody Crossing
Wood	ATWS-375	174.5	174.5	Right	132	75	0.2	AG	Road and Waterbody Crossing
Wood	ATWS-1916	174.5	175.0	Right	2,649	25	1.5	AG	Topsoil Segregation
Wood	ATWS-376	175.0	175.1	Right	409	125	1.2	AG,OL	Road Crossing
Wood	ATWS-4370	175.2	175.4	Left	1,361	25	0.8	AG	Bend Installation and Waterbody Crossing
Wood	ATWS-3003	175.2	175.3	Right	626	125	1.8	AG	Bend Installation and Road Crossing
Wood	ATWS-3596	175.3	175.4	Right	293	50	0.3	AG	Bend Installation and Topsoil Segregation
Wood	ATWS-1915	175.4	175.6	Left	626	25	0.4	AG	Bend Installation and Waterbody Crossing
Wood	ATWS-1913	175.5	175.6	Right	406	50	0.5	AG,ID	Bend Installation and Road and Waterbody Crossing
Wood	ATWS-378	175.6	175.6	Left	170	75	0.3	AG,ID	Bend Installation and Road and Waterbody Crossing
Wood	ATWS-379	175.6	175.6	Left	180	75	0.3	AG	Bend Installation and Road and Waterbody Crossing
Wood	ATWS-3598	175.6	175.6	Right	179	50	0.2	AG	Bend Installation and Road and Waterbody Crossing
Wood	ATWS-4361	175.6	176.0	Left	2,013	25	1.2	AG	Topsoil Segregation
Wood	ATWS-1912	176.0	176.1	Right	293	25	0.2	AG	Bend Installation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions[a] Length (ft.)	Width (ft.)	ATWS Acres Affected[b]	Existing Land Use[c]	Justification
Mainline (cont.'d)									
Wood	ATWS-4149	176.0	176.0	Left	200	50	0.2	AG	Bend Installation and Topsoil Segregation
Wood	ATWS-4374	176.0	176.2	Left	666	25	0.4	AG,OL	Topsoil Segregation
Wood	ATWS-1914	176.2	176.3	Left	783	25	0.4	AG	Topsoil Segregation
Wood	ATWS-948	176.3	176.4	Left	296	50	0.3	AG	Bend Installation and Topsoil Segregation
Wood	ATWS-1911	176.4	176.5	Left	730	25	0.4	AG	Topsoil Segregation
Wood	ATWS-380	176.5	176.6	Left	312	125	0.9	AG,ID,OL	Road Crossing
Wood	ATWS-381	176.6	176.7	Left	291	125	0.8	AG,ID	Road Crossing
Wood	ATWS-4369	176.7	176.9	Left	1,057	25	0.6	AG,RE	Topsoil Segregation
Wood	ATWS-1909	176.9	177.0	Left	830	25	0.5	AG,RE	Topsoil Segregation
Wood	ATWS-950	177.0	177.1	Left	321	50	0.4	AG	Bend Installation and Topsoil Segregation
Wood	ATWS-1283	177.1	177.1	Left	283	25	0.2	AG	Topsoil Segregation
Wood	ATWS-951	177.1	177.2	Right	320	50	0.4	AG	Bend Installation and Topsoil Segregation
Wood	ATWS-1284	177.2	177.3	Right	668	25	0.4	AG	Topsoil Segregation
Wood	ATWS-382	177.3	177.3	Right	174	75	0.3	AG,ID	Road and Waterbody Crossing
Wood	ATWS-383	177.3	177.4	Right	155	75	0.3	AG	Road and Waterbody Crossing
Wood	ATWS-1908	177.4	178.0	Right	3,607	25	2.1	AG	Topsoil Segregation
Wood	ATWS-384	178.0	178.1	Right	179	75	0.3	AG	Road and Waterbody Crossing
Wood	ATWS-385	178.1	178.1	Right	167	75	0.3	AG	Road and Waterbody Crossing
Wood	ATWS-1907	178.1	178.2	Right	648	25	0.4	AG	Topsoil Segregation
Wood	ATWS-4362	178.2	178.5	Right	1,385	25	0.8	AG	Topsoil Segregation
Wood	ATWS-1906	178.5	178.5	Right	166	75	0.3	AG	Spoil Storage for Private Gun Range Protective Earth Berms and Topsoil Segregation
Wood	ATWS-1905	178.6	178.6	Right	159	75	0.3	AG,OL	Spoil Storage for Private Gun Range Protective Earth Berms and Topsoil Segregation
Wood	ATWS-1904	178.6	178.9	Right	1,544	25	0.9	AG	Topsoil Segregation
Wood	ATWS-3601	178.9	179.0	Right	285	50	0.3	AG	Bend Installation and Topsoil Segregation
Wood	ATWS-4283	178.9	178.9	Left	200	25	0.1	AG	Bend Installation
Wood	ATWS-3600	179.0	179.0	Right	522	25	0.3	AG	Topsoil Segregation
Wood	ATWS-2605	179.0	179.1	Left	313	75	0.5	AG,OL	Rail Crossing
Wood	ATWS-2604	179.0	179.1	Right	303	125	0.9	AG,OL	Rail Crossing
Wood	ATWS-2606	179.1	179.2	Right	298	125	0.9	AG	Rail Crossing
Wood	ATWS-2607	179.1	179.2	Left	292	75	0.5	AG	Rail Crossing
Wood	ATWS-1903	179.2	179.4	Right	1,446	25	0.8	AG	Topsoil Segregation
Wood	ATWS-3602	179.4	179.5	Left	287	50	0.3	AG,OL	Bend Installation and Topsoil Segregation
Wood	ATWS-4510	179.4	179.5	Right	204	75	0.4	AG,OL	HDD Pullback String
Wood	ATWS-4418	179.5	179.8	Right	1,409	50	1.6	AG,OL	HDD Exit Location
Wood	ATWS-4150	179.8	179.8	Right	352	125	1	AG	HDD Exit Location
Wood	ATWS-957	180.1	180.2	Left	615	175	2.2	AG	HDD Entry Location
Wood	ATWS-2900	180.1	180.2	Right	605	265	1.8	AG,FW	HDD Entry Location
Wood	ATWS-3603	180.2	180.3	Left	236	25	0.1	AG	Bend Installation
Wood	ATWS-960	180.2	180.3	Right	207	50	0.2	AG	Bend Installation and Topsoil Segregation
Wood	ATWS-1901	180.3	180.6	Right	1,698	25	1	AG	Topsoil Segregation
Wood	ATWS-4284	180.6	180.7	Right	225	50	0.3	AG,FW	Wetland Crossing and Topsoil Segregation
Wood	ATWS-962	180.7	180.8	Right	125	50	0.1	FW	Waterbody Crossing
Wood	ATWS-4151	180.8	180.8	Left	100	50	0.1	FW	Waterbody Crossing
Wood	ATWS-1287	180.8	180.9	Right	602	25	0.3	AG,ID	Topsoil Segregation
Wood	ATWS-963	180.9	181.0	Right	221	75	0.4	AG,OL	Road, Waterbody and Existing Pipeline Crossing
Wood	ATWS-3002	180.9	181.0	Left	143	50	0.2	AG,OL	Road, Waterbody and Existing Pipeline Crossing
Wood	ATWS-3007	181.0	181.0	Left	257	50	0.3	AG,ID,OL	Road, Waterbody and Existing Pipeline Crossing
Wood	ATWS-964	181.0	181.0	Right	179	75	0.3	AG,ID,OL	Road, Waterbody and Existing Pipeline Crossing
Wood	ATWS-1900	181.0	181.1	Right	461	25	0.3	AG	Topsoil Segregation
Wood	ATWS-2063	181.1	181.2	Left	602	100	1.4	AG,ID	HDD Entry Location
Wood	ATWS-4152	181.1	181.2	Right	439	125	1.3	AG,ID	HDD Entry Location
Wood	ATWS-4435	181.3	181.4	Right	414	25	0.2	AG,FW,OW	Access To Hydrostatic Test Water
Lucas	ATWS-3674	181.9	182.1	Left	1,208	50	1.4	AG,OL	HDD Exit Location
Lucas	ATWS-2077	181.9	182.0	Right	595	100	1.4	AG	HDD Exit Location
Lucas	ATWS-2643	182.0	182.1	Right	607	75	1	AG,OL	HDD Pull Back String and Rail Trail Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a] Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Lucas	ATWS-2656	182.1	182.5	Left	1,892	25	1.1	AG	HDD Pull Back String
Lucas	ATWS-2642	182.1	182.7	Right	2,966	25	1.7	AG	Topsoil Segregation
Lucas	ATWS-1062	182.5	182.8	Right	1,582	100	3.6	AG	HDD Pull Back String
Lucas	ATWS-3676	182.7	182.7	Left	91	50	0.1	AG,OL	Waterbody Crossing
Lucas	ATWS-2640	182.7	182.7	Right	137	75	0.2	AG,OL	Waterbody Crossing and Topsoil Segregation
Lucas	ATWS-3677	182.7	182.8	Left	126	50	0.1	AG,OL	Waterbody Crossing
Lucas	ATWS-2639	182.7	182.8	Right	95	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Lucas	ATWS-2638	182.8	183.1	Right	1,861	25	1.1	AG	Topsoil Segregation
Lucas	ATWS-398	183.1	183.1	Left	177	50	0.2	AG	Road Crossing
Lucas	ATWS-2637	183.1	183.1	Right	164	75	0.3	AG	Road Crossing
Lucas	ATWS-673	183.1	183.2	Right	187	75	0.3	AG,ID	Road Crossing
Lucas	ATWS-3008	183.1	183.2	Left	175	50	0.2	AG,ID	Road Crossing
Lucas	ATWS-1898	183.2	183.2	Right	217	25	0.1	AG	Topsoil Segregation
Lucas	ATWS-4285	183.2	183.3	Right	325	125	0.9	AG	Road and Waterbody Crossing
Lucas	ATWS-3678	183.2	183.3	Left	184	75	0.3	AG	Waterbody Crossing
Lucas	ATWS-675	183.3	183.3	Right	146	75	0.3	AG	Bend Installation and Waterbody and Wetland Crossing
Lucas	ATWS-676	183.3	183.3	Left	241	75	0.4	AG	Bend Installation and Waterbody and Wetland Crossing
Lucas	ATWS-3680	183.4	183.4	Right	175	125	0.3	AG,ID,OL	Road and Waterbody Crossing
Lucas	ATWS-3679	183.4	183.4	Left	340	50	0.4	AG	Road and Waterbody Crossing
Lucas	ATWS-3681	183.6	183.6	Left	123	50	0.1	AG	Waterbody Crossing
Lucas	ATWS-2202	183.6	183.6	Right	90	75	0.2	AG	Waterbody Crossing
Lucas	ATWS-1286	183.6	183.7	Right	489	25	0.3	AG	Topsoil Segregation
Lucas	ATWS-4153	183.7	183.7	Left	106	50	0.1	AG	Waterbody Crossing
Lucas	ATWS-2203	183.7	183.7	Right	132	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Lucas	ATWS-4154	183.7	183.7	Left	130	50	0.1	AG	Waterbody Crossing
Lucas	ATWS-2204	183.7	183.7	Right	93	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Lucas	ATWS-1897	183.7	184.1	Right	1,863	25	1.1	AG	Topsoil Segregation
Lucas	ATWS-4155	184.1	184.1	Left	138	50	0.2	AG	Waterbody Crossing
Lucas	ATWS-1063	184.1	184.1	Right	94	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Lucas	ATWS-2201	184.1	184.1	Right	135	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Lucas	ATWS-4156	184.1	184.2	Left	468	50	0.5	AG	Bend Installation and Waterbody Crossing
Lucas	ATWS-2200	184.1	184.2	Right	243	25	0.1	AG	Topsoil Segregation
Lucas	ATWS-400	184.2	184.3	Left	196	75	0.3	AG,ID	Road Crossing
Lucas	ATWS-401	184.3	184.3	Left	194	75	0.3	AG,ID	Road Crossing
Lucas	ATWS-1895	184.3	184.7	Left	2,310	25	1.3	AG	Topsoil Segregation
Lucas	ATWS-535	184.7	184.8	Left	177	75	0.3	AG,ID	Road Crossing
Lucas	ATWS-536	184.8	184.8	Left	182	75	0.3	AG,ID,OL	Road Crossing
Lucas	ATWS-1288	184.8	185.1	Left	1,590	25	0.9	AG	Topsoil Segregation
Lucas	ATWS-1064	185.1	185.2	Right	271	50	0.3	AG	Bend Installation and Topsoil Segregation
Lucas	ATWS-966	185.1	185.2	Left	529	50	0.6	AG	Bend Installation and Topsoil Segregation
Lucas	ATWS-1187	185.2	185.2	Right	256	25	0.1	AG	Topsoil Segregation
Lucas	ATWS-2029	185.2	185.3	Right	344	75	0.6	AG	Road and Waterbody Crossing
Lucas	ATWS-2205	185.2	185.3	Left	351	75	0.6	AG,ID	Road and Waterbody Crossing
Lucas	ATWS-2030	185.3	185.3	Right	243	75	0.4	AG,ID	Road and Waterbody Crossing
Lucas	ATWS-3683	185.3	185.3	Left	195	75	0.3	AG,ID,OL	Road and Waterbody Crossing
Lucas	ATWS-1192	185.3	185.8	Right	2,571	25	1.5	AG	Topsoil Segregation
Lucas	ATWS-4157	185.8	185.9	Left	403	25	0.2	AG	Bend Installation
Lucas	ATWS-4158	185.8	185.9	Right	301	50	0.3	AG	Bend Installation and Topsoil Segregation
Lucas	ATWS-4372	185.9	186.3	Right	2,045	25	1.2	AG	Topsoil Segregation
Lucas	ATWS-3009	186.3	186.3	Left	128	50	0.1	AG,ID	Road Crossing
Lucas	ATWS-404	186.3	186.3	Right	121	75	0.2	AG,ID	Road Crossing
Lucas	ATWS-3010	186.3	186.3	Left	123	50	0.1	AG,ID,OL	Road Crossing
Lucas	ATWS-405	186.3	186.3	Right	125	75	0.2	AG,ID,OL	Road Crossing
Lucas	ATWS-2101	186.3	186.6	Right	1,490	25	0.9	AG	Topsoil Segregation
Lucas	ATWS-967	186.4	186.4	Left	321	25	0.2	AG	Bend Installation
Lucas	ATWS-4408	186.5	186.5	Left	200	50	0.2	AG	Waterbody Crossing
Lucas	ATWS-4159	186.6	186.6	Left	250	50	0.3	AG	Waterbody Crossing
Lucas	ATWS-1066	186.6	186.6	Right	150	75	0.3	AG	Waterbody Crossing and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a] Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Lucas	ATWS-1195	186.7	187.3	Right	3,271	25	1.9	AG	Waterbody Crossing and Topsoil Segregation
Lucas	ATWS-4286	187.0	187.1	Left	200	25	0.1	AG	Bend Installation
Lucas	ATWS-1068	187.3	187.3	Right	147	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Lucas	ATWS-3004	187.3	187.3	Left	168	50	0.2	AG	Road and Waterbody Crossing
Lucas	ATWS-1018	187.3	187.4	Right	208	75	0.4	AG,ID	Waterbody Crossing and Topsoil Segregation
Lucas	ATWS-3005	187.3	187.4	Left	198	50	0.2	AG,ID,OL	Road and Waterbody Crossing
Lucas	ATWS-2102	187.4	187.4	Right	314	25	0.2	AG	Topsoil Segregation
Lucas	ATWS-4163	187.4	187.5	Left	186	50	0.2	AG	Waterbody Crossing
Lucas	ATWS-4162	187.4	187.4	Right	119	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Lucas	ATWS-4161	187.5	187.5	Right	159	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Lucas	ATWS-4160	187.5	187.5	Left	103	50	0.1	AG	Waterbody Crossing
Lucas	ATWS-2103	187.5	187.6	Right	753	25	0.4	AG	Waterbody Crossing and Topsoil Segregation
Lucas	ATWS-968	187.5	187.5	Left	302	25	0.2	AG	Bend Installation
Lucas	ATWS-4287	187.7	187.7	Left	200	75	0.3	AG	Waterbody Crossing
Lucas	ATWS-4288	187.7	187.7	Right	200	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Lucas	ATWS-2104	187.7	187.8	Right	492	25	0.3	AG	Topsoil Segregation
Lucas	ATWS-969	187.8	187.8	Right	202	75	0.3	AG,ID,OL	Road Crossing
Lucas	ATWS-4261	187.9	187.9	Right	245	75	0.4	AG	Road Crossing
Lucas	ATWS-1189	187.9	188.1	Right	636	25	0.4	AG	Topsoil Segregation
Lucas	ATWS-1070	188.1	188.1	Right	178	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Lucas	ATWS-4165	188.1	188.1	Left	188	50	0.2	AG	Waterbody Crossing
Lucas	ATWS-2657	188.1	188.2	Right	177	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Lucas	ATWS-4164	188.1	188.2	Left	114	50	0.1	AG	Waterbody Crossing
Lucas	ATWS-1191	188.2	188.4	Right	1,091	25	0.6	AG,ID,OL	Topsoil Segregation
Lucas	ATWS-971	188.3	188.4	Left	189	75	0.3	AG,ID,OL	Road Crossing
Lucas	ATWS-972	188.4	188.4	Left	184	75	0.3	AG,ID,OL	Road Crossing
Lucas	ATWS-2651	188.4	188.8	Right	2,430	25	1.4	AG,ID,OL,RE	Waterbody Crossing and Topsoil Segregation
Lucas	ATWS-973	188.6	188.7	Left	302	25	0.2	AG	Bend Installation
Lucas	ATWS-3006	188.8	188.9	Left	193	50	0.2	AG	Road Crossing
Lucas	ATWS-974	188.8	188.9	Right	160	75	0.3	AG	Road Crossing
Lucas	ATWS-975	188.9	188.9	Right	242	75	0.4	AG,ID	Road Crossing
Lucas	ATWS-4166	188.9	189.0	Left	727	75	1.3	AG,ID,FW	Bend Installation and Road and Wetland Crossing and Topsoil Segregation
Lucas	ATWS-976	188.9	188.9	Right	326	50	0.4	AG	Bend Installation and Wetland Crossing and Topsoil Segregation
Lucas	ATWS-2907	189.1	189.1	Right	105	50	0.1	AG,OL	Wetland Crossing and Topsoil Segregation
Lucas	ATWS-1190	189.2	189.3	Right	323	25	0.2	AG	Topsoil Segregation
Lucas	ATWS-3011	189.2	189.3	Left	394	75	0.7	AG,ID	Wetland and Road Crossing
Lucas	ATWS-977	189.3	189.3	Right	153	75	0.3	AG,ID,RE	Road Crossing
Henry	ATWS-4167	189.3	189.3	Left	78	50	0.1	ID,RE	Road Crossing
Henry	ATWS-4169	189.3	189.4	Right	169	25	0.1	AG,OL,RE	Bend Installation and Road and Wetland Crossing
Henry	ATWS-4168	189.4	189.4	Left	283	25	0.2	AG	Bend Installation and Wetland Crossing and Topsoil Segregation
Henry	ATWS-4478	189.4	189.4	Right	240	75	0.4	AG	Road and Wetland Crossing
Henry	ATWS-1188	189.4	189.5	Right	150	75	0.3	AG	Waterbody and Wetland Crossing and Topsoil Segregation
Henry	ATWS-4289	189.4	189.5	Left	109	50	0.1	AG	Waterbody Crossing
Henry	ATWS-4290	189.5	189.5	Left	123	50	0.1	AG	Waterbody and Wetland Crossing
Henry	ATWS-2106	189.5	189.5	Right	301	25	0.2	AG,FW	Topsoil Segregation
Henry	ATWS-979	189.5	189.5	Left	168	25	0.1	AG,FW	Bend Installation
Henry	ATWS-4171	189.6	189.7	Right	107	50	0.1	FW	Waterbody Crossing
Henry	ATWS-4173	189.7	189.7	Right	100	50	0.1	FW	Waterbody Crossing
Henry	ATWS-4172	189.7	189.7	Left	100	50	0.1	FW	Waterbody Crossing
Henry	ATWS-2032	189.8	190.0	Left	831	50	1	AG,FW,OL	Wetland and Existing Pipeline Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Henry	ATWS-2034	189.8	190.0	Right	643	75	1.1	AG,OL	Wetland and Existing Pipeline Crossing.
Henry	ATWS-4174	190.0	190.0	Left	97	50	0.1	FW,OL	Wetland and Existing Pipeline Crossing
Henry	ATWS-2648	190.1	190.2	Right	474	50	0.5	AG	Waterbody and Wetland Crossing
Henry	ATWS-4175	190.1	190.2	Left	120	50	0.1	AG	Waterbody and Wetland Crossing
Henry	ATWS-2650	190.2	190.2	Right	173	95	0.2	AG,ID,OL	Road, Wetland and Waterbody Crossing
Henry	ATWS-2649	190.2	190.2	Left	247	75	0.4	AG,OL	Road, Wetland and Waterbody Crossing
Fulton	ATWS-981	190.2	190.3	Right	431	75	0.7	AG,ID	Road, Wetland and Waterbody Crossing
Fulton	ATWS-3013	190.2	190.3	Left	216	75	0.4	AG,ID	Road, Wetland and Waterbody Crossing
Fulton	ATWS-2108	190.3	190.5	Right	955	25	0.5	AG	Topsoil Segregation
Fulton	ATWS-983	190.5	190.5	Right	205	75	0.4	AG,ID	Road Crossing
Fulton	ATWS-984	190.5	190.5	Right	216	75	0.4	AG,ID	Road Crossing
Fulton	ATWS-2109	190.5	190.7	Right	640	25	0.4	AG	Topsoil Segregation
Fulton	ATWS-985	190.7	190.7	Right	257	50	0.3	AG	Bend Installation and Topsoil Segregation
Fulton	ATWS-4176	190.7	190.7	Left	314	25	0.2	AG	Bend Installation
Fulton	ATWS-1201	190.7	190.9	Right	662	25	0.4	AG	Topsoil Segregation
Fulton	ATWS-4263	190.9	190.9	Left	130	50	0.1	AG	Waterbody Crossing
Fulton	ATWS-1073	190.9	190.9	Right	137	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-4439	190.9	190.9	Right	158	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-1072	190.9	191.0	Right	147	50	0.2	AG,OL	Waterbody Crossing
Fulton	ATWS-4437	190.9	191.0	Right	622	25	0.4	AG	Topsoil Segregation
Fulton	ATWS-1197	191.0	191.0	Left	441	25	0.3	AG	Bend Installation
Fulton	ATWS-2579	191.0	191.1	Left	117	50	0.1	AG,OL	Waterbody Crossing
Fulton	ATWS-1074	191.0	91.1	Right	143	75	0.2	AG,OL	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-2578	191.1	191.1	Left	109	50	0.1	AG,OL	Waterbody Crossing
Fulton	ATWS-4438	191.1	191.1	Right	130	75	0.2	AG,OL	Waterbody Crossing
Fulton	ATWS-1199	191.1	191.5	Right	1,731	25	1	AG	Topsoil Segregation
Fulton	ATWS-986	191.2	191.3	Left	303	25	0.2	AG	Bend Installation
Fulton	ATWS-987	191.5	191.5	Right	134	75	0.2	AG,ID,OL	Road Crossing
Fulton	ATWS-4177	191.5	191.5	Left	276	50	0.3	AG,ID,OL	Road Crossing
Fulton	ATWS-988	191.5	191.5	Right	33	100	0.1	AG,ID	Road Crossing
Fulton	ATWS-4509	191.5	191.5	Right	50	75	0.1	AG	Road Crossing
Fulton	ATWS-4264	191.5	191.5	Left	114	50	0.1	AG,ID	Road and Wetland Crossing
Fulton	ATWS-4265	191.5	191.6	Right	659	25	0.4	AG	Topsoil Segregation
Fulton	ATWS-1200	191.7	192.0	Right	1,727	25	1	AG,OL	Topsoil Segregation
Fulton	ATWS-2112	192.0	192.0	Right	157	25	0.1	AG	Topsoil Segregation
Fulton	ATWS-2113	192.0	192.2	Right	1,151	25	0.7	AG	Topsoil Segregation
Fulton	ATWS-4291	192.0	192.1	Left	200	25	0.1	AG	Bend Installation
Fulton	ATWS-1019	192.2	192.3	Right	119	75	0.2	AG,OL	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-4179	192.3	192.3	Left	100	50	0.1	AG,OL	Waterbody Crossing
Fulton	ATWS-1022	192.3	192.3	Right	118	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-3017	192.3	192.3	Left	129	50	0.1	AG,ID,OL	Road and Waterbody Crossing
Fulton	ATWS-1198	192.3	192.3	Right	108	25	0.1	AG	Topsoil Segregation
Fulton	ATWS-3018	192.3	192.4	Left	250	50	0.3	AG,ID,OL	Road Crossing
Fulton	ATWS-991	192.3	192.4	Right	130	75	0.2	AG,ID,OL	Road Crossing
Fulton	ATWS-992	192.3	192.4	Right	144	75	0.2	AG,ID,OL	Road Crossing
Fulton	ATWS-2206	192.4	192.5	Right	698	25	0.4	AG	Topsoil Segregation
Fulton	ATWS-4292	192.5	192.6	Left	363	50	0.4	AG	Bend Installation and Topsoil Segregation
Fulton	ATWS-1205	192.6	192.7	Left	992	25	0.6	AG	Topsoil Segregation
Fulton	ATWS-1021	192.7	192.8	Left	123	75	0.2	AG,ID,OL	Road Crossing
Fulton	ATWS-3012	192.7	192.8	Right	129	50	0.1	AG,ID,OL	Road Crossing
Fulton	ATWS-1020	192.8	192.8	Left	100	75	0.2	AG,ID	Road Crossing
Fulton	ATWS-3014	192.8	192.8	Right	87	50	0.1	AG,ID	Road Crossing
Fulton	ATWS-2114	192.8	193.1	Left	1,794	25	1	AG,OL	Topsoil Segregation
Fulton	ATWS-1024	193.1	193.2	Left	163	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-1023	193.2	193.3	Left	298	75	0.5	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-1075	193.6	193.7	Left	269	25	0.2	FW	Bend Installation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a] Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Fulton	ATWS-2646	193.8	193.8	Left	289	75	0.5	ID,OL,RE	Road and Wetland Crossing and Bend/ Fitting
Fulton	ATWS-1025	193.8	193.8	Right	90	75	0.2	ID,OL,RE	Road Crossing
Fulton	ATWS-4293	193.8	193.8	Left	150	50	0.1	AG,ID	Road and Waterbody Crossing
Fulton	ATWS-1076	193.8	193.9	Right	346	75	0.6	AG,ID	Road and Waterbody Crossing
Fulton	ATWS-4294	193.9	193.9	Left	150	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-1215	193.9	194.8	Right	4,822	25	2.8	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-4180	194.1	194.1	Left	300	25	0.2	AG	Bend Installation
Fulton	ATWS-4181	194.3	194.4	Left	200	25	0.1	AG	Bend Installation
Fulton	ATWS-1078	194.8	194.8	Left	151	75	0.3	AG	Road Crossing
Fulton	ATWS-2659	194.8	194.9	Left	149	75	0.3	AG,ID	Road Crossing
Fulton	ATWS-4419	194.8	194.9	Right	142	75	0.2	AG,ID	Road Crossing
Fulton	ATWS-2100	194.9	194.9	Right	573	25	0.3	AG	Road Crossing
Fulton	ATWS-1027	194.9	194.9	Left	210	25	0.1	AG	Bend Installation
Fulton	ATWS-2660	194.9	195.0	Left	95	75	0.2	AG	Waterbody Crossing
Fulton	ATWS-1028	194.9	195.0	Right	129	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-4182	195.0	195.0	Left	174	50	0.2	AG	Waterbody Crossing
Fulton	ATWS-1029	195.0	195.0	Right	128	75	0.2	AG,FW	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-1209	195.0	195.1	Right	503	25	0.3	AG	Topsoil Segregation
Fulton	ATWS-4183	195.1	195.2	Right	267	25	0.2	AG	Topsoil Segregation
Fulton	ATWS-1079	195.2	195.2	Right	133	75	0.2	AG	Waterbody Crossing
Fulton	ATWS-1080	195.2	195.3	Right	152	75	0.3	AG,OL	Waterbody Crossing
Fulton	ATWS-1081	195.3	195.3	Left	265	25	0.2	AG	Waterbody Crossing
Fulton	ATWS-1213	195.3	195.5	Right	1,428	25	0.8	AG,FW	Topsoil Segregation
Fulton	ATWS-4295	195.4	195.4	Left	200	25	0.1	AG	Bend Installation
Fulton	ATWS-4296	195.5	195.5	Left	200	25	0.1	AG	Bend Installation
Fulton	ATWS-1031	195.5	195.6	Right	195	75	0.3	AG,ID	Bend Installation and Road Crossing
Fulton	ATWS-3015	195.6	195.6	Left	159	50	0.2	AG,ID	Road Crossing
Fulton	ATWS-1030	195.6	195.7	Right	267	75	0.5	AG,ID	Road Crossing
Fulton	ATWS-3016	195.6	195.7	Left	265	50	0.3	AG,ID	Road Crossing
Fulton	ATWS-2116	195.7	195.8	Right	940	25	0.5	AG	Topsoil Segregation
Fulton	ATWS-4297	195.8	195.9	Left	160	50	0.2	AG	Waterbody Crossing
Fulton	ATWS-1033	195.8	195.9	Right	132	75	0.2	AG,OL	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-1032	195.9	195.9	Right	139	75	0.2	AG,OL	Bend Installation and Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-4184	195.9	195.9	Left	333	50	0.4	AG	Bend Installation and Waterbody Crossing
Fulton	ATWS-994	195.9	196.0	Right	139	50	0.2	AG	Bend Installation and Topsoil Segregation
Fulton	ATWS-1212	196.0	196.2	Right	1,416	25	0.8	AG	Topsoil Segregation
Fulton	ATWS-995	196.2	196.2	Left	189	25	0.1	AG	Bend Installation
Fulton	ATWS-2636	196.2	196.2	Left	150	50	0.2	AG,ID,OL	Road Crossing
Fulton	ATWS-997	196.2	196.2	Right	148	75	0.3	AG,ID,OL	Road Crossing
Fulton	ATWS-996	196.2	196.3	Right	153	75	0.3	AG,ID	Road Crossing
Fulton	ATWS-4185	196.2	196.3	Left	150	50	0.2	AG,ID,RE	Road Crossing
Fulton	ATWS-2117	196.3	196.3	Right	310	25	0.2	AG	Topsoil Segregation
Fulton	ATWS-999	196.3	196.4	Right	150	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-4186	196.3	196.4	Left	148	50	0.2	AG,OL	Waterbody Crossing
Fulton	ATWS-998	196.4	196.4	Right	150	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-4187	196.4	196.4	Left	141	50	0.2	AG	Waterbody Crossing
Fulton	ATWS-1211	196.4	197.2	Right	4,350	25	2.5	AG	Topsoil Segregation
Fulton	ATWS-4188	197.1	197.1	Left	200	25	0.1	AG	Bend Installation
Fulton	ATWS-1000	197.2	197.2	Right	106	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-2119	197.3	197.3	Right	195	75	0.3	AG,ID,RE	Road and Waterbody Crossing
Fulton	ATWS-3019	197.3	197.3	Left	164	50	0.2	AG,ID	Road and Waterbody Crossing
Fulton	ATWS-3020	197.3	197.3	Left	199	50	0.2	AG,ID	Road Crossing
Fulton	ATWS-1210	197.3	197.3	Right	200	75	0.3	AG,ID	Road Crossing
Fulton	ATWS-2652	197.3	197.5	Right	798	25	0.5	AG	Topsoil Segregation
Fulton	ATWS-4189	197.5	197.5	Left	104	50	0.1	AG	Waterbody Crossing
Fulton	ATWS-2653	197.5	197.5	Right	100	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-2118	197.5	197.5	Right	100	75	0.2	AG	Waterbody Crossing and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Fulton	ATWS-4190	197.5	197.5	Left	100	50	0.1	AG	Waterbody Crossing
Fulton	ATWS-2654	197.5	197.8	Right	1,345	25	0.8	AG	Topsoil Segregation
Fulton	ATWS-4298	197.8	197.8	Left	151	25	0.1	AG	Bend Installation
Fulton	ATWS-1007	197.8	197.8	Left	230	100	0.5	AG	Rail and Wetland Crossing
Fulton	ATWS-2037	197.8	197.8	Right	280	125	0.8	AG	Rail and Wetland Crossing
Fulton	ATWS-1005	197.9	197.9	Left	314	100	0.7	AG	Rail and Waterbody Crossing
Fulton	ATWS-2038	197.9	197.9	Right	304	125	0.9	AG	Rail and Waterbody Crossing
Fulton	ATWS-1216	197.9	198.3	Right	1,878	25	1.1	AG	Topsoil Segregation
Fulton	ATWS-4300	198.1	198.1	Left	200	25	0.1	AG	Bend Installation
Fulton	ATWS-4192	198.3	198.3	Left	152	50	0.2	AG,ID	Road Crossing
Fulton	ATWS-1009	198.3	198.3	Right	150	75	0.3	AG,ID	Road Crossing
Fulton	ATWS-4191	198.3	198.3	Left	151	50	0.2	AG,ID,OL	Road Crossing
Fulton	ATWS-1008	198.3	198.3	Right	150	75	0.3	AG,OL	Road Crossing
Fulton	ATWS-2120	198.3	198.6	Right	1,286	25	0.7	AG	Topsoil Segregation
Fulton	ATWS-1010	198.6	198.6	Right	153	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-4194	198.6	198.6	Left	150	75	0.3	AG	Waterbody Crossing
Fulton	ATWS-1011	198.6	198.7	Right	172	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-4195	198.7	198.7	Left	195	50	0.2	AG	Waterbody Crossing
Fulton	ATWS-2655	198.7	199.0	Right	1,663	25	1	AG	Topsoil Segregation
Fulton	ATWS-1034	199.0	199.0	Right	341	75	0.6	AG,OL	Road Crossing
Fulton	ATWS-1082	199.0	199.0	Left	257	125	0.7	AG,OL	Road Crossing
Fulton	ATWS-1035	199.1	199.2	Right	394	85	0.8	AG	Road and Waterbody Crossing
Fulton	ATWS-1083	199.1	199.2	Left	395	115	1.1	AG	Road and Waterbody Crossing
Fulton	ATWS-2122	199.2	199.3	Right	484	25	0.3	AG	Topsoil Segregation
Fulton	ATWS-3022	199.3	199.3	Left	200	50	0.2	AG,ID,OL	Road Crossing
Fulton	ATWS-1013	199.3	199.3	Right	200	75	0.3	AG,ID,OL,RE	Road Crossing
Fulton	ATWS-3021	199.3	199.3	Left	202	50	0.2	AG,ID,OL	Road Crossing
Fulton	ATWS-1012	199.3	199.3	Right	201	75	0.3	AG,OL	Road Crossing
Fulton	ATWS-1014	199.3	199.4	Right	311	50	0.4	AG	Bend Installation and Topsoil Segregation
Fulton	ATWS-4303	199.4	199.4	Left	200	25	0.1	AG	Bend Installation
Fulton	ATWS-2124	199.4	200.0	Right	2,959	25	1.7	AG	Topsoil Segregation
Fulton	ATWS-1016	200.0	200.0	Right	135	75	0.2	AG,ID,OL	Road Crossing
Fulton	ATWS-3024	200.0	200.0	Left	245	50	0.3	AG,ID,OL	Road Crossing
Fulton	ATWS-1015	200.0	200.1	Right	267	75	0.5	AG,ID,OL	Road Crossing
Fulton	ATWS-3023	200.0	200.1	Left	164	50	0.2	AG,ID,OL	Road Crossing
Fulton	ATWS-1217	200.1	200.7	Right	3,669	25	2.1	AG	Topsoil Segregation
Fulton	ATWS-1017	200.7	200.7	Left	361	25	0.2	AG	Bend Installation
Fulton	ATWS-539	200.7	200.8	Right	146	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-444	200.8	200.9	Right	419	75	0.7	AG,ID,RE	Road and Waterbody Crossing
Fulton	ATWS-445	200.9	200.9	Right	197	75	0.3	ID,RE	Road Crossing
Fulton	ATWS-2186	200.9	200.9	Right	97	25	0.1	RE	Topsoil Segregation
Fulton	ATWS-2185	201.0	201.4	Right	2,136	25	1.2	AG	Topsoil Segregation
Fulton	ATWS-1214	201.4	201.6	Right	1,067	25	0.6	AG	Topsoil Segregation
Fulton	ATWS-1036	201.5	201.6	Left	578	25	0.3	AG	Bend Installation
Fulton	ATWS-1038	201.6	201.6	Left	222	75	0.4	AG,ID	Road Crossing
Fulton	ATWS-1037	201.6	201.7	Left	200	75	0.3	AG,ID	Road Crossing
Fulton	ATWS-1218	201.7	201.8	Left	840	25	0.5	AG	Topsoil Segregation
Fulton	ATWS-1084	201.7	201.9	Right	610	50	0.7	AG	Topsoil Segregation and Bend/ Fitting
Fulton	ATWS-1222	201.9	202.1	Right	1,313	25	0.8	AG	Topsoil Segregation
Fulton	ATWS-1040	202.1	202.1	Right	150	75	0.3	AG	Waterbody and Wetland Crossing
Fulton	ATWS-1039	202.2	202.2	Right	150	75	0.3	AG	Waterbody and Existing Pipeline Crossing
Fulton	ATWS-2126	202.2	202.6	Right	2,399	25	1.4	AG	Topsoil Segregation
Fulton	ATWS-516	202.6	202.7	Right	200	75	0.3	AG	Road and Waterbody Crossing
Fulton	ATWS-1041	202.7	202.7	Right	235	75	0.4	AG,OL	Road and Waterbody Crossing
Fulton	ATWS-1224	202.7	203.2	Right	2,464	25	1.4	AG	Topsoil Segregation
Fulton	ATWS-4496	203.2	203.4	Right	926	25	0.5	AG	Topsoil Segregation
Fulton	ATWS-1043	203.4	203.4	Right	150	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-1042	203.4	203.5	Right	158	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-1221	203.5	203.7	Right	1,251	25	0.7	AG	Topsoil Segregation
Fulton	ATWS-446	203.7	203.8	Right	257	75	0.4	AG,ID	Road and Waterbody Crossing
Fulton	ATWS-447	203.8	203.8	Right	281	75	0.5	AG	Road and Waterbody Crossing
Fulton	ATWS-1045	203.9	203.9	Right	384	75	0.7	AG	Waterbody Crossing and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Fulton	ATWS-1044	203.9	204.0	Right	167	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-1223	204.0	204.4	Right	2,213	25	1.3	AG	Topsoil Segregation
Fulton	ATWS-4304	204.4	204.4	Left	199	25	0.1	AG	Bend Installation
Fulton	ATWS-1046	204.4	204.4	Right	157	75	0.3	AG,ID	Road Crossing
Fulton	ATWS-4305	204.4	204.5	Left	258	50	0.3	AG,ID	Road Crossing
Fulton	ATWS-1047	204.4	204.5	Right	378	75	0.7	AG,ID	Road Crossing
Fulton	ATWS-4306	204.5	204.5	Left	224	50	0.3	AG,ID	Road Crossing
Fulton	ATWS-2127	204.5	204.9	Right	2,000	25	1.1	AG	Topsoil Segregation
Fulton	ATWS-4307	204.9	204.9	Left	193	50	0.2	AG,ID	Bend Installation and Road Crossing
Fulton	ATWS-448	204.9	204.9	Right	324	75	0.6	AG,ID	Bend Installation and Road Crossing
Fulton	ATWS-4308	204.9	205.0	Left	200	50	0.2	AG,ID,OL	Road Crossing
Fulton	ATWS-1086	204.9	205.0	Right	201	75	0.3	AG,ID,OL	Road Crossing
Fulton	ATWS-1225	205.0	205.2	Right	970	25	0.6	AG	Topsoil Segregation
Fulton	ATWS-4309	205.2	205.2	Left	162	50	0.2	AG	Bend Installation and Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-1049	205.2	205.2	Right	161	75	0.3	AG	Bend Installation and Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-1048	205.2	205.2	Right	100	75	0.2	AG	Waterbody Crossing
Fulton	ATWS-4302	205.2	205.2	Left	114	50	0.1	AG	Waterbody Crossing
Fulton	ATWS-2128	205.2	205.4	Right	900	25	0.5	AG	Bend Installation
Fulton	ATWS-2093	205.2	205.6	Left	1,817	25	1	AG	Topsoil Segregation
Fulton	ATWS-1050	205.6	205.6	Left	150	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-2209	205.6	205.6	Left	150	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-1226	205.6	205.9	Left	1,546	25	0.9	AG	Topsoil Segregation
Fulton	ATWS-2039	205.9	206.0	Left	200	75	0.3	AG,OL	Road and Waterbody Crossing
Fulton	ATWS-1087	206.0	206.0	Left	101	75	0.2	AG	Road and Waterbody Crossing
Fulton	ATWS-4502	206.0	206.0	Left	49	75	0.1	AG,ID,OL	Road Crossing
Fulton	ATWS-1227	206.0	206.2	Left	929	25	0.5	AG	Topsoil Segregation
Fulton	ATWS-1088	206.2	206.2	Left	150	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-1089	206.2	206.3	Left	150	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-2094	206.3	206.9	Left	3,587	25	2.1	AG	Topsoil Segregation
Fulton	ATWS-1052	206.9	207.0	Left	200	75	0.3	AG,ID,OL	Road and Waterbody Crossing
Fulton	ATWS-1051	207.0	207.0	Left	223	75	0.4	AG	Road and Waterbody Crossing
Fulton	ATWS-2129	207.0	207.2	Left	804	25	0.5	AG	Topsoil Segregation
Fulton	ATWS-2909	207.2	207.2	Left	139	75	0.2	AG	Existing Pipeline Crossing and Topsoil Segregation
Fulton	ATWS-2040	207.3	207.3	Left	200	75	0.3	AG	Existing Pipeline Crossing and Topsoil Segregation
Fulton	ATWS-4311	207.3	207.3	Left	191	25	0.1	AG	Topsoil Segregation
Fulton	ATWS-4310	207.3	207.4	Left	150	75	0.3	AG	Wetland Crossing and Topsoil Segregation
Fulton	ATWS-1229	207.4	207.8	Left	2,322	25	1.3	AG	Topsoil Segregation
Fulton	ATWS-1054	207.8	207.8	Left	200	75	0.3	AG,ID	Road Crossing
Fulton	ATWS-1053	207.8	207.9	Left	171	75	0.3	ID,OL	Road and Waterbody Crossing
Fulton	ATWS-1055	207.9	207.9	Left	151	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Fulton	ATWS-4312	207.9	208.3	Left	2,189	25	1.3	AG	Topsoil Segregation
					Mainline - Ohio Subtotal		**1,073.9**		
MICHIGAN									
Mainline									
Lenawee	ATWS-1232	208.3	208.7	Right	2,035	25	1.2	AG	Topsoil Segregation
Lenawee	ATWS-1057	208.7	208.7	Right	128	75	0.2	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-4313	208.7	208.7	Left	132	50	0.2	AG,OL	Waterbody Crossing
Lenawee	ATWS-1056	208.7	208.8	Right	135	75	0.2	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-4314	208.7	208.8	Left	134	50	0.2	AG,OL	Waterbody Crossing
Lenawee	ATWS-1230	208.8	208.9	Right	917	25	0.5	AG	Topsoil Segregation
Lenawee	ATWS-3026	208.9	209.0	Left	239	50	0.3	AG,OL	Road and Waterbody Crossing
Lenawee	ATWS-1671	208.9	209.0	Right	235	75	0.4	AG	Waterbody Crossing and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Lenawee	ATWS-1670	209.0	209.0	Right	172	75	0.3	AG,ID,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-3025	209.0	209.0	Left	173	50	0.2	AG,ID,OL	Road and Waterbody Crossing
Lenawee	ATWS-1672	209.0	209.9	Right	4,689	25	2.7	AG	Topsoil Segregation
Lenawee	ATWS-4315	209.6	209.7	Left	304	25	0.2	AG	Bend Installation
Lenawee	ATWS-678	209.9	210.0	Left	406	75	0.7	AG,OL	Rail, Road and Waterbody Crossing
Lenawee	ATWS-452	209.9	210.0	Right	472	75	0.8	AG,ID,OL,OW	Rail, Road and Waterbody Crossing
Lenawee	ATWS-453	210.0	210.1	Right	240	75	0.4	AG,OL	Bend Installation and Rail, Road and Waterbody Crossing
Lenawee	ATWS-2662	210.0	210.1	Left	417	100	1	AG,ID	Bend Installation and Rail, Road and Waterbody Crossing
Lenawee	ATWS-1673	210.1	211.0	Right	4,802	25	2.8	AG	Topsoil Segregation
Lenawee	ATWS-4316	210.4	210.4	Left	305	25	0.2	AG	Bend Installation
Lenawee	ATWS-3028	211.0	211.0	Left	150	50	0.2	AG,OL	Road and Waterbody Crossing
Lenawee	ATWS-454	211.0	211.0	Right	157	75	0.3	AG,OL	Road and Waterbody Crossing
Lenawee	ATWS-3027	211.0	211.0	Left	153	50	0.2	AG,ID	Road and Waterbody Crossing
Lenawee	ATWS-455	211.0	211.0	Right	151	75	0.3	AG,ID	Road and Waterbody Crossing
Lenawee	ATWS-1239	211.0	212.0	Right	5,098	25	2.9	AG	Topsoil Segregation
Lenawee	ATWS-3030	212.0	212.0	Left	167	50	0.2	AG	Road and Waterbody Crossing
Lenawee	ATWS-456	212.0	212.0	Right	167	75	0.3	AG	Road and Waterbody Crossing
Lenawee	ATWS-457	212.0	212.1	Right	150	75	0.3	AG,ID	Road and Waterbody Crossing
Lenawee	ATWS-3029	212.0	212.1	Left	149	50	0.2	AG,ID	Road and Waterbody Crossing
Lenawee	ATWS-1235	212.1	213.0	Right	4,675	25	2.7	AG	Topsoil Segregation
Lenawee	ATWS-4317	212.7	212.8	Left	75	25	0	AG	Existing Pipeline Crossing
Lenawee	ATWS-2041	212.8	212.8	Left	75	25	0	AG	Existing Pipeline Crossing
Lenawee	ATWS-458	213.0	213.0	Right	200	75	0.3	AG,OL	Road and Waterbody Crossing
Lenawee	ATWS-3032	213.0	213.0	Left	197	50	0.2	AG,OL	Road and Waterbody Crossing
Lenawee	ATWS-459	213.0	213.0	Right	200	75	0.3	AG,ID	Road and Waterbody Crossing
Lenawee	ATWS-3031	213.0	213.0	Left	192	50	0.2	AG,ID	Road and Waterbody Crossing
Lenawee	ATWS-2088	213.0	213.5	Right	2,312	25	1.3	AG	Topsoil Segregation
Lenawee	ATWS-679	213.5	213.5	Right	140	75	0.2	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-4318	213.5	213.5	Left	136	50	0.2	AG,OL	Waterbody Crossing
Lenawee	ATWS-4319	213.5	213.5	Left	138	50	0.2	AG,OL	Waterbody Crossing
Lenawee	ATWS-680	213.5	213.5	Right	138	75	0.2	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-1236	213.5	214.0	Right	2,390	25	1.4	AG	Topsoil Segregation
Lenawee	ATWS-3034	214.0	214.0	Left	150	50	0.2	AG,OL	Road and Waterbody Crossing
Lenawee	ATWS-460	214.0	214.0	Right	149	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-3033	214.0	214.1	Left	150	50	0.2	AG	Road and Waterbody Crossing
Lenawee	ATWS-461	214.0	214.1	Right	150	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-1237	214.1	215.0	Right	4,845	25	2.8	AG	Topsoil Segregation
Lenawee	ATWS-4321	214.6	214.7	Left	510	25	0.3	AG	Bend Installation
Lenawee	ATWS-463	215.0	215.1	Left	462	75	0.8	AG	HDD Entry Location
Lenawee	ATWS-462	215.0	215.1	Right	516	125	1.5	AG	HDD Entry Location
Lenawee	ATWS-2760	215.3	215.4	Left	400	75	0.7	AG	HDD Exit Location
Lenawee	ATWS-2761	215.3	215.4	Right	400	125	1.1	AG,OL	HDD Exit Location
Lenawee	ATWS-2762	215.4	215.7	Right	1,472	25	0.8	AG	Topsoil Segregation
Lenawee	ATWS-4384	215.7	215.7	Right	544	25	0.3	AG,FW,OW	Access To Hydrostatic Test Water
Lenawee	ATWS-4409	215.7	215.7	Right	150	50	0.2	AG	Access To Hydrostatic Test Water
Lenawee	ATWS-4497	215.7	215.7	Right	430	25	0.2	AG	Topsoil Segregation
Lenawee	ATWS-1674	215.7	215.8	Right	201	75	0.3	AG	Road and Waterbody Crossing
Lenawee	ATWS-2097	215.7	215.8	Left	207	50	0.2	AG	Road and Waterbody Crossing
Lenawee	ATWS-1059	215.8	215.8	Right	158	75	0.3	AG	Road and Waterbody Crossing
Lenawee	ATWS-2757	215.8	215.8	Left	151	50	0.2	AG	Road and Waterbody Crossing
Lenawee	ATWS-1678	215.8	216.3	Right	2,336	25	1.3	AG	Topsoil Segregation
Lenawee	ATWS-4327	215.8	215.9	Left	317	25	0.2	AG	Bend Installation
Lenawee	ATWS-4322	216.3	216.3	Left	137	50	0.2	AG	Waterbody Crossing
Lenawee	ATWS-2616	216.3	216.3	Right	105	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-2617	216.3	216.3	Right	130	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-4323	216.3	216.3	Left	100	50	0.1	AG	Waterbody Crossing
Lenawee	ATWS-1679	216.3	216.7	Right	1,948	25	1.1	AG	Topsoil Segregation
Lenawee	ATWS-4328	216.4	216.4	Left	200	25	0.1	AG	Bend Installation
Lenawee	ATWS-464	216.7	216.7	Right	199	75	0.3	AG,ID	Road Crossing
Lenawee	ATWS-2763	216.7	216.7	Left	195	75	0.3	AG,ID	Road Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Lenawee	ATWS-2042	216.7	216.8	Left	204	75	0.4	AG,ID,OL	Road and Waterbody Crossing
Lenawee	ATWS-465	216.7	216.8	Right	221	75	0.4	AG,ID,OL	Road and Waterbody Crossing
Lenawee	ATWS-4325	216.8	216.8	Left	340	50	0.4	AG,OL	Bend Installation and Waterbody Crossing
Lenawee	ATWS-4329	216.8	216.8	Right	106	50	0.1	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-4324	216.8	216.9	Right	226	25	0.1	AG	Bend Installation
Lenawee	ATWS-1686	216.8	217.0	Left	1,028	25	0.6	AG	Topsoil Segregation
Lenawee	ATWS-1687	217.0	217.1	Right	342	125	1	AG	Rail, Road and Waterbody Crossing
Lenawee	ATWS-1681	217.0	217.1	Left	309	100	0.7	AG	Rail, Road and Waterbody Crossing
Lenawee	ATWS-1683	217.1	217.1	Right	184	75	0.3	AG	Rail, Road and Waterbody Crossing
Lenawee	ATWS-1682	217.1	217.2	Left	238	75	0.4	AG	Rail, Road and Waterbody Crossing
Lenawee	ATWS-4330	217.1	217.2	Right	350	125	1	AG	Road, Rail and Waterbody Crossing and Bore Pull Back String
Lenawee	ATWS-1238	217.2	217.4	Right	1,231	25	0.7	AG	Topsoil Segregation
Lenawee	ATWS-4326	217.4	217.4	Left	75	25	0	AG	Existing Pipeline Crossing
Lenawee	ATWS-541	217.4	217.5	Right	130	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-4331	217.4	217.5	Left	215	75	0.4	AG	Waterbody Crossing
Lenawee	ATWS-542	217.5	217.5	Right	197	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-1234	217.5	218.1	Right	2,802	25	1.6	AG	Topsoil Segregation
Lenawee	ATWS-1688	218.1	218.1	Right	174	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-4332	218.1	218.1	Left	200	75	0.3	AG,OL	Waterbody Crossing
Lenawee	ATWS-1689	218.1	218.1	Right	150	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-1233	218.1	218.3	Right	948	25	0.5	AG	Topsoil Segregation
Lenawee	ATWS-466	218.3	218.4	Right	203	75	0.3	AG,ID	Road Crossing
Lenawee	ATWS-4336	218.3	218.4	Left	200	50	0.2	AG,ID	Road Crossing
Lenawee	ATWS-4335	218.4	218.4	Left	200	50	0.2	AG,ID,OL	Road Crossing
Lenawee	ATWS-467	218.4	218.4	Right	193	75	0.3	AG,ID,OL	Road Crossing
Lenawee	ATWS-1690	218.4	218.5	Right	401	25	0.2	AG	Topsoil Segregation
Lenawee	ATWS-682	218.5	218.5	Right	139	75	0.2	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-4337	218.5	218.5	Left	150	50	0.2	AG,OL	Waterbody Crossing
Lenawee	ATWS-4338	218.5	218.5	Left	150	50	0.2	AG,OL	Waterbody Crossing
Lenawee	ATWS-681	218.5	218.5	Right	145	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-1231	218.5	218.8	Right	1,135	25	0.7	AG	Topsoil Segregation
Lenawee	ATWS-3988	218.7	218.8	Left	261	75	0.5	AG	Existing Pipeline and Waterbody Crossing
Lenawee	ATWS-683	218.8	218.8	Right	217	75	0.4	AG,OL	Existing Pipeline and Waterbody Crossing
Lenawee	ATWS-684	218.8	218.8	Right	79	75	0.1	AG,OL	Existing Pipeline and Waterbody Crossing
Lenawee	ATWS-3987	218.8	218.8	Left	79	50	0.1	AG,OL	Existing Pipeline and Waterbody Crossing
Lenawee	ATWS-3984	218.8	218.9	Left	375	50	0.4	AG	Bend Installation and Existing Pipeline Crossing
Lenawee	ATWS-2758	218.9	218.9	Right	252	25	0.1	AG	Bend Installation
Lenawee	ATWS-1692	218.9	219.1	Left	1,190	25	0.7	AG	Topsoil Segregation
Lenawee	ATWS-468	219.1	219.2	Left	227	75	0.4	AG,OL	Road Crossing
Lenawee	ATWS-2764	219.2	219.2	Left	225	75	0.4	AG,OL	Road Crossing
Lenawee	ATWS-1705	219.2	219.6	Left	1,917	25	1.1	AG	Topsoil Segregation
Lenawee	ATWS-1694	219.6	219.6	Left	293	75	0.5	AG	Road and Waterbody Crossing
Lenawee	ATWS-1693	219.7	219.7	Left	210	75	0.4	AG	Road and Waterbody Crossing
Lenawee	ATWS-1706	210.7	220.0	Left	1,609	25	0.9	AG	Topsoil Segregation
Lenawee	ATWS-1696	220.0	220.1	Left	260	75	0.4	AG,OL	Road and Waterbody Crossing
Lenawee	ATWS-1695	220.1	220.1	Left	296	75	0.5	AG,ID,OL	Road and Waterbody Crossing
Lenawee	ATWS-1704	220.1	220.2	Left	145	50	0.2	AG	Bend Installation and Topsoil Segregation
Lenawee	ATWS-1707	220.2	220.4	Left	1,164	25	0.7	AG	Topsoil Segregation
Lenawee	ATWS-1698	220.4	220.5	Left	194	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-1699	220.5	220.5	Left	150	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-1708	220.5	220.6	Left	690	25	0.4	AG	Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Lenawee	ATWS-1700	220.6	220.7	Left	251	75	0.4	AG	Road and Waterbody Crossing
Lenawee	ATWS-1701	220.7	220.7	Left	193	75	0.3	AG	Road and Waterbody Crossing
Lenawee	ATWS-1709	220.7	221.3	Left	2,717	25	1.6	AG	Topsoil Segregation
Lenawee	ATWS-1702	221.3	221.3	Left	380	75	0.7	AG,ID	Bend Installation and Road Crossing
Lenawee	ATWS-1703	221.3	221.4	Left	266	75	0.5	AG,ID	Bend Installation and Road Crossing
Lenawee	ATWS-3983	221.4	221.6	Left	1,196	25	0.7	AG,OL	Topsoil Segregation
Lenawee	ATWS-3982	221.6	221.7	Left	300	50	0.3	AG	Bend Installation and Topsoil Segregation
Lenawee	ATWS-1711	221.7	222.0	Left	1,707	25	1	AG	Topsoil Segregation
Lenawee	ATWS-1712	222.0	222.0	Left	240	75	0.4	AG	Road and Waterbody Crossing
Lenawee	ATWS-1713	222.0	222.1	Left	274	75	0.5	AG,ID	Road and Waterbody Crossing
Lenawee	ATWS-1714	222.1	222.4	Left	1,701	25	1	AG	Topsoil Segregation
Lenawee	ATWS-1716	222.4	222.5	Left	152	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-1715	222.5	222.5	Left	150	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-1717	222.5	222.6	Left	322	25	0.2	AG	Topsoil Segregation
Lenawee	ATWS-2910	222.6	222.6	Left	100	50	0.1	AG	Existing Pipeline Crossing
Lenawee	ATWS-1718	222.6	222.6	Left	205	75	0.4	AG	Road and Waterbody Crossing
Lenawee	ATWS-1719	222.6	222.7	Left	258	75	0.4	AG,ID	Road and Waterbody Crossing
Lenawee	ATWS-1720	222.7	223.0	Left	1,516	25	0.9	AG	Topsoil Segregation
Lenawee	ATWS-1721	223.1	223.2	Left	466	25	0.3	AG	Topsoil Segregation
Lenawee	ATWS-1723	223.2	223.2	Left	193	75	0.3	AG,OL	Road and Waterbody Crossing
Lenawee	ATWS-1722	223.2	223.3	Left	260	75	0.4	AG,ID,OL	Road and Waterbody Crossing
Lenawee	ATWS-1724	223.3	223.4	Left	639	25	0.4	AG	Topsoil Segregation
Lenawee	ATWS-1725	223.5	223.8	Left	1,554	25	0.9	AG	Topsoil Segregation
Lenawee	ATWS-3981	223.8	223.8	Left	173	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-3980	223.8	223.9	Left	150	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-1726	223.9	224.3	Left	2,542	25	1.5	AG	Topsoil Segregation
Lenawee	ATWS-1727	224.3	224.4	Left	303	75	0.5	AG,ID,OL	Road and Waterbody Crossing
Lenawee	ATWS-1728	224.4	224.5	Left	420	75	0.7	AG,OL	Road and Waterbody Crossing
Lenawee	ATWS-1729	224.5	224.9	Left	2,270	25	1.3	AG	Topsoil Segregation
Lenawee	ATWS-3978	224.9	225.0	Left	412	75	0.7	AG,ID	Road Crossing
Lenawee	ATWS-4394	224.9	225.0	Right	150	50	0.2	AG,ID	Road Crossing
Lenawee	ATWS-3979	225.0	225.0	Right	502	50	0.6	AG,ID,OL	Bend Installation and Road and Waterbody Crossing
Lenawee	ATWS-4395	225.0	225.0	Left	209	75	0.3	AG,ID,OL	Bend Installation and Road and Waterbody Crossing
Lenawee	ATWS-2624	225.1	225.1	Left	300	75	0.5	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-3977	225.1	225.1	Right	272	50	0.3	AG	Waterbody Crossing
Lenawee	ATWS-2625	225.1	225.5	Left	2,294	25	1.3	AG	Topsoil Segregation
Lenawee	ATWS-4396	225.2	225.2	Right	302	25	0.2	AG	Bend Installation
Lenawee	ATWS-2623	225.5	225.6	Left	163	75	0.3	AG,ID	Road and Waterbody Crossing
Lenawee	ATWS-3975	225.5	225.6	Right	225	50	0.3	AG,ID	Road and Waterbody Crossing
Lenawee	ATWS-2622	225.6	225.6	Left	167	75	0.3	AG	Road and Waterbody Crossing
Lenawee	ATWS-3976	225.6	225.6	Right	119	50	0.1	AG	Road and Waterbody Crossing
Lenawee	ATWS-2621	225.6	225.8	Left	789	25	0.5	AG	Topsoil Segregation
Lenawee	ATWS-2247	225.6	225.7	Right	304	25	0.2	AG	Bend Installation
Lenawee	ATWS-3974	225.8	225.8	Right	253	50	0.3	AG	Waterbody Crossing
Lenawee	ATWS-2620	225.8	225.8	Left	130	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-2619	225.8	225.9	Left	222	75	0.4	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-3973	225.8	225.9	Right	125	50	0.1	AG	Waterbody Crossing
Lenawee	ATWS-2913	225.9	226.4	Left	2,826	25	1.6	AG	Topsoil Segregation
Lenawee	ATWS-3972	226.0	226.1	Right	300	25	0.2	AG	Bend Installation
Lenawee	ATWS-2914	226.4	226.4	Left	191	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-4339	226.4	226.5	Right	158	50	0.2	AG,OL	Waterbody Crossing
Lenawee	ATWS-2915	226.4	226.5	Left	153	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-2916	226.5	226.6	Left	670	25	0.4	AG	Topsoil Segregation
Lenawee	ATWS-1744	226.6	226.6	Right	177	50	0.2	AG,OL	Road and Waterbody Crossing
Lenawee	ATWS-2917	226.6	226.6	Left	259	75	0.4	AG,OL	Road and Waterbody Crossing
Lenawee	ATWS-1745	226.6	226.7	Right	216	50	0.2	AG,ID	Road and Waterbody Crossing
Lenawee	ATWS-2918	226.7	226.7	Left	176	75	0.3	AG	Road and Waterbody Crossing
Lenawee	ATWS-3971	226.7	226.8	Left	250	50	0.3	AG	Bend Installation and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Lenawee	ATWS-1746	226.8	226.8	Left	140	25	0.1	AG	Topsoil Segregation
Lenawee	ATWS-2044	226.8	226.8	Left	224	75	0.4	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-1747	226.8	226.9	Left	200	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-3970	226.9	227.0	Left	389	25	0.2	AG	Topsoil Segregation
Lenawee	ATWS-1748	227.0	227.0	Left	225	75	0.4	AG,ID	Road and Waterbody Crossing
Lenawee	ATWS-3969	227.0	227.0	Left	200	75	0.3	AG	Road and Waterbody Crossing
Lenawee	ATWS-1750	227.0	227.5	Left	2,400	25	1.4	AG	Topsoil Segregation
Lenawee	ATWS-1751	227.5	227.6	Left	350	75	0.6	AG,ID	Road Crossing
Lenawee	ATWS-1752	227.6	227.6	Left	308	75	0.5	AG	Road Crossing
Lenawee	ATWS-1753	227.6	228.1	Left	2,530	25	1.5	AG	Topsoil Segregation
Lenawee	ATWS-3968	228.1	228.1	Left	150	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-1755	228.1	228.2	Left	305	75	0.5	AG,ID,OL	Road and Waterbody Crossing
Lenawee	ATWS-1756	228.2	228.3	Left	376	75	0.6	AG,ID	Road Crossing
Lenawee	ATWS-1757	228.3	228.7	Left	2,460	25	1.4	AG	Topsoil Segregation
Lenawee	ATWS-3967	228.7	228.8	Left	170	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-3966	228.8	228.8	Left	174	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-3965	228.8	229.3	Left	2,677	25	1.5	AG	Topsoil Segregation
Lenawee	ATWS-2808	229.4	229.4	Right	130	25	0.1	AG	Bend Installation
Lenawee	ATWS-1759	229.3	229.4	Left	190	75	0.3	AG	Road and Waterbody Crossing
Lenawee	ATWS-1760	229.4	229.4	Left	198	75	0.3	AG	Road and Waterbody Crossing
Lenawee	ATWS-1761	229.4	229.5	Left	380	50	0.4	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-1762	229.5	229.5	Left	205	75	0.4	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-3963	229.5	229.5	Right	120	75	0.2	AG,FW	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-1763	229.5	229.6	Left	157	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-3962	229.5	229.6	Right	100	25	0.1	AG,ID	Waterbody Crossing
Lenawee	ATWS-1764	229.6	229.8	Left	1,060	25	0.6	AG	Topsoil Segregation
Lenawee	ATWS-1766	229.8	229.8	Left	148	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-1765	229.8	229.9	Left	168	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Lenawee	ATWS-1767	229.9	230.0	Left	786	25	0.5	AG	Topsoil Segregation
Lenawee	ATWS-1768	230.0	230.1	Left	170	75	0.3	AG,ID	Road Crossing
Lenawee	ATWS-1769	230.0	230.1	Left	237	75	0.4	AG,ID	Road Crossing
Lenawee	ATWS-1770	230.1	230.3	Left	1,184	25	0.7	AG	Topsoil Segregation
Lenawee	ATWS-1771	230.3	230.4	Left	298	75	0.5	AG	Bend Installation and Road and Waterbody Crossing
Lenawee	ATWS-2187	230.3	230.4	Right	142	50	0.2	AG,ID	Bend Installation and Road and Waterbody Crossing
Monroe	ATWS-1772	230.4	230.4	Left	171	75	0.3	AG,OL	Bend Installation and Road and Waterbody Crossing
Monroe	ATWS-2070	230.4	230.4	Right	360	50	0.4	AG,ID,OL	Bend Installation and Road and Waterbody Crossing
Monroe	ATWS-1773	230.4	230.5	Left	214	25	0.1	AG	Topsoil Segregation
Monroe	ATWS-1774	230.5	230.6	Left	864	25	0.5	AG	Topsoil Segregation
Monroe	ATWS-3961	230.6	230.7	Right	232	50	0.3	AG,ID	Road Crossing
Monroe	ATWS-1775	230.6	230.7	Left	143	75	0.2	AG,ID	Road Crossing
Monroe	ATWS-1776	230.7	230.7	Left	236	75	0.4	AG,ID,RE	Bend Installation and Road and Waterbody Crossing
Monroe	ATWS-3960	230.7	230.7	Right	109	50	0.1	AG,ID,RE	Bend Installation and Road and Waterbody Crossing
Monroe	ATWS-3959	230.7	230.7	Left	123	75	0.2	AG	Waterbody Crossing
Monroe	ATWS-1778	230.7	231.2	Left	2,439	25	1.4	AG	Topsoil Segregation
Monroe	ATWS-1779	231.2	231.3	Left	328	75	0.6	AG,ID	Bend Installation and Road Crossing
Monroe	ATWS-3958	231.2	231.2	Right	158	25	0.1	AG,ID	Bend Installation and Road Crossing
Monroe	ATWS-3957	231.2	231.3	Right	142	50	0.2	AG,ID,OL	Road Crossing
Monroe	ATWS-1782	231.3	231.3	Left	108	75	0.2	ID,OL	Bend Installation and Road Crossing
Monroe	ATWS-1783	231.3	231.4	Left	517	75	0.9	AG,ID	Road and Waterbody Crossing
Monroe	ATWS-1784	231.4	231.4	Left	150	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Monroe	ATWS-1788	231.4	231.9	Left	2,237	25	1.3	AG,OL	Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

					Approximate Dimensions [a]				
State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Length (ft.)	Width (ft.)	ATWS Acres Affected [b]	Existing Land Use [c]	Justification
Mainline (cont.'d)									
Monroe	ATWS-1786	231.9	231.9	Left	150	75	0.3	AG,FW	Waterbody Crossing and Topsoil Segregation
Monroe	ATWS-1787	231.9	231.9	Left	150	75	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Monroe	ATWS-1789	231.9	232.2	Left	1,187	25	0.7	AG,OL	Topsoil Segregation
Monroe	ATWS-3956	232.2	232.2	Left	284	50	0.3	AG	Bend Installation and Topsoil Segregation
Monroe	ATWS-1791	232.2	232.3	Left	199	75	0.3	AG,ID	Road Crossing
Monroe	ATWS-1790	232.2	232.3	Left	139	75	0.2	AG,ID	Road Crossing
Monroe	ATWS-1792	232.3	232.4	Left	402	25	0.2	AG	Topsoil Segregation
Monroe	ATWS-3955	232.4	232.4	Left	98	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Monroe	ATWS-2806	232.4	232.4	Left	99	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Monroe	ATWS-2098	232.4	232.5	Left	112	75	0.2	AG,ID,RE	Road and Waterbody Crossing
Monroe	ATWS-1793	232.5	232.5	Left	322	75	0.6	AG	Road and Waterbody Crossing
Monroe	ATWS-1798	232.5	232.9	Left	2,054	25	1.2	AG	Topsoil Segregation
Monroe	ATWS-1794	232.9	233.0	Left	312	50	0.4	AG	Bend Installation and Topsoil Segregation
Monroe	ATWS-1796	233.0	233.0	Right	337	75	0.6	AG	Rail and Road Crossing
Monroe	ATWS-1795	233.0	233.0	Left	183	100	0.4	AG	Rail Crossing
Monroe	ATWS-2071	233.0	233.0	Right	120	200	0.4	AG,ID,OL	Equipment Access Around Road and Rail Crossing
Monroe	ATWS-3953	233.1	233.1	Left	162	100	0.4	AG,ID,OL	Rail and Road Crossing
Monroe	ATWS-1797	233.1	233.1	Left	120	100	0.2	AG	Rail and Road Crossing
Monroe	ATWS-3954	233.1	233.2	Left	344	65	0.5	AG	Road and Rail Bore Pull Back String
Monroe	ATWS-1799	233.1	233.2	Left	351	25	0.2	AG	Topsoil Segregation
Monroe	ATWS-3950	233.2	233.2	Right	347	25	0.2	AG,OL	Bend Installation
Monroe	ATWS-3951	233.2	233.2	Left	205	50	0.2	AG	Bend Installation and Topsoil Segregation
Monroe	ATWS-3952	233.2	233.2	Left	157	25	0.1	AG	Topsoil Segregation
Monroe	ATWS-3948	233.2	233.3	Left	133	75	0.2	AG,OL	Waterbody Crossing and Topsoil Segregation
Monroe	ATWS-3949	233.2	233.3	Right	213	50	0.2	OL	Waterbody Crossing
Monroe	ATWS-3947	233.3	233.3	Left	140	75	0.2	AG,OL	Waterbody Crossing and Topsoil Segregation
Monroe	ATWS-3946	233.3	233.3	Right	100	50	0.1	OL	Waterbody Crossing
Monroe	ATWS-1800	233.3	233.6	Left	1,808	25	1	AG	Topsoil Segregation
Monroe	ATWS-3942	233.6	233.7	Left	132	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Monroe	ATWS-3943	233.6	233.7	Right	247	50	0.3	AG	Waterbody Crossing
Monroe	ATWS-3941	233.7	233.7	Left	221	75	0.4	AG,OL	Waterbody Crossing and Topsoil Segregation
Monroe	ATWS-3940	233.7	233.7	Right	119	50	0.1	AG,OL	Waterbody Crossing
Monroe	ATWS-2099	233.7	233.9	Left	1,033	25	0.6	AG	Topsoil Segregation
Monroe	ATWS-1801	233.9	234.0	Left	442	50	0.5	AG	Bend Installation and Topsoil Segregation
Monroe	ATWS-4340	234.0	234.0	Right	199	25	0.1	AG	Bend Installation
Monroe	ATWS-1805	234.0	234.2	Left	1,084	25	0.6	AG	Topsoil Segregation
Monroe	ATWS-3939	234.2	234.3	Left	168	75	0.3	AG,ID	Road Crossing
Monroe	ATWS-1803	234.2	234.3	Right	173	50	0.2	AG,ID	Road Crossing
Monroe	ATWS-1806	234.3	234.3	Left	153	75	0.3	AG,OL	Road and Waterbody Crossing
Monroe	ATWS-1802	234.3	234.3	Right	152	50	0.2	AG,OL	Road and Waterbody Crossing
Monroe	ATWS-3938	234.3	234.4	Left	578	25	0.3	AG	Topsoil Segregation
Monroe	ATWS-3936	234.4	234.4	Left	119	75	0.2	AG	Waterbody Crossing
Monroe	ATWS-1807	234.5	234.5	Left	148	75	0.3	AG	Topsoil Segregation and Waterbody Crossing
Monroe	ATWS-3935	234.5	234.6	Right	310	25	0.2	AG,FW	Bend Installation
Monroe	ATWS-1810	234.5	234.6	Left	312	25	0.2	AG	Topsoil Segregation and Bend Installation
Monroe	ATWS-1809	234.6	234.6	Right	226	50	0.3	AG,ID,OL	Road Crossing
Monroe	ATWS-3934	234.6	234.7	Right	301	50	0.3	AG,ID,OL	Road Crossing
Monroe	ATWS-2188	234.6	234.6	Left	308	75	0.5	AG,ID,OL	Road Crossing
Monroe	ATWS-3933	234.6	234.7	Left	206	75	0.4	AG,ID,OL	Road Crossing
Monroe	ATWS-1812	234.7	234.9	Left	1,294	25	0.7	AG	Topsoil Segregation
Monroe	ATWS-3945	234.9	235.0	Left	410	25	0.2	AG	Topsoil Segregation
Monroe	ATWS-3932	235.0	235.2	Left	739	25	0.4	AG	Topsoil Segregation
Monroe	ATWS-3931	235.1	235.2	Left	413	50	0.5	AG	Bend Installation and Topsoil Segregation
Monroe	ATWS-2189	235.3	235.3	Left	439	25	0.3	AG	Topsoil Segregation
Monroe	ATWS-3930	235.3	235.4	Left	149	50	0.2	AG	Waterbody Crossing and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Monroe	ATWS-3929	235.4	235.4	Left	166	50	0.2	AG,OL	Waterbody Crossing and Topsoil Segregation
Monroe	ATWS-2608	235.4	235.8	Left	2,169	25	1.2	AG	Topsoil Segregation
Monroe	ATWS-3928	235.8	236.0	Left	652	75	1.1	AG	Wetland and Waterbody Crossing and Topsoil Segregation
Monroe	ATWS-4342	236.0	236.1	Left	361	75	0.6	AG	Wetland and Waterbody Crossing and Topsoil Segregation
Monroe	ATWS-4341	236.1	236.2	Left	380	25	0.2	AG	Topsoil Segregation
Monroe	ATWS-2609	236.2	236.2	Left	226	75	0.4	AG	Road Crossing
Monroe	ATWS-2610	236.2	236.2	Right	243	50	0.3	AG,ID	Road Crossing
Monroe	ATWS-4343	236.2	236.2	Left	38	120	0.1	AG	Road Crossing
Monroe	ATWS-2611	236.3	236.3	Right	120	75	0.2	AG	Road and Wetland Crossing
Monroe	ATWS-4373	236.3	236.4	Left	378	75	0.7	AG	Road Crossing
Monroe	ATWS-2612	236.4	236.7	Left	2,152	25	1.2	AG	Topsoil Segregation
Monroe	ATWS-3927	236.8	236.8	Left	157	25	0.1	AG,OL	Topsoil Segregation
Washtenaw	ATWS-3926	236.8	236.9	Left	324	25	0.2	AG	Topsoil Segregation
Washtenaw	ATWS-3924	236.9	237.0	Left	404	50	0.5	AG	Bend Installation and Topsoil Segregation
Washtenaw	ATWS-3925	237.0	237.4	Left	2,301	25	1.3	AG	Topsoil Segregation
Washtenaw	ATWS-3923	237.3	237.4	Right	223	25	0.1	AG	Bend Installation
Washtenaw	ATWS-4375	237.4	237.4	Left	30	60	0	AG,FW,OW	Access To Hydrostatic Test Water
Washtenaw	ATWS-2046	237.4	237.5	Right	349	100	0.8	AG	HDD Entry Location
Washtenaw	ATWS-1658	237.4	237.5	Left	349	75	0.6	AG	HDD Entry Location
Washtenaw	ATWS-2047	237.7	237.7	Left	443	100	1	AG	HDD Exit Location
Washtenaw	ATWS-3922	237.7	238.0	Right	1,484	75	2.6	AG,OL	HDD Exit Location
Washtenaw	ATWS-1657	237.7	238.2	Left	2,498	75	4.3	AG,OL	HDD Pull Back String and Road and Waterbody Crossing
Washtenaw	ATWS-3921	238.2	238.3	Right	249	25	0.1	AG	Road and Waterbody Crossing
Washtenaw	ATWS-1820	238.2	238.3	Left	195	75	0.3	AG,ID	Bend Installation and Road Crossing
Washtenaw	ATWS-1822	238.3	238.4	Left	898	25	0.5	AG	Topsoil Segregation
Washtenaw	ATWS-1821	238.4	238.5	Left	293	125	0.8	AG,OL	Rail Crossing
Washtenaw	ATWS-1823	238.5	238.6	Left	239	125	0.7	AG	Rail Crossing
Washtenaw	ATWS-1824	238.6	238.9	Left	1,852	25	1.1	AG	Topsoil Segregation
Washtenaw	ATWS-3919	238.9	239.0	Left	300	50	0.3	AG	Bend Installation and Topsoil Segregation
Washtenaw	ATWS-3920	239.0	239.1	Left	436	25	0.3	AG	Topsoil Segregation
Washtenaw	ATWS-2215	239.1	239.1	Left	93	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Washtenaw	ATWS-3512	239.1	239.1	Right	124	50	0.1	AG	Waterbody Crossing
Washtenaw	ATWS-2214	239.1	239.1	Left	100	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Washtenaw	ATWS-3918	239.1	239.1	Right	136	50	0.2	AG	Bend Installation and Waterbody Crossing
Washtenaw	ATWS-2213	239.1	239.2	Left	317	25	0.2	AG	Topsoil Segregation
Washtenaw	ATWS-2212	239.2	239.2	Left	105	50	0.1	AG	Road Crossing
Washtenaw	ATWS-3917	239.2	239.2	Right	100	50	0.1	AG	Waterbody Crossing
Washtenaw	ATWS-2210	239.2	239.3	Left	153	75	0.3	AG	Waterbody Crossing
Washtenaw	ATWS-3507	239.2	239.3	Right	168	50	0.2	AG	Bend Installation and Waterbody Crossing
Washtenaw	ATWS-1827	239.2	239.3	Left	151	25	0.1	AG	Topsoil Segregation
Washtenaw	ATWS-3506	239.3	239.3	Right	158	50	0.2	AG	Road and Waterbody Crossing
Washtenaw	ATWS-2753	239.3	239.3	Left	125	75	0.2	AG	Road and Waterbody Crossing
Washtenaw	ATWS-2752	239.3	239.4	Left	163	75	0.3	AG,OL	Road and Waterbody Crossing
Washtenaw	ATWS-3505	239.3	239.4	Right	116	50	0.1	AG	Road and Waterbody Crossing
Washtenaw	ATWS-2751	239.4	239.5	Left	945	25	0.5	AG	Topsoil Segregation
Washtenaw	ATWS-2748	239.5	239.6	Right	258	100	0.6	AG	Bend Installation and Road and Wetland Crossing
Washtenaw	ATWS-3916	239.5	239.6	Left	239	80	0.4	AG	Bore Pull Back String
Washtenaw	ATWS-2750	239.5	239.6	Left	289	100	0.7	AG,OL	Road and Wetland Crossing
Washtenaw	ATWS-1829	239.6	239.7	Right	231	100	0.5	OL	Road and Wetland Crossing
Washtenaw	ATWS-2749	239.6	239.7	Left	247	100	0.6	OL	Bend Installation and Road, Waterbody and Wetland Crossing
Washtenaw	ATWS-1831	239.7	239.8	Left	439	25	0.3	AG,OL	Waterbody Crossing and Topsoil Segregation
Washtenaw	ATWS-1833	239.8	239.8	Left	137	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Washtenaw	ATWS-1832	239.8	239.9	Left	146	75	0.3	AG,FW	Waterbody Crossing and Topsoil Segregation

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Washtenaw	ATWS-3915	239.9	239.9	Left	181	25	0.1	AG	Topsoil Segregation
Washtenaw	ATWS-1835	239.9	240.0	Left	348	75	0.6	AG,FW	Bend Installation and Road Crossing
Washtenaw	ATWS-1836	240.0	240.1	Left	220	220	1.1	AG	Road Crossing
Washtenaw	ATWS-1837	240.1	240.6	Left	2,909	25	1.7	AG,OL	Topsoil Segregation
Washtenaw	ATWS-1838	240.6	240.8	Left	662	25	0.4	AG,OL	Topsoil Segregation
Washtenaw	ATWS-3914	240.8	240.8	Left	143	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Washtenaw	ATWS-3504	240.8	240.9	Left	160	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Washtenaw	ATWS-1840	240.9	241.0	Left	882	25	0.5	AG	Topsoil Segregation
Washtenaw	ATWS-3913	241.0	241.1	Left	243	50	0.3	AG	Bend Installation and Topsoil Segregation
Washtenaw	ATWS-1842	241.1	241.1	Left	190	75	0.3	AG,ID,OL	Road Crossing
Washtenaw	ATWS-1841	241.1	241.2	Left	83	75	0.1	AG,ID	Road Crossing
Washtenaw	ATWS-1843	241.3	241.4	Left	951	25	0.5	AG	Topsoil Segregation
Washtenaw	ATWS-3503	241.4	241.5	Left	148	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Washtenaw	ATWS-3502	241.5	241.5	Left	118	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Washtenaw	ATWS-2665	241.5	241.5	Left	201	25	0.1	AG	Topsoil Segregation
Washtenaw	ATWS-3912	241.5	241.6	Right	150	50	0.2	AG	Existing Pipeline Crossing Topsoil Segregation
Washtenaw	ATWS-3501	241.6	241.6	Right	154	25	0.1	AG	Topsoil Segregation
Washtenaw	ATWS-2667	241.6	241.7	Right	690	25	0.4	AG	Topsoil Segregation
Washtenaw	ATWS-2663	241.7	241.8	Right	187	75	0.3	AG,ID	Road and Existing Pipeline Crossing
Washtenaw	ATWS-1844	241.7	241.8	Left	166	25	0.1	AG,ID	Road and Existing Pipeline Crossing
Washtenaw	ATWS-1845	241.8	241.8	Left	252	75	0.4	AG,ID	Bend Installation and Road Crossing
Washtenaw	ATWS-1846	241.8	241.8	Right	179	75	0.3	AG,ID	Road Crossing
Washtenaw	ATWS-1666	241.8	242.2	Right	2,204	25	1.3	AG	Topsoil Segregation
Washtenaw	ATWS-2669	242.2	242.3	Left	229	75	0.3	AG,ID	Road and Waterbody Crossing
Washtenaw	ATWS-1848	242.2	242.3	Right	331	75	0.6	AG,ID	Road and Waterbody Crossing
Washtenaw	ATWS-2668	242.3	242.3	Left	500	75	0.8	AG,OL	Road and Waterbody Crossing
Washtenaw	ATWS-1850	242.3	242.3	Right	256	75	0.4	AG,OL	Road and Waterbody Crossing
Washtenaw	ATWS-1852	242.4	242.4	Right	340	25	0.2	AG,OL	Waterbody Crossing
Washtenaw	ATWS-2670	242.4	242.4	Left	205	75	0.4	AG,OL	Waterbody Crossing and Topsoil Segregation
Washtenaw	ATWS-1851	242.4	242.5	Right	319	50	0.4	AG	Bend Installation and Topsoil Segregation
Washtenaw	ATWS-3910	242.4	242.5	Left	412	25	0.2	AG	Bend Installation
Washtenaw	ATWS-1668	242.5	242.8	Right	1,462	25	0.8	AG	Topsoil Segregation
Washtenaw	ATWS-2190	242.8	243.3	Right	2,456	25	1.4	AG	Topsoil Segregation
Washtenaw	ATWS-485	243.3	243.3	Right	160	75	0.3	AG,ID,OL	Road Crossing
Washtenaw	ATWS-3500	243.3	243.3	Left	163	50	0.2	AG,ID,OL	Road Crossing
Washtenaw	ATWS-484	243.3	243.3	Right	158	75	0.3	AG,ID	Road Crossing
Washtenaw	ATWS-1853	243.3	243.7	Right	2,191	25	1.3	AG	Topsoil Segregation
Washtenaw	ATWS-2679	243.7	243.8	Left	279	75	0.5	AG	Road and Waterbody Crossing
Washtenaw	ATWS-2678	243.7	243.8	Right	273	75	0.5	AG	Road and Waterbody Crossing
Washtenaw	ATWS-2681	243.8	243.8	Right	263	75	0.5	AG,ID	Road and Waterbody Crossing
Washtenaw	ATWS-2680	243.8	243.8	Left	172	75	0.3	AG,ID	Road and Waterbody Crossing
Washtenaw	ATWS-3472	243.8	243.9	Right	614	25	0.4	AG	Topsoil Segregation
Washtenaw	ATWS-3499	243.9	244.2	Right	1,162	75	2	AG,FW	Waterbody Crossing, Wetland Crossing and Topsoil Segregation
Washtenaw	ATWS-3498	244.1	244.2	Left	200	50	0.2	AG	Waterbody and Wetland Crossing.
Washtenaw	ATWS-2691	244.3	244.4	Right	528	75	0.9	AG,FW	Waterbody Crossing and Topsoil Segregation
Washtenaw	ATWS-3908	244.6	244.7	Right	133	25	0.1	FW	Bend Installation and Waterbody Crossing
Washtenaw	ATWS-3909	244.6	244.7	Left	183	25	0.1	AG,FW	Bend Installation and Waterbody Crossing
Washtenaw	ATWS-2686	244.7	244.9	Right	1,013	25	0.6	AG	Topsoil Segregation
Washtenaw	ATWS-3497	244.7	244.8	Left	380	75	0.7	AG	Bend Installation and Waterbody Crossing and Topsoil Segregation
Washtenaw	ATWS-2687	244.9	245.0	Left	246	50	0.3	AG	Road and Waterbody Crossing
Washtenaw	ATWS-2685	244.9	244.9	Right	132	75	0.2	AG	Road and Waterbody Crossing
Washtenaw	ATWS-3907	244.9	245.0	Right	183	50	0.2	AG,ID	Road and Wetland Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Washtenaw	ATWS-2688	245.0	245.0	Left	172	50	0.2	AG,ID	Road, Wetland and Waterbody Crossing
Washtenaw	ATWS-2689	245.0	245.0	Right	87	50	0.1	AG	Waterbody Crossing and Topsoil Segregation
Washtenaw	ATWS-481	245.0	245.0	Left	114	50	0.1	AG	Waterbody Crossing
Washtenaw	ATWS-3906	245.0	245.0	Right	100	50	0.1	AG	Waterbody Crossing and Topsoil Segregation
Washtenaw	ATWS-1654	245.0	245.2	Right	697	25	0.4	AG,OL	Topsoil Segregation
Washtenaw	ATWS-3905	245.2	245.2	Right	174	50	0.2	OL	Road and Wetland Crossing
Washtenaw	ATWS-480	245.2	245.2	Left	151	50	0.2	OL	Road and Wetland Crossing
Washtenaw	ATWS-4390	245.2	245.3	Right	182	25	0.1	ID,OL	Road and Wetland Crossing
Washtenaw	ATWS-1652	245.2	245.3	Left	151	75	0.3	OL	Road and Wetland Crossing
Washtenaw	ATWS-1651	245.3	245.5	Right	982	25	0.6	AG,FW	Topsoil Segregation
Washtenaw	ATWS-2675	245.8	246.2	Right	2,117	25	1.2	AG,FW	Topsoil Segregation
Washtenaw	ATWS-4498	245.5	245.7	Right	1,255	25	0.7	AG	Topsoil Segregation
Washtenaw	ATWS-3904	245.6	245.6	Left	300	25	0.2	AG	Bend Installation
Washtenaw	ATWS-3903	245.7	245.7	Left	151	25	0.1	AG	Bend Installation
Washtenaw	ATWS-3902	245.8	245.8	Left	145	25	0.1	AG,FW	Bend Installation
Washtenaw	ATWS-2674	246.2	246.2	Right	322	75	0.6	AG	Bend Installation and Topsoil Segregation
Washtenaw	ATWS-3900	246.2	246.2	Left	301	25	0.2	AG	Bend Installation
Washtenaw	ATWS-1647	246.3	246.4	Right	334	75	0.6	AG	Waterbody and Wetland Crossing
Washtenaw	ATWS-3901	246.3	246.4	Left	307	50	0.4	AG	Waterbody and Wetland Crossing
Washtenaw	ATWS-1859	246.4	246.5	Right	936	25	0.5	AG	Topsoil Segregation
Washtenaw	ATWS-3492	246.5	246.6	Left	86	50	0.1	AG	Road and Waterbody Crossing
Washtenaw	ATWS-479	246.5	246.6	Right	186	75	0.3	AG,ID	Road and Waterbody Crossing
Washtenaw	ATWS-478	246.6	246.6	Right	185	75	0.3	AG	Road and Waterbody Crossing
Washtenaw	ATWS-3491	246.6	246.6	Left	184	50	0.2	AG	Road and Waterbody Crossing
Washtenaw	ATWS-4503	246.6	246.6	Left	50	50	0.1	AG,ID	Road Crossing
Washtenaw	ATWS-1645	246.6	247.2	Right	2,991	25	1.7	AG	Topsoil Segregation
Washtenaw	ATWS-2673	246.8	246.9	Left	541	25	0.3	AG	Bend Installation
Washtenaw	ATWS-3490	247.2	247.2	Left	130	50	0.1	AG	Waterbody Crossing
Washtenaw	ATWS-3488	247.2	247.2	Right	161	75	0.3	AG	Waterbody Crossing and Topsoil Segregation
Washtenaw	ATWS-3489	247.2	247.2	Left	120	50	0.1	AG	Waterbody Crossing
Washtenaw	ATWS-1861	247.2	247.4	Right	1,099	25	0.6	AG	Topsoil Segregation
Washtenaw	ATWS-2692	247.4	247.4	Left	327	50	0.4	AG	Bend Installation and Road Crossing
Washtenaw	ATWS-3896	247.4	247.4	Right	162	50	0.3	AG	Bend Installation and Road Crossing
Washtenaw	ATWS-1642	247.4	247.5	Left	420	50	0.5	AG,ID	Bend Installation and Road Crossing
Washtenaw	ATWS-3895	247.4	247.5	Right	239	50	0.3	AG,ID	Bend Installation and Road Crossing
Washtenaw	ATWS-1860	247.5	247.6	Right	497	25	0.3	AG	Topsoil Segregation
Washtenaw	ATWS-1641	247.6	247.7	Right	334	50	0.4	AG	Bend Installation and Topsoil Segregation
Washtenaw	ATWS-3894	247.6	247.6	Left	200	25	0.1	AG	Bend Installation
Washtenaw	ATWS-3487	247.9	248.0	Right	407	25	0.2	RE	Bend Installation
Washtenaw	ATWS-3486	248.0	248.0	Left	144	50	0.2	ID,RE	Road Crossing
Washtenaw	ATWS-3485	248.0	248.0	Right	94	50	0.1	ID,RE	Road Crossing
Washtenaw	ATWS-1638	248.0	248.0	Left	222	50	0.3	AG,ID,OL	Bend Installation and Road Crossing
Washtenaw	ATWS-1640	248.0	248.0	Right	286	75	0.5	AG,OL	Bend Installation and Road Crossing
Washtenaw	ATWS-1639	248.0	248.1	Right	463	25	0.3	AG,OL	Topsoil Segregation
Washtenaw	ATWS-1637	248.1	248.1	Left	207	75	0.4	AG,ID,OL	Road Crossing
Washtenaw	ATWS-2676	248.1	248.2	Left	264	50	0.3	FW,OL,RE	Road and Waterbody Crossing
Washtenaw	ATWS-2677	248.2	248.2	Right	213	50	0.2	FW,OL	Road and Waterbody Crossing
Washtenaw	ATWS-1636	248.3	248.3	Right	312	25	0.2	FW,OL	Bend Installation
Washtenaw	ATWS-3495	248.4	248.4	Left	71	50	0.1	AG,OL	Waterbody Crossing
Washtenaw	ATWS-3496	248.4	248.5	Right	100	75	0.2	AG	Waterbody Crossing and Topsoil Segregation
Washtenaw	ATWS-3494	248.4	248.5	Left	75	50	0.1	AG	Waterbody Crossing
Washtenaw	ATWS-1862	248.5	248.6	Right	514	25	0.3	AG	Topsoil Segregation
Washtenaw	ATWS-3893	248.5	248.5	Left	150	25	0.1	AG	Existing Pipeline Crossing
Washtenaw	ATWS-3493	248.6	248.6	Right	152	25	0.1	RE	Bend Installation
Washtenaw	ATWS-1634	248.7	248.7	Left	231	50	0.3	AG,ID,OL	Bend Installation and Road Crossing
Washtenaw	ATWS-3483	248.7	248.7	Right	97	50	0.1	ID,RE	Road Crossing
Washtenaw	ATWS-3482	248.7	248.7	Right	164	50	0.2	AG,ID,OL	Road Crossing

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Washtenaw	ATWS-1633	248.7	248.8	Right	643	25	0.4	AG	Topsoil Segregation
Washtenaw	ATWS-2050	248.8	248.9	Left	116	25	0.1	AG,OL	Existing Pipeline Crossing
Washtenaw	ATWS-3481	248.8	248.9	Right	150	50	0.2	AG	Waterbody Crossing
Washtenaw	ATWS-3892	248.9	249.0	Right	510	25	0.3	FW,OL	Bend Installation and Wetland Crossing
Washtenaw	ATWS-3891	249.1	249.1	Left	79	50	0.1	OL	Existing Pipeline and Wetland Crossing
Washtenaw	ATWS-3890	249.2	249.2	Left	278	50	0.3	FW,OL	Existing Pipeline and Wetland Crossing
Washtenaw	ATWS-3889	249.2	249.2	Right	300	50	0.3	FW,OL	Existing Pipeline and Wetland Crossing
Washtenaw	ATWS-2051	249.4	249.6	Left	546	100	1.3	ID,FW,OL	Road and Wetland Crossing
Washtenaw	ATWS-3480	250.0	250.1	Right	291	50	0.3	AG,ID,OL	Equipment Access From Staging Area and Topsoil Segregation and Crossing Past Commercial Structure
Washtenaw	ATWS-1632	250.2	250.3	Left	334	75	0.6	ID,OL	Existing Pipeline and Road Crossing
Washtenaw	ATWS-489	250.2	250.3	Right	194	75	0.3	ID,FW,OL	Road and Existing Pipeline Crossing
Washtenaw	ATWS-3888	250.3	250.4	Right	436	50	0.5	FW,OL	Bend Installation and Wetland Crossing
Washtenaw	ATWS-3887	250.4	250.4	Left	117	25	0.1	FW,OL	Wetland Crossing
Washtenaw	ATWS-3886	250.5	250.6	Left	306	25	0.2	FW,OL	Bend Installation
Washtenaw	ATWS-1620	250.6	250.7	Left	498	170	1	FW,OL	HDD Entry Location and Bend Installation
Washtenaw	ATWS-1619	250.6	250.7	Right	1,221	251	3.4	FW,OL	HDD Entry Location
Washtenaw	ATWS-1621	251.1	251.1	Left	2,355	200	8.5	ID,FW,OL,OW	Access To Hydrostatic Test Water
Washtenaw	ATWS-4391	251.1	251.1	Right	109	25	0.1	ID,FW,OL	HDD Exit Location
Washtenaw	ATWS-3884	251.2	251.3	Left	746	25	0.4	OL	Topsoil Segregation
Washtenaw	ATWS-1622	251.3	251.4	Left	361	75	0.6	ID,OL	Bend Installation and Road Crossing
Washtenaw	ATWS-552	251.4	251.7	Right	1,210	190	4.5	ID,OL	Road and Multilane Interstate Highway Crossing, Equipment/ Material Staging and Topsoil Segregation
Washtenaw	ATWS-3883	251.7	251.8	Right	424	75	0.7	FW	Road and Waterbody Crossing
Washtenaw	ATWS-490	251.8	252.0	Right	954	75	1.6	ID,FW,OL	Bend Installation and Road and Waterbody Crossing
Washtenaw	ATWS-4392	252.1	252.2	Left	207	50	0.2	ID,FW	Extra Work Space Passing Commercial Junk Yard To Change Row Configuration To Stay Out of The Junk Yard
Washtenaw	ATWS-1623	252.2	252.2	Left	329	75	0.6	ID,FW,RE	Bend Installation and Road Crossing
Washtenaw	ATWS-4260	252.2	252.2	Right	130	100	0.2	ID,FW	Road Crossing
Washtenaw	ATWS-2672	252.2	252.3	Right	226	75	0.4	ID,FW	Road Crossing
Washtenaw	ATWS-3882	252.3	252.4	Left	683	50	0.8	ID,FW,OL	Road and Existing Pipeline Crossing
Washtenaw	ATWS-1625	252.3	252.4	Right	631	50	0.7	ID,FW,OL	Road and Existing Pipeline Crossing
Washtenaw	ATWS-3881	252.4	252.4	Left	280	75	0.4	ID,OL	Bend Installation and Road Crossing
Washtenaw	ATWS-3880	252.4	252.8	Left	1,700	140	5.2	ID,OL	Spoil, Equipment and Material Storage for Congested Area Working In Road Median
Washtenaw	ATWS-3879	252.5	252.8	Left	1,252	25	0.7	OL	Extra Work Space In Congested Area Working In Road Median
Washtenaw	ATWS-3473	252.5	252.7	Right	993	25	0.6	ID,OL	Topsoil Segregation
Washtenaw	ATWS-2682	252.7	252.8	Right	206	50	0.2	ID,OL	Existing Pipeline Crossing and Topsoil Segregation
Washtenaw	ATWS-2613	252.8	252.8	Right	75	25	0	ID,OL	Road Crossing
Washtenaw	ATWS-4410	252.8	252.9	Left	665	150	2.3	ID,OL	Spoil, Equipment and Material Storage for Congested Area Working In Road Median
Washtenaw	ATWS-2614	252.8	252.9	Right	523	45	0.4	ID,OL	Extra Work Space In Congested Area Working In Road Median

APPENDIX C-2 (cont'd)

Summary of ATWS Associated with the NGT Pipeline Project

State, Component, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		ATWS Acres Affected [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Mainline (cont.'d)									
Washtenaw	ATWS-2615	252.9	252.9	Right	180	25	0.1	ID,OL	Extra Work Space In Congested Area Working In Road Median
Washtenaw	ATWS-4411	252.9	253.0	Left	183	155	0.6	ID,OL	Extra Work Space In Congested Area Working In Road Median
Washtenaw	ATWS-2712	252.9	253.1	Right	803	25	0.5	ID,OL	Topsoil Segregation
Washtenaw	ATWS-4412	252.9	253.1	Left	1,042	150	4.3	ID,OL	Spoil, Equipment and Material Storage for Congested Area Working In Road Median
Washtenaw	ATWS-4421	253.1	253.2	Right	727	65	0.9	ID,OL	Extra Work Space In Congested Area Working In Road Median
Washtenaw	ATWS-3877	253.2	253.3	Left	263	75	0.3	ID,OL	Bore Pull Back String
Washtenaw	ATWS-2713	253.2	253.3	Right	144	50	0.2	ID,OL	Road Crossing
Washtenaw	ATWS-4518	253.3	253.4	Right	677	145	3	ID,FW,OL	Road and Waterbody Crossing
Washtenaw	ATWS-4521	253.4	253.6	Right	423	150	1.5	FW,OL	Waterbody Crossing
Washtenaw	ATWS-4520	253.4	253.7	Left	1,550	75	2.5	ID,FW,OL	Access Around Stormwater Retention Pond
Washtenaw	ATWS-4523	253.6	253.7	Right	355	250	2	ID,FW,OL	Road and Waterbody Crossing
Washtenaw	ATWS-3479	253.7	253.7	Right	936	200	4.3	ID	HDD Pullback String
Washtenaw	ATWS-4519	253.7	253.8	Left	570	75	1	ID	Bend Installation and Road Crossing
Washtenaw	ATWS-4522	253.7	253.8	Right	600	190	2.8	ID,OL	Road Crossing
Washtenaw	ATWS-2718	253.7	254.0	Right	1,402	100	3.2	ID,OL	HDD Pullback String
Washtenaw	ATWS-4517	253.8	254.0	Left	935	25	0.6	ID	Access to Contractor Yard
Washtenaw	ATWS-4524	253.8	254.0	Right	825	150	3.3	ID	Extra Work Space for Crossing Existing Underground Utilities Beneath Parking Lot
Washtenaw	ATWS-4516	254.0	254.0	Right	340	25	0.2	ID,OL	Bend Installation
Washtenaw	ATWS-4514	254.0	254.1	Right	476	90	0.9	ID,OL	HDD Exit Location and Parking Location
Washtenaw	ATWS-4515	254.0	254.1	Left	587	75	1	ID,OL	HDD Exit Location
Washtenaw	ATWS-3873	254.3	254.5	Left	790	75	1.4	ID,FW,OL	HDD Entry Location
Washtenaw	ATWS-4513	254.4	254.5	Right	343	100	0.8	ID,FW,OL	HDD Entry Location
Washtenaw	ATWS-4539	254.5	254.5	Right	446	50	0.5	ID,FW,OL	Wetland Crossing and HDD Tie-in Location
Washtenaw	ATWS-4508	254.5	254.6	Left	408	25	0.2	OL	Bend Installation
Washtenaw	ATWS-4541	254.5	254.6	Right	517	25	0.3	OL	Wetland Crossing
Washtenaw	ATWS-4540	254.7	254.7	Right	81	25	0	FW,OL	Wetland Crossing
Washtenaw	ATWS-2721	254.7	254.8	Left	336	75	0.6	OL	Bend Installation and Existing Pipeline Crossing
Washtenaw	ATWS-3475	254.7	254.8	Right	256	75	0.4	OL	Waterbody and Existing Pipeline Crossing
Washtenaw	ATWS-2740	254.8	254.9	Right	183	140	0.4	ID,FW,OL	Bend Installation and Waterbody and Wetland Crossing
Washtenaw	ATWS-4530	254.9	255.0	Left	205	50	0.2	ID,OL	Bend Installation and Access to Existing Roadway Inside DTE Facility
Washtenaw	ATWS-4413	255.0	255.0	Right	340	240	1.5	ID,OL	Willow Run M&R Workspace
					Mainline - Michigan Subtotal		**280.6**		
					Total Acres Affected by NGT Project ATWS		**1,359.7**		

APPENDIX C-3

PIPE/CONTRACTOR YARDS AND STAGING AREAS FOR THE NGT PROJECT

APPENDIX C-3

Pipe/Contractor Yards and Staging Areas for the NGT Project

State/County	Yard Name	Nearest Milepost	Construction Area (acres)	Existing Land Use [a]
OHIO				
Pipe/Contractor Yards				
Stark	Wareyard 1-1	23.0	17.2	AG/OL
Medina	Wareyard 2-1	77.0	16.0	AG/OL
Wood	Wareyard 3-1A	176.4	22.4	AG/OL/ID
Wood	Wareyard 3-1B	176.4	38.1	AG/OL
Lucas	Wareyard 3-2	186.3	75.3	AG
Staging Areas				
Columbiana	Staging Area-16	0.2 (TGP)	2.48	AG/FW
Columbiana	Staging Area-56	0.3	0.35	AG/OL/ID
Columbiana	Staging Area-51	2.6	0.12	AG/OL
Columbiana	Staging Area-52	3.7	0.13	AG/FW
Columbiana	Staging Area-53	4.1	0.34	AG
Columbiana	Staging Area-91	6.8	1.43	AG/ID
Columbiana	Staging Area-54	7.8	0.09	AG
Columbiana	Staging Area-55	8.2	0.26	AG
Columbiana	Staging Area-80	8.2	0.28	AG/FW
Columbiana	Staging Area-99	10.7	0.17	AG/OL/FW
Stark	Staging Area-57	13.3	0.09	AG
Stark	Staging Area-17	15.3	0.16	AG
Stark	Staging Area-18	15.5	0.26	AG
Stark	Staging Area-81	18.7	0.10	AG/OL
Stark	Staging Area-82	20.1	0.18	AG/OL/ID
Stark	Staging Area-59	29.3	0.22	AG/OL
Stark	Staging Area-2	32.6	2.74	AG/OL
Summit	Staging Area-4	35.8	0.24	AG
Summit	Staging Area-1	41.5	4.23	AG/OL/ID
Summit	Staging Area-5	47.4	0.20	AG
Summit	Staging Area-60	48.6	0.18	AG
Wayne	Staging Area-61	53.1	1.70	AG/OL/FW
Wayne	Staging Area-34	53.7	4.11	AG/OL/ID/FW
Medina	Staging Area-85	63.0	0.23	AG
Medina	Staging Area-86	63.8	0.09	AG/OL/ID
Medina	Staging Area-14	65.0	0.35	AG/OL
Medina	Staging Area-13	66.4	0.25	AG/ID
Medina	Staging Area-11	68.4	0.19	AG
Medina	Staging Area-12	68.5	0.35	AG
Medina	Staging Area-10	69.4	0.23	AG/OL/ID
Medina	Staging Area-9	70.8	0.15	AG/OL
Medina	Staging Area-8	70.9	0.11	OL/ID
Medina	Staging Area-7	70.9	0.29	AG/OL
Medina	Staging Area-19	72.8	0.12	AG/OL
Medina	Staging Area-21	73.1	0.14	AG/FW
Medina	Staging Area-20	73.2	0.14	AG/OL
Medina	Staging Area-88	75.9	0.23	AG
Lorain	Staging Area-62	85.6	0.10	AG/ID
Lorain	Staging Area-89	86.0	0.10	AG

APPENDIX C-3 (cont'd)

Pipe/Contractor Yards and Staging Areas for the NGT Project

State/County	Yard Name	Nearest Milepost	Construction Area (acres)	Existing Land Use [a]
Lorain	Staging Area-63	87.1	0.11	AG
Lorain	Staging Area-22	91.4	0.12	AG
Lorain	Staging Area-24	91.4	0.11	AG/FW
Lorain	Staging Area-25	92.1	0.35	AG/OL
Lorain	Staging Area-26	92.6	0.18	AG/OL/ID
Erie	Staging Area-28	110.3	0.25	OL/ID
Erie	Staging Area-30	115.9	0.11	AG
Erie	Staging Area-29	116.0	0.29	AG/FW
Erie	Staging Area-31	116.6	0.13	FW
Erie	Staging Area-32	117.6	0.09	AG/OL
Erie	Staging Area-33	119.8	0.17	AG/ID
Erie	Staging Area-37	128.3	0.11	AG/ID
Erie	Staging Area-79	128.9	0.21	AG/ID
Sandusky	Staging Area-94	131.6	3.48	AG/OL/ID
Sandusky	Staging Area-38	132.7	0.16	AG
Sandusky	Staging Area-93	133.3	3.06	AG/OL
Sandusky	Staging Area-64	138.6	0.14	AG/OL/ID
Sandusky	Staging Area-41	147.6	0.06	AG/OL
Sandusky	Staging Area-65	155.1	0.05	AG/OL
Sandusky	Staging Area-66	158.6	0.20	AG/OL/ID
Wood	Staging Area-67	163.9	0.13	AG/OL/ID
Wood	Staging Area-69	165.3	0.22	AG/ID
Wood	Staging Area-70	166.6	0.19	AG/OL/ID
Wood	Staging Area-71	166.7	0.26	AG
Wood	Staging Area-72	171.2	0.13	AG
Wood	Staging Area-73	175.0	0.20	AG/OL/ID
Wood	Staging Area-74	179.1	0.12	AG
Wood	Staging Area-75	179.2	0.29	AG/OL/ID
Wood	Staging Area-76	180.0	0.12	AG/OL
Lucas	Staging Area-78	182.3	0.20	AG
Fulton	Staging Area-96	200.8	0.17	AG
Fulton	Staging Area-3	208.2	4.54	AG
Fulton	Staging Area-97	208.2	0.15	AG
	Ohio Contractor/Pipe Yard Total		**169.0**	
	Ohio Staging Area Total		**39.3**	
	Ohio Total		**208.3**	
MICHIGAN				
Pipe/Contractor Yards				
Lenawee	Wareyard 4-1	228.0	41.9	AG/OL/ID
Washtenaw	Wareyard 4-3	250.0	13.4	AG/FW
Washtenaw	Wareyard 4-4	254.0	9.9	ID/OL
Staging Areas				
Lenawee	Staging Area-98	208.3	0.15	AG
Lenawee	Staging Area-6	208.4	5.86	AG
Lenawee	Staging Area-50	226.5	0.39	AG/OL
Lenawee	Staging Area-49	229.5	0.18	AG/OL
Washtenaw	Staging Area-47	237.1	0.32	AG/OL
Washtenaw	Staging Area-46	239.7	0.15	AG/ID

APPENDIX C-3 (cont'd)

Pipe/Contractor Yards and Staging Areas for the NGT Project

State/County	Yard Name	Nearest Milepost	Construction Area (acres)	Existing Land Use [a]
Washtenaw	Staging Area-44	242.3	0.18	AG/OL
Washtenaw	Staging Area-43	246.2	0.18	AG/OL/ID
Washtenaw	Staging Area-42	247.4	0.99	AG/ID
Washtenaw	Staging Area-92	250.3	0.95	AG/FW
		Michigan Contractor/Pipe Yard Total	**65.2**	
		Michigan Staging Area Total	**9.4**	
		Michigan Total	**74.6**	
		NGT Project Total	**282.9**	

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a Land use types: AG = Agricultural; ID = Industrial/Commercial; OL = Open Land; and FW = Forested Woodland

Note: The totals shown in this table may not equal the sum of addends due to rounding

APPENDIX C-4

PROPOSED NEW, IMPROVED, AND PRIVATE ACCESS ROADS FOR THE NGT AND TEAL PROJECTS

APPENDIX C-4

Proposed New, Improved, and Private Access Roads for the NGT and TEAL Projects

State, County, Access Road ID	Municipality/Township	Milepost [a]	New or Existing	Proposed for Temporary or Permanent Use [b]	Existing Surface [c]	Road Dimensions Width x Length (feet)	Proposed Improvement (Y/N) [d]	Construction Area (acres)	Operation Area (acres)
NGT PROJECT									
Ohio									
Mainline									
TAR-0.3	Hanover	0.3	New	Temporary	Gr	25 x 1125	C/G/S	0.6	0.0
TAR-2.6	Hanover	2.6	New	Temporary	Gr	25 x 655	C/G/S	0.4	0.0
TAR-3.7	Hanover	3.7	New	Temporary	Gr	25 x 230	C/G/S	0.1	0.0
TAR-4.4 R	West	4.4	New and Existing	Temporary	D/Gr	25 x 2913	G/S	1.7	0.0
TAR-4.8	West	4.8	New	Temporary	Gr	25 x 178	G/S	0.1	0.0
TAR-7.3 R	West	7.3	Existing	Temporary	G	25 x 376	G/S/W	0.2	0.0
TAR-7.8	West	7.8	New	Temporary	Gr	25 x 524	G/S	0.3	0.0
TAR-8.2	West	8.2	New and Existing	Temporary	G/Gr	25 x 1579	G/S/W	0.9	0.0
TAR-10.8	Knox	10.8	New	Temporary	Gr	25 x 1063	C/G/S	0.6	0.0
TAR-13.5	Washington	13.5	New	Temporary	Gr	25 x 850	C/G/S	0.5	0.0
TAR-15.4	Washington	15.4	New and Existing	Temporary	D/G/Gr	25 x 2672	C/G/S/W	1.5	0.0
TAR-18.6	Washington	18.6	New	Temporary	Gr	25 x 1380	G/S	0.8	0.0
TAR-20.4	Nimishillen	20.4	New	Temporary	Gr	25 x 1363	G/S	0.8	0.0
TAR-22.9	Marlboro	22.9	Existing	Temporary	A/G	25 x 165	G/P/S/W	0.1	0.0
TAR-23.1	Marlboro	23.1	New	Temporary	Gr	50 x 35	C/G/S	0.0	0.0
TAR-29.1	Lake	29.1	New and Existing	Temporary	G/Gr	25 x 1599	G/S/W	0.9	0.0
TAR-33.2	Lake	33.2	New	Temporary	Gr	25 x 274	C/G/S/W	0.2	0.0
TAR-33.5 R	Lake	33.5	Existing	Temporary	D	75 x 33	G/S/W	0.1	0.0
TAR-35.6	Green	35.6	New and Existing	Temporary	G/Gr	25 x 2629	G/S/W	1.5	0.0
TAR-39.8 R	Green	39.8	New and Existing	Temporary	A/Gr	25 x 93	G/P/S	0.1	0.0
TAR 40.8 R	Green	40.8	Existing	Temporary	A/G	25 x 3833	P/S/W	2.2	0.0
TAR-43.7 R	New Franklin	43.7	Existing	Temporary	G	25 x 824	S/W	0.5	0.0
TAR-44.1	New Franklin	44.1	Existing	Temporary	D	20 x 197	G/S	0.1	0.0
TAR-44.3	New Franklin	44.3	New and Existing	Temporary	G/Gr	25 x 135	G/S/W	0.1	0.0
TAR-47.4	New Franklin	47.4	New	Temporary	Gr	25 x 736	C/G/S/W	0.4	0.0

APPENDIX C-4 (cont'd)

Proposed New, Improved, and Private Access Roads for the NGT and TEAL Projects

State, County, Access Road ID	Municipality/Township	Milepost [a]	New or Existing	Proposed for Temporary or Permanent Use [b]	Existing Surface [c]	Road Dimensions Width x Length (feet)	Proposed Improvement (Y/N) [d]	Construction Area (acres)	Operation Area (acres)
Mainline (cont'd)									
TAR-48.5	New Franklin	48.5	New and Existing	Temporary	G/Gr	25 x 2235	C/G/S	1.3	0.0
TAR-52.4 R	Chippewa	52.4	Existing	Temporary	G	25 x 1699	G/S/W	1.0	0.0
TAR-53.5	Doylestown	53.5	Existing	Temporary	C/G	25 x 299	S	0.2	0.0
TAR-53.6	Doylestown	53.6	New	Temporary	Gr	25 x 530	C/G/S/W	0.3	0.0
TAR-56.2	Chippewa	56.2	Existing	Temporary	D/G	25 x 689	G/S	0.4	0.0
TAR-63.1	Guilford	63.1	New and Existing	Temporary	D/Gr	25 x 1954	G/S	1.1	0.0
TAR-63.8	Guilford	63.8	Existing	Temporary	G	25 x 544	C/G/S	0.3	0.0
TAR-64.9	Guilford	64.9	New and Existing	Temporary	D/Gr	25 x 1045	C/G/S	0.6	0.0
TAR-66.4	Montville	66.4	New and Existing	Temporary	D/Gr	25 x 1073	G/S	0.6	0.0
TAR-68.3	Lafayette	68.3	New	Temporary	Gr	25 x 670	C/G/S/W	0.4	0.0
TAR-68.6	Lafayette	68.6	New	Temporary	Gr	25 x 1275	G/S	0.7	0.0
TAR- 69.6 R	Lafayette	69.6	Existing	Temporary	G	25 x 1100	G/S	0.6	0.0
TAR-70.1 R	Lafayette	70.1	Existing	Temporary	C/G	25 x 2940	P/S	1.7	0.0
TAR-70.8a	Lafayette	70.8	New	Temporary	Gr	25 x 282	C/G/S	0.2	0.0
TAR-70.8b	Lafayette	70.8	Existing	Temporary	G	25 x 308	G/S	0.2	0.0
TAR-70.9	Lafayette	70.9	New	Temporary	Gr	25 x 496	C/G/S	0.3	0.0
TAR-72.8 R	Lafayette	72.8	New	Temporary	Gr	25 x 607	C/G/S/W	0.3	0.0
TAR-73.1	Lafayette	73.1	New and Existing	Temporary	G/Gr	25 x 1531	C/G/S/W	0.9	0.0
TAR-73.6	Lafayette	73.6	Existing	Temporary	C	25 x 45	P/W	0.0	0.0
TAR-75.8	York	75.8	New and Existing	Temporary	C/G/Gr	25 x 1908	G/S/W	1.1	0.0
TAR-76.1 R	York	76.1	Existing	Temporary	G	25 x 1078	C/G/S/W	0.6	0.0
TAR-76.8a	York	76.8	Existing	Temporary	G	25 x 791	C/G/S/W	0.5	0.0
TAR-76.8b	York	76.8	Existing	Temporary	G	25 x 542	C/G/S/W	0.3	0.0
TAR-85.5	Grafton	85.5	New	Temporary	Gr	25 x 1235	G/S	0.7	0.0
TAR-85.9a	Grafton	85.9	New	Temporary	Gr	25 x 51	G/S	0.0	0.0
TAR-85.9b	Grafton	85.9	New	Temporary	Gr	25 x 283	C/G/S	0.2	0.0
TAR-87.0	La Grange	87.0	New	Temporary	Gr	25 x 249	C/G/S	0.1	0.0

APPENDIX C-4 (cont'd)

Proposed New, Improved, and Private Access Roads for the NGT and TEAL Projects

State, County, Access Road ID	Municipality/Township	Milepost [a]	New or Existing	Proposed for Temporary or Permanent Use [b]	Existing Surface [c]	Road Dimensions Width x Length (feet)	Proposed Improvement (Y/N) [d]	Construction Area (acres)	Operation Area (acres)
Mainline (cont'd)									
TAR-91.4	La Grange	91.4	New	Temporary	Gr	25 x 1421	G/S/W	0.8	0.0
TAR-92.1	Pittsfield	92.1	New	Temporary	Gr	25 x 597	G/S	0.3	0.0
TAR-92.2	Pittsfield	92.2	Existing	Temporary	G/D	12 x 639	G/S	0.2	0.0
TAR- 92.6 R	Pittsfield	92.6	Existing	Temporary	D/G	25 x 463	C/G/S	0.3	0.0
TAR-95.7	New Russia	95.7	Existing	Temporary	G	25 x 2054	S	1.2	0.0
TAR-99.2a	Camden	99.2	New and Existing	Temporary	G/Gr	25 x 210	G/S	0.1	0.0
TAR-99.2b R	Camden	99.2	New and Existing	Temporary	G/Gr	25 x 101	C/G/S	0.1	0.0
TAR-110.2	Berlin	110.2	New and Existing	Temporary	A/Gr	25 x 1156	G/P/S	0.7	0.0
TAR-111.6	Berlin Heights	111.6	Existing	Temporary	D/G	25 x 526	G/S/W	0.3	0.0
TAR-115.8	Milan	115.8	New and Existing	Temporary	G/Gr	25 x 3806	G/S	2.2	0.0
TAR-115.9 R	Milan	115.9	New	Temporary	Gr	25 x 1351	G/S/W	0.8	0.0
TAR-116.5	Milan	116.5	Existing	Temporary	G	25 x 687	G/S/W	0.4	0.0
TAR-116.8	Milan	116.8	Existing	Temporary	G	25 x 171	G/S	0.1	0.0
TAR-117.6	Milan	117.6	New and Existing	Temporary	D/Gr	25 x 487	C/G/S	0.3	0.0
TAR-117.8	Milan	117.8	Existing	Temporary	D	25 x 1365	C/G/S	0.8	0.0
TAR-119.4	Milan	119.4	Existing	Temporary	C/G	25 x 305	P/S	0.2	0.0
TAR-119.8	Milan	119.8	New and Existing	Temporary	C/Gr	25 x 1880	G/P/S	1.1	0.0
TAR-124.0	Oxford	124.0	Existing	Temporary	G	25 x 4144	G/S	2.4	0.0
TAR-128.3	Groton	128.3	New	Temporary	Gr	25 x 385	C/G/S	0.2	0.0
TAR-128.9	Groton	128.9	New	Temporary	Gr	25 x 841	C/G/S	0.5	0.0
TAR-132.7	Townsend	132.7	New	Temporary	Gr	25 x 1385	C/G/S	0.8	0.0
TAR-133.3	Townsend	133.3	Existing	Temporary	G	25 x 46	G/S	0.0	0.0
TAR-138.7	Riley	138.7	New	Temporary	Gr	25 x 503	C/G/S	0.3	0.0
TAR-143.2	Riley	143.2	New	Temporary	Gr	38 x 184	C/G/S	0.2	0.0
TAR-143.3	Riley	143.3	Existing	Temporary	G	50 x 226	G/S	0.3	0.0
TAR-147.7	Sandusky	147.7	New	Temporary	Gr	25 x 262	C/G/S	0.2	0.0
TAR-155.1	Washington	155.1	New	Temporary	Gr	25 x 215	G/S	0.1	0.0

APPENDIX C-4 (cont'd)

Proposed New, Improved, and Private Access Roads for the NGT and TEAL Projects

State, County, Access Road ID	Municipality/Township	Milepost [a]	New or Existing	Proposed for Temporary or Permanent Use [b]	Existing Surface [c]	Road Dimensions Width x Length (feet)	Proposed Improvement (Y/N) [d]	Construction Area (acres)	Operation Area (acres)
Mainline (cont'd)									
TAR-158.6	Woodville	158.6	Existing	Temporary	G	25 x 1193	G/S	0.7	0.0
TAR-163.9	Troy	163.9	Existing	Temporary	G/D	25 x 1066	C/G/S	0.6	0.0
TAR-165.5	Troy	165.5	New and Existing	Temporary	G/Gr	25 x 2477	C/G/S	1.4	0.0
TAR-166.8	Troy	166.8	New and Existing	Temporary	G/Gr	25 x 3193	C/G/S	1.8	0.0
TAR-171.2	Webster	171.2	New and Existing	Temporary	D/Gr	25 x 574	C/G/S	0.3	0.0
TAR-173.9	Middleton	173.9	New	Temporary	Gr	25 x 513	G/S	0.3	0.0
TAR-174.5	Middleton	174.5	Existing	Temporary	D	25 x 42	G/S	0.0	0.0
TAR-175.1	Middleton	175.1	New	Temporary	Gr	25 x 1276	G/S	0.7	0.0
TAR-176.7	Middleton	176.7	New	Temporary	Gr	50 x 33	C/G/S	0.0	0.0
TAR-179.1	Middleton	179.1	New	Temporary	Gr	25 x 646	G/S	0.4	0.0
TAR- 179.2	Middleton	179.2	New	Temporary	Gr	25 x 1599	G/S	0.9	0.0
TAR-179.9	Middleton	179.9	New	Temporary	Gr	25 x 1224	C/G/S	0.7	0.0
TAR-180.1	Haskins	180.1	New	Temporary	Gr	25 x 940	G/S	0.5	0.0
TAR-181.3	Middleton	181.3	New and Existing	Temporary	D/Gr	25 x 159	C/G/S	0.1	0.0
TAR-182.1	Waterville	182.1	New and Existing	Temporary	G/Gr	25 x 3103	G/S	1.8	0.0
TAR-185.3	Waterville	185.3	New	Temporary	Gr	25 x 147	C/G/S	0.1	0.0
TAR-200.7	Fulton	200.7	New and Existing	Temporary	G/Gr	25 x 1291	C/G/S	0.7	0.0
TAR-208.2	Amboy	208.2	New	Temporary	Gr	25 x 650	C/G/S	0.4	0.0
Facilities									
PAR-0.0a	Franklin	TPG 0.0	New	Permanent	Gr	15 x 300	G/S	0.1	0.1
PAR-0.0b	Hanover	0.0/TGP 0.9	New	Permanent	Gr	15 x 34	G/S	<0.1	<0.1
PAR-1.4	Hanover	1.4	New	Permanent	Gr	20 x 92	C/G/P/S	<0.1	<0.1
PAR-16.7 R	Washington	16.7	New	Permanent	Gr	15 x 103*	C/G/S	<0.1	<0.1
PAR-32.6	Greentown	32.6	New	Permanent	Gr	25 x 275	C/G/S	0.2	0.2
PAR-40.1 R	Green	40.1	New	Permanent	Gr	15 x 63*	C/G/S/W	<0.1	<0.1
PAR-50.5	Chippewa	50.5	New	Permanent	Gr	15 x 87*	C/G/S	<0.1	<0.1

APPENDIX C-4 (cont'd)

Proposed New, Improved, and Private Access Roads for the NGT and TEAL Projects

State, County, Access Road ID	Municipality/Township	Milepost [a]	New or Existing	Proposed for Temporary or Permanent Use [b]	Existing Surface [c]	Road Dimensions Width x Length (feet)	Proposed Improvement (Y/N) [d]	Construction Area (acres)	Operation Area (acres)
Facilities (cont'd)									
PAR-57.5	Rittman	57.5	New and Existing	Permanent	D/Gr	15 x 331	C/G/S	0.1	0.1
PAR-58.1	Wadsworth	58.1	New	Permanent	Gr	15 x 125*	C/G/S	<0.1	<0.1
PAR-63.4	Guilford	63.4	New	Permanent	Gr	20 x 2057	C/G/P/S	0.9	0.9
PAR-71.8	Lafayette	71.8	New and Existing	Permanent	G/Gr	25 x 456	G/S	0.3	0.3
PAR-89.2	La Grange	89.2	New	Permanent	Gr	15 x 52*	C/G/S	<0.1	<0.1
PAR-96.8	Pittsfield	96.8	New	Permanent	Gr	15 x 85*	C/G/S	<0.1	<0.1
PAR-116.3	Milan	116.3	New	Permanent	Gr	15 x 350*	G/S	0.1	0.1
PAR-124.8	Oxford	124.8	New	Permanent	Gr	15 x 58*	C/G/S	<0.1	<0.1
PAR-128.8	Groton	128.8	New	Permanent	Gr	30 x 427	C/G/S	0.3	0.3
PAR-134.1	Townsend	134.1	New	Permanent	Gr	20 x 18	C/G/P/S	<0.1	<0.1
PAR-151.7	Washington	151.7	New	Permanent	Gr	15 x 137*	C/G/S	<0.1	<0.1
PAR-159.3	Woodville	159.3	New and Existing	Permanent	D/Gr	25 x 1831	C/G/S	1.1	1.1
PAR-167.8	Troy	167.8	New	Permanent	Gr	15 x 85	C/G/S	<0.1	<0.1
PAR-183.4	Waterville	183.4	New	Permanent	Gr	20 x 50	C/G/P/S	<0.1	<0.1
PAR-189.2	Providence	189.2	New	Permanent	Gr	15 x 333*	G/S	0.1	0.1
Michigan									
Mainline									
TAR-208.3	Ogden	208.3	New	Temporary	Gr	25 x 610	C/G/S	0.4	0.0
TAR-220.7	Blissfield	220.7	New	Temporary	Gr	25 x 22	G/S	<0.1	0.0
TAR-226.4	Ridgeway	226.4	New	Temporary	Gr	25 x 1406	CG/S	0.8	0.0
TAR-228.0	Ridgeway	228.0	New	Temporary	Gr	35 x 45	CG/S	<0.1	0.0
TAR-229.6	Ridgeway	229.6	New	Temporary	G	25 x 1028	G/S	0.6	0.0
TAR-230.7	Milan	230.7	New	Temporary	Gr	25 x 383	C/G/S	0.2	0.0
TAR-237.2	York	237.2	New	Temporary	Gr	25 x 2247	C/G/S	1.3	0.0
TAR-239.6	York	239.6	New and Existing	Temporary	G/Gr	25 x 1327	C/G/S	0.8	0.0
TAR-242.4	Augusta	242.4	Existing	Temporary	G	25 x 505	C/G/S	0.3	0.0
TAR-246.2	Augusta	246.2	New	Temporary	Gr	25 x 1846	C/G/S	1.1	0.0
TAR 248.1	Ypsilanti	248.1	New	Temporary	Gr	25 x 36	C/G/S	<0.1	0.0

APPENDIX C-4 (cont'd)

Proposed New, Improved, and Private Access Roads for the NGT and TEAL Projects

State, County, Access Road ID	Municipality/Township	Milepost [a]	New or Existing	Proposed for Temporary or Permanent Use [b]	Existing Surface [c]	Road Dimensions Width x Length (feet)	Proposed Improvement (Y/N) [d]	Construction Area (acres)	Operation Area (acres)
Mainline (cont'd)									
TAR-249.9	Ypsilanti	249.9	New	Temporary	Gr	25 x 59	C/G/S/W	<0.1	0.0
TAR-250.1	Ypsilanti	250.1	Existing	Temporary	A	30 x 30	P	<0.1	0.0
TAR-250.2	Ypsilanti	250.2	New and Existing	Temporary	A/G/Gr	25 x 1777	G/S/W	1.0	0.0
TAR-251.1	Ypsilanti	251.1	Existing	Temporary	A/G	25 x 1518	G/P/S	0.9	0.0
TAR-251.7	Ypsilanti	251.7	New	Temporary	Gr	25 x 434	G/S/W	0.2	0.0
TAR-254.4 R	Ypsilanti	254.4	New and Existing	Temporary	A/Gr	25 x 951	G/P/S/W	0.5	0.0
TAR-255.0 R	Ypsilanti	255.0	Existing	Temporary	A/G	25 x 347	C/G/S	0.2	0.0
Facilities									
PAR-208.9	Ogden	208.9	New	Permanent	Gr	15 x 80*	C/G/S	<0.1	<0.1
PAR-228.2	Ridgeway	228.2	New	Permanent	Gr	15 x 225*	C/G/S	0.1	0.1
PAR-247.4	Augusta	247.4	New	Permanent	Gr	15 x 84*	C/G/S	<0.1	<0.1
PAR-255.1	Ypsilanti	255.1	Existing	Permanent	A/G	15 x 448	C/P	0.2	0.2
							NGT Project Ohio Total	**58.6**	**3.2**
							NGT Project Michigan Total	**8.6**	**0.3**
							NGT Project Total	**67.1**	**3.5**
TEAL PROJECT									
PAR-01	Sunsbury	0.1		Permanent	Gr	20 x 741	TBD	0.3	0.3
TAR-02	Switzerland	0.8		Temporary	Gr	20 x 2924	TBD	1.3	0.0
TAR-03	Switzerland	1.0		Temporary	Gr	20 x 2235	TBD	1	0.0
TAR-04	Switzerland	2.0		Temporary	Gr	20 x 2709	TBD	1.2	0.0
TAR-05	Switzerland	3.0		Temporary	D	20 x 714	TBD	0.3	0.0
PAR-06	Switzerland	4.5		Permanent	Gr	20 x 749	TBD	0.3	0.3
							TEAL Project Total	**4.4**	**0.6**
							OhioTotal	**63.0**	**3.8**
							Michigan Total	**8.6**	**0.3**
							Project Total	**71.6**	**4.1**

APPENDIX C-5

SUMMARY OF ATWS ASSOCIATED WITH THE TEAL PIPELINE PROJECT

APPENDIX C-5

Summary of ATWS Associated with the TEAL Project

State, Facility, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		Area Affected (acres) [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
OHIO									
Pipeline Loop									
Monroe	ATWS-01	0.0	0.1	Left	775	400	6.2	AG, FW, OL	Start, End, or Connection Point, Road Crossing, Access Road Entry, Topsoil Segregation
Monroe	ATWS-02	0.1	0.6	Left	2925	35	2.4	FW, OL	Road Crossing, Existing Utility Crossing, Severe Slope, Topsoil Segregation
Monroe	ATWS-03	0.5	0.7	Right	1058	35	0.9	FW, OL	Existing Utility Crossing, Severe Slope
Monroe	ATWS-04	0.7	0.8	Left	340	67	0.5	FW, OL	Access Road Entry, Wetland Crossing, Stream Crossing, Severe Slope
Monroe	ATWS-05	0.8	1.0	Right	970	35	0.8	FW, OL	Existing Utility Crossing, Severe Slope
Monroe	ATWS-06	0.9	1.0	Left	629	35	0.5	FW, OL	Existing Utility Crossing, Access Road Entry, Severe Slope
Monroe	ATWS-07	1.1	1.2	Right	300	40	0.3	OL	Severe Slope
Monroe	ATWS-08	1.1	1.2	Left	451	20	0.2	FW	Wetland Crossing, Stream Crossing, Severe Slope
Monroe	ATWS-09	1.2	1.3	Left	555	20	0.3	FW	Road Crossing, Wetland Crossing, Stream Crossing, Severe Slope
Monroe	ATWS-10	1.2	1.5	Left	1372	35	1.1	AG, ID, FW, OL	Road Crossing, Severe Slope, Topsoil Segregation
Monroe	ATWS-11	1.6	1.6	Left	100	35	0.1	FW	Wetland Crossing, Stream Crossing, Severe Slope
Monroe	ATWS-12	1.6	1.6	Left	216	35	0.2	FW	Wetland Crossing, Stream Crossing, Severe Slope
Monroe	ATWS-13	1.6	1.7	Left	89	15	0.0	OW, FW, OL	Severe Slope
Monroe	ATWS-14	1.7	1.9	Left	1140	35	0.9	AG, FW, OL	Wetland Crossing, Stream Crossing, Severe Slope, Topsoil Segregation
Monroe	ATWS-15	1.9	2.0	Left	618	35	0.5	FW	Wetland Crossing, Stream Crossing, Severe Slope
Monroe	ATWS-16	2.0	2.0	Left	142	50	0.1	FW, OL	Access Road Entry
Monroe	ATWS-17	2.0	2.1	Right	331	15	0.1	OL	Access Road Entry, Severe Slope
Monroe	ATWS-18	2.0	2.2	Left	640	35	0.5	FW, OL	Wetland Crossing, Stream Crossing, Severe Slope
Monroe	ATWS-19	2.2	2.2	Left	140	35	0.1	OL	Wetland Crossing, Stream Crossing, Severe Slope
Monroe	ATWS-20	2.3	2.3	Right	227	15	0.1	AG, OL	Severe Slope, Topsoil Segregation
Monroe	ATWS-20-A	2.5	2.5	Left	269	20	0.1	FW, OL	Wetland Crossing, Stream Crossing, Severe Slope
Monroe	ATWS-21	2.5	2.5	Right	276	181	1.0	ID, FW, OL	Road Crossing, Existing Utility Crossing, Severe Slope, Topsoil Segregation
Monroe	ATWS-22	2.5	2.6	Left	101	35	0.1	FW, OL	Road Crossing, Existing Utility Crossing, Severe Slope
Monroe	ATWS-23	2.6	2.6	Left	275	35	0.2	AG	Road Crossing, Severe Slope, Topsoil Segregation

APPENDIX C-5 (cont'd)

Summary of ATWS Associated with the TEAL Project

State, Facility, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a]		Area Affected (acres) [b]	Existing Land Use [c]	Justification
					Length (ft.)	Width (ft.)			
Monroe	ATWS-24	2.6	2.8	Left	1042	35	0.8	AG, FW, OL	Severe Slope, Topsoil Segregation
Monroe	ATWS-25	2.8	2.9	Left	229	20	0.1	FW, OL	Severe Slope, Topsoil Segregation
Monroe	ATWS-26	2.9	3.0	Left	457	20	0.2	FW, OL	Severe Slope, Topsoil Segregation
Monroe	ATWS-27	3.0	3.0	Left	110	35	0.1	OL	Access Road Entry, Wetland Crossing, Stream Crossing, Severe Slope, Topsoil Segregation
Monroe	ATWS-28	3.1	3.1	Left	100	35	0.1	FW	Wetland Crossing, Stream Crossing, Severe Slope
Monroe	ATWS-29	3.1	3.3	Left	878	35	0.8	FW, OL	Existing Utility Crossing, Severe Slope, Topsoil Segregation
Monroe	ATWS-30	3.3	3.3	Left	150	32	0.1	OL	Existing Utility Crossing
Monroe	ATWS-31	3.3	3.5	Left	898	35	0.8	ID, FW, OL	Road Crossing, Existing Utility Crossing, Topsoil Segregation
Monroe	ATWS-32	3.5	3.6	Left	656	65	0.9	AG, ID, FW	Road Crossing, Severe Slope, Topsoil Segregation
Monroe	ATWS-33	3.6	3.8	Left	920	35	0.8	AG, FW, OL	Road Crossing, Existing Utility Crossing, Severe Slope, Topsoil Segregation
Monroe	ATWS-34	3.8	4.1	Right	1531	35	1.3	AG, FW, OL	Existing Utility Crossing, Severe Slope, Topsoil Segregation
Monroe	ATWS-35	4.1	4.2	Right	445	35	0.3	FW	Wetland Crossing, Stream Crossing, Severe Slope
Monroe	ATWS-36	4.2	4.3	Right	349	35	0.3	FW	Wetland Crossing, Stream Crossing, Severe Slope
Monroe	ATWS-37	4.3	4.3	Right	128	35	0.1	FW	Wetland Crossing, Stream Crossing, Severe Slope
Monroe	ATWS-38	4.3	4.4	Right	645	25	0.4	FW, OL	Start, End, or Connection Point, Severe Slope, Topsoil Segregation
Monroe	ATWS-39	4.4	4.4	Left	744	243	2.7	OL	Start, End, or Connection Point, Access Road Entry, Topsoil Segregation
						Pipeline Loop Total	**27.0**		
Connecting Pipeline									
Columbiana	ATWS-40	0.0	0.0	South	117	325	1.4	OL	Start, End, or Connection Point, Existing Utility Crossing, Topsoil Segregation
Columbiana	ATWS-41	0.0	0.0	Left	65	87	0.2	OL	Start, End, or Connection Point, Topsoil Segregation
Columbiana	ATWS-42	0.0	0.1	Right	524	128	0.9	OL	Start, End, or Connection Point, Topsoil Segregation
Columbiana	ATWS-43	0.1	0.1	Left	414	65	0.6	OL	Wetland Crossing, Stream Crossing, Topsoil Segregation
Columbiana	ATWS-44	0.3	0.3	North	411	474	4.5	OL	Start, End, or Connection Point
						Connecting Pipeline Total	**7.5**		
Line 73 Regulator Site									
Monroe	ATWS-45	74.1 [d]	74.1 [d]	Left	592	392	4.3	OL	Start, End, or Connection Point, Topsoil Segregation
						Line 73 Regulator Site Total	**4.3**		

APPENDIX C-5 (cont'd)

Summary of ATWS Associated with the TEAL Project

State, Facility, County	ATWS ID	Start MP	End MP	Side of Work Area	Approximate Dimensions [a] Length (ft.)	Approximate Dimensions [a] Width (ft.)	Area Affected (acres) [b]	Existing Land Use [c]	Justification
Line 73 Launcher/Receiver Site									
Monroe	ATWS-46	75.8 [d]	75.8 [d]	Left	315	80	0.5	OL	Start, End, or Connection Point, Topsoil Segregation
Monroe	ATWS-47	75.8 [d]	75.8 [d]	Right	150	25	0.1	OL	Start, End, or Connection Point, Topsoil Segregation
				Line 73 Launcher/Receiver Site Total			**0.6**		
				Total Acres Affected by TEAL Project ATWS			**39.5**		

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[a] Dimensions provided are approximate, as some ATWS are irregularly shaped. The approximate dimensions of two sides of irregularly shaped ATWS are provided and, as such, may not match acreage provided.

[b] Acreage was calculated using GIS software and represents the actual acreage of each ATWS. For this reason, the approximate length and width provided for irregularly shaped ATWS may not match total acres provided.

[c] Open Land = OL (non-agricultural), AG = Agricultural, FW = Forested/Woodland, ID = Industrial/Commercial, RE = Residential, OW = Open Water.

[d] Mileposts are associated with Line 73.

Office of
Energy
Projects

July 2016

FERC/DEIS-270D

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Volume II

NEXUS Gas Transmission Project and Texas Eastern Appalachian Lease Project

Source: State of Ohio Office of Information Technology

NEXUS Gas Transmission, LLC	**Docket Nos.:** CP16-22-000
Texas Eastern Transmission, LP	CP16-23-000
DTE Gas Company	CP16-24-000
Vector Pipeline L.P.	CP16-102-000

Federal Energy Regulatory Commission
Office of Energy Projects
Washington, DC 20426

Cooperating Agencies:

U.S. Environmental Protection Agency **U.S. Fish and Wildlife Service**

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NEXUS Gas Transmission, LLC
NEXUS Gas Transmission Project

Texas Eastern Transmission, LP
Texas Eastern Appalachian Lease Project

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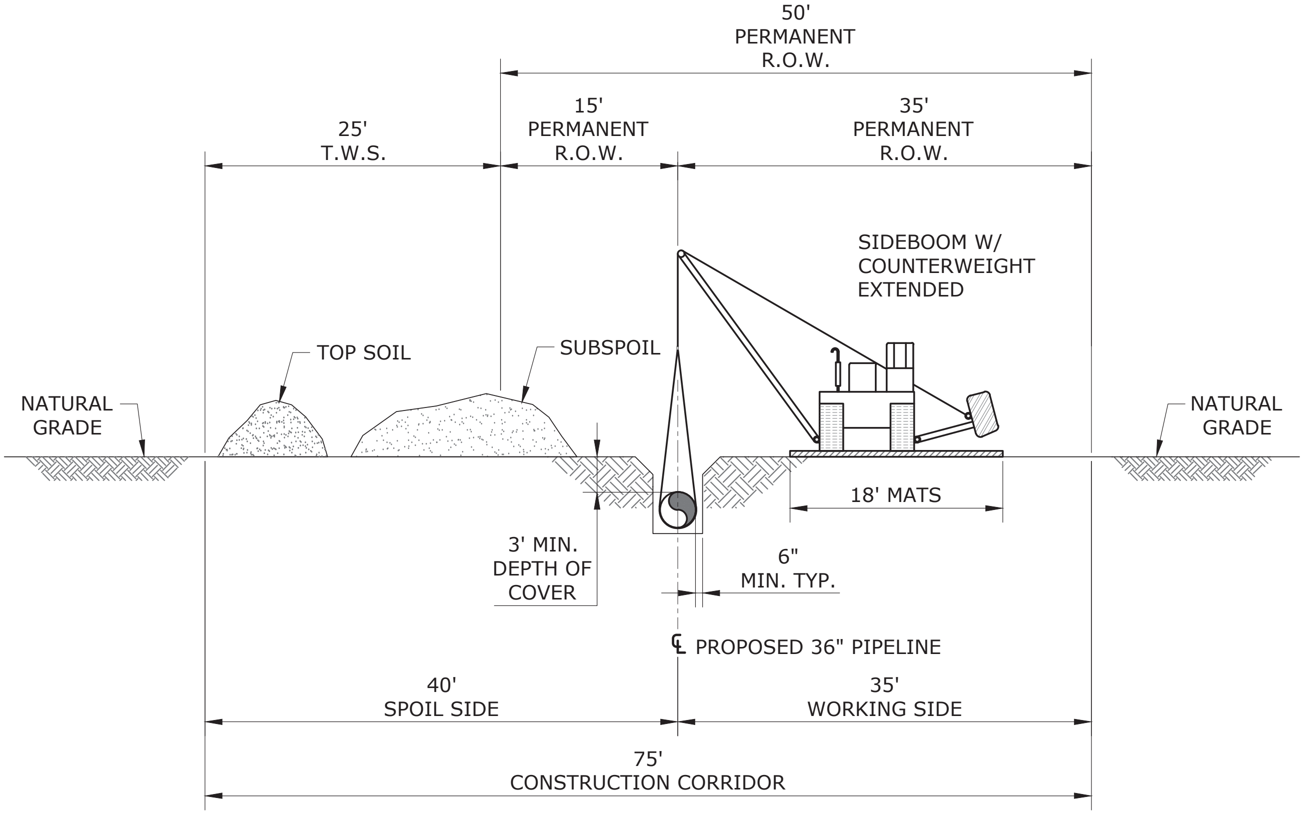
APPENDIX D

TYPICAL RIGHT-OF-WAY CONFIGURATIONS



TYPICAL 75' CONSTRUCTION CORRIDOR

N.T.S.

NOTES:

1. THIS CONSTRUCTION METHOD APPLIES TO LOCATIONS WHERE THE APPLICABLE R.O.W. ARRANGEMENT CALLS FOR 15'-35' PERMANENT R.O.W.
2. THIS CONSTRUCTION METHOD APPLIES TO FORWARD & REVERSE PIPELINE LAY.
3. ALL SPOIL SHALL BE CONTAINED WITHIN THE CONFINES OF THE ROW.
4. THE PIPELINE COVER HAS A MINIMUM DEPTH OF 3FT. IF ROCK IS PRESENT, THE PIPE WILL NEED TO BE PLACED ON SAND BAGS AND THE CONTRACTOR WILL ACCOUNT FOR EXTRA DEPTH IN THE DITCH.
5. CONTRACTORS MAY REQUEST TO PLACE TOP SOIL TO THE WORKING SIDE OF THE CONSTRUCTION R.O.W. WHEN DEEMED FIT.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	23Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL WETLAND CONSTRUCTION 75ft CORRIDOR DETAIL –METHOD #1
CHECKED BY: DC	23Oct15	YR.: 2017	
DRAWN BY: RVE	23Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: OHIO / MICHIGAN

DWG. NO. S4NX–P–8000

IC.#

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D-1

D-2

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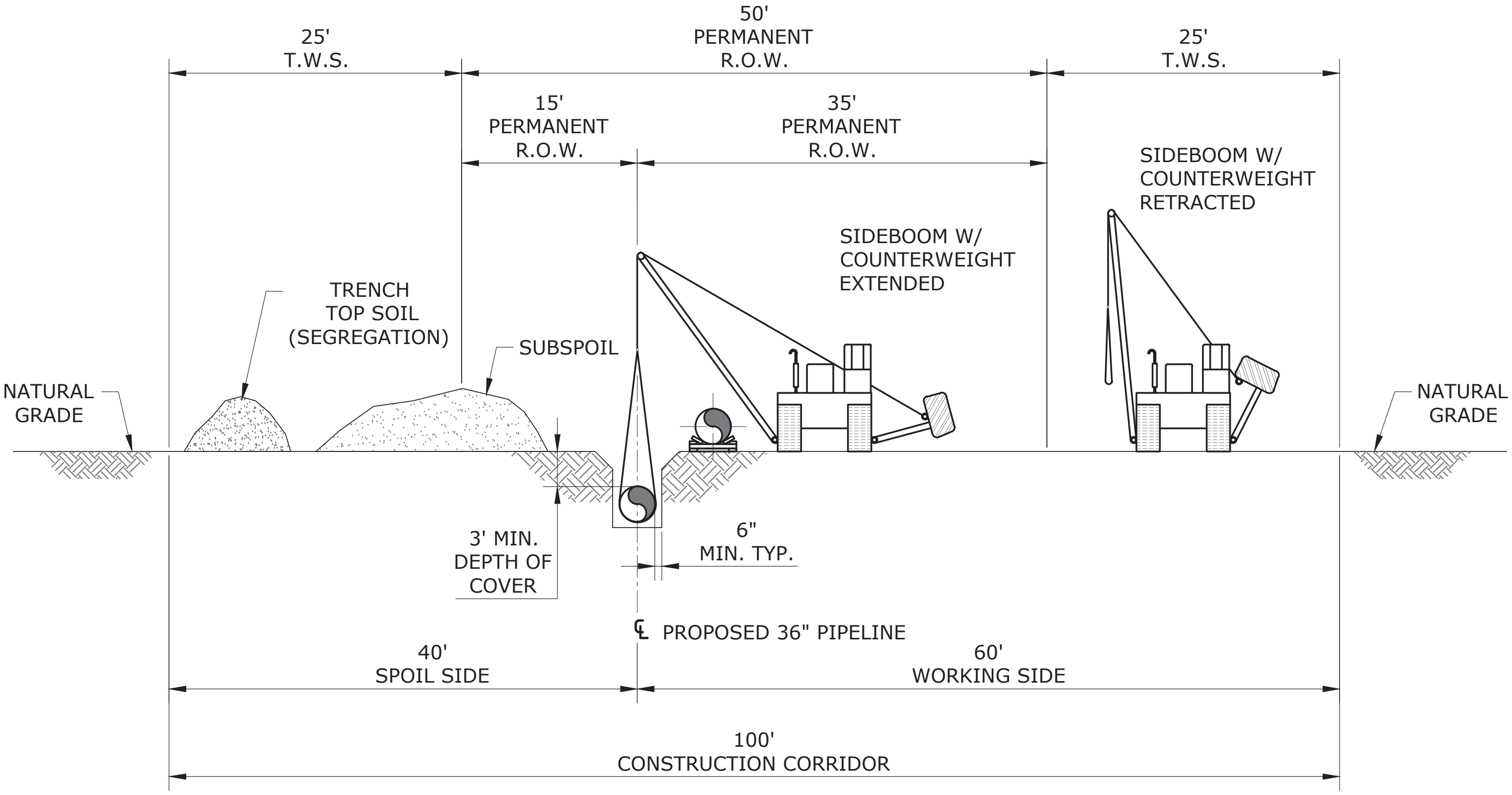

TYPICAL 100' CONSTRUCTION CORRIDOR

N.T.S.

NOTES:

1. THIS CONSTRUCTION METHOD APPLIES TO LOCATIONS WHERE THE APPLICABLE R.O.W. ARRANGEMENT CALLS FOR 15'-35' PERMANENT R.O.W.
2. THIS CONSTRUCTION METHOD APPLIES TO FORWARD & REVERSE PIPELINE LAY.
3. ALL SPOIL SHALL BE CONTAINED WITHIN THE CONFINES OF THE ROW.
4. THE PIPELINE COVER HAS A MINIMUM DEPTH OF 3FT. IF ROCK IS PRESENT, THE PIPE WILL NEED TO BE PLACED ON SAND BAGS AND THE CONTRACTOR WILL ACCOUNT FOR EXTRA DEPTH IN THE DITCH.
5. CONTRACTOR MAY REQUEST TO PLACE TOP SOIL TO WORKING SIDE OF THE CONSTRUCTION R.O.W. WHEN DEEMED FIT.

0	ISSUED FOR FERC FILING	29Oct15
REV.	DESCRIPTION	DATE

PROJ. ENG. KG	23Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE UPLAND CONSTRUCTION 100' CORRIDOR DETAIL -METHOD #2	
CHECKED BY: DF	23Oct15	YR.: 2017		
DRAWN BY: RVE	23Oct15	W.O.		
SCALE: NTS	DATE	REV.: 0	LOC.: OHIO / MICHIGAN	DWG. NO. S4NX-P-8001

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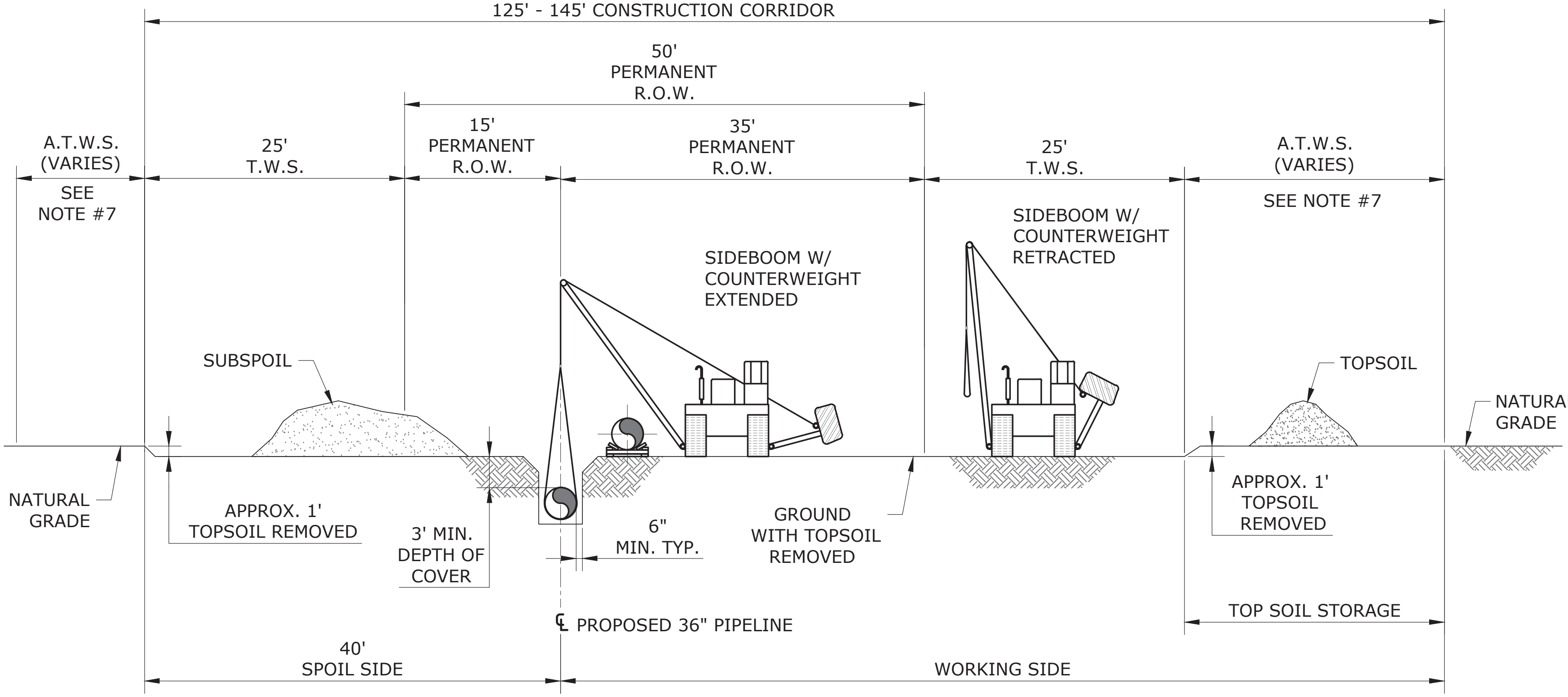

TYPICAL 125' - 145' CONSTRUCTION CORRIDOR

N.T.S.

NOTES:

1. THIS CONSTRUCTION METHOD APPLIES TO LOCATIONS WHERE THE APPLICABLE R.O.W. ARRANGEMENT CALLS FOR 15'-35' PERMANENT R.O.W.
2. THIS CONSTRUCTION METHOD APPLIES TO FORWARD & REVERSE PIPELINE LAY.
3. ALL SPOIL SHALL BE CONTAINED WITHIN THE CONFINES OF THE ROW.
4. USE IN AREAS OF DRAIN TILE CROSSINGS, TOPSOIL SEGREGATION AND/ OR SIDE SLOPE.
5. THE PIPELINE COVER HAS A MINIMUM DEPTH OF 3FT. IF ROCK IS PRESENT, THE PIPE WILL NEED TO BE PLACED ON SANDBAGS AND CONTRACTOR WILL ACCOUNT FOR EXTRA DEPTH IN THE DITCH.
6. ATWS: POTENTIALLY USED WHEN DRAIN TILES ARE ENCOUNTERED.
7. TOPSOIL TO BE STORED ON SIDE OF ROW AS INDICATED BY 25 FT ATWS SHOWN ON PIPELINE ALIGNMENT SHEETS.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	21Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL AGRICULTURAL MAINLINE CONSTRUCTION 125' - 145' CORRIDOR DETAIL -METHOD #3
CHECKED BY: DF	21Oct15	YR.: 2017	
DRAWN BY: RVE	21Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: OHIO / MICHIGAN

DWG. NO. S4NX-P-8002

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D-4

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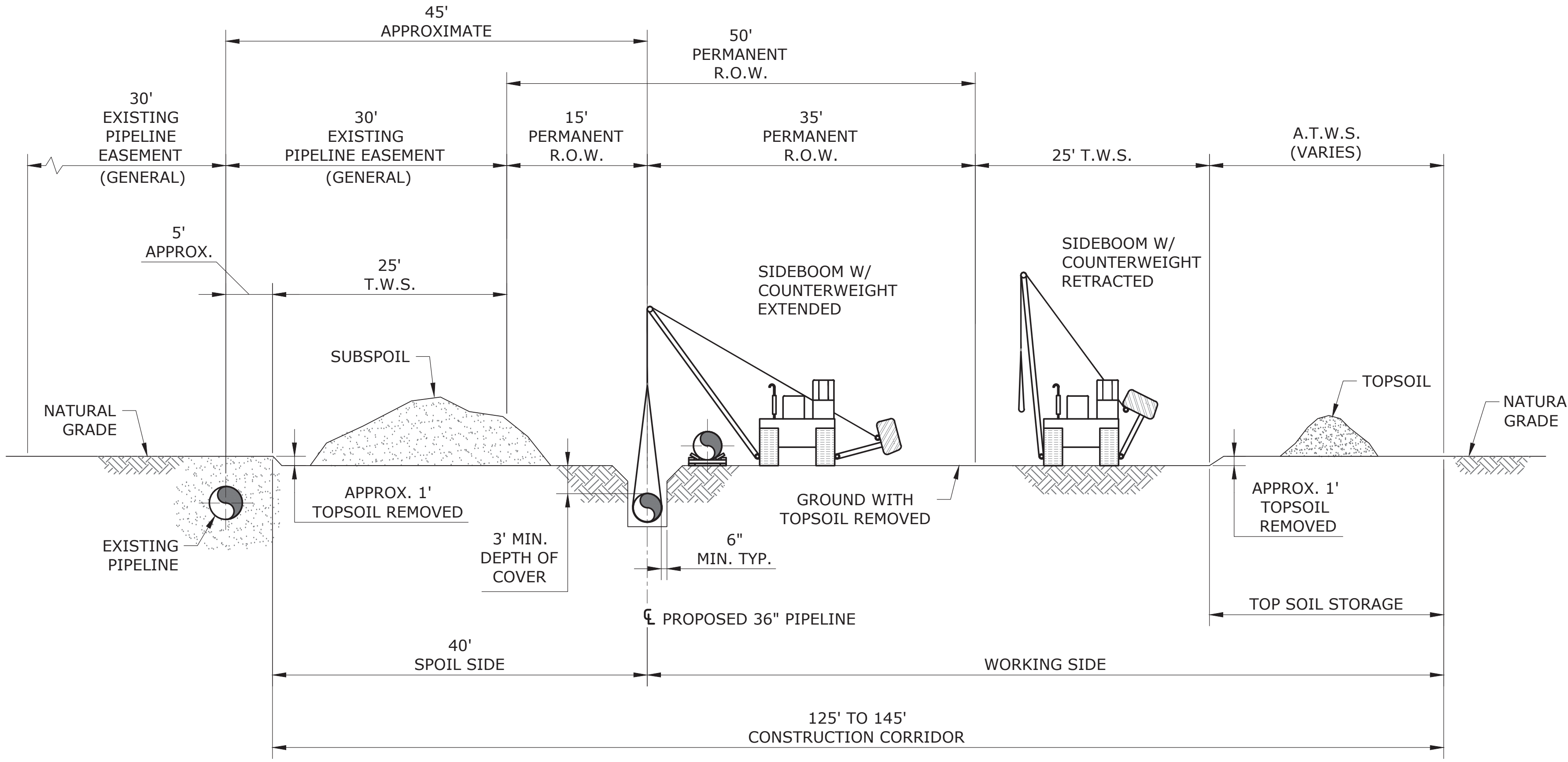

TYPICAL 125' TO 145' CONSTRUCTION
PROPOSED PIPELINE TO THE EAST OF EXISTING LINE

N.T.S.

NOTES:

1. THIS CONSTRUCTION METHOD APPLIES TO LOCATIONS WHERE THE APPLICABLE R.O.W. ARRANGEMENT CALLS FOR 15'-35' PERMANENT R.O.W.
2. THIS CONSTRUCTION METHOD APPLIES TO FORWARD & REVERSE PIPELINE LAY.
3. ALL SPOIL SHALL BE CONTAINED WITHIN THE CONFINES OF THE ROW.
4. THE PIPELINE COVER HAS A MINIMUM DEPTH OF 3FT. IF ROCK IS PRESENT, THE PIPE WILL NEED TO BE PLACED ON SAND BAGS AND THE CONTRACTOR WILL ACCOUNT FOR EXTRA DEPTH IN THE DITCH.
5. USE IN AREAS OF DRAIN TILE CROSSINGS, TOPSOIL SEGREGATION AND/ OR SIDE SLOPE.
6. TRAVELING ON TOP OR ACROSS EXISTING PIPELINE IS PROHIBITED WITHOUT WRITTEN PERMISSION.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	23Oct15	YR.: 2017	TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL EXISTING PIPELINE ROW EASEMENT 125' TO 145' CONSTRUCTION CORRIDOR (EAST)
CHECKED BY: DF	23Oct15		
DRAWN BY: RVE	23Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: OHIO \ MICHIGAN

DWG. NO. S4NX-P-8003

IC.#

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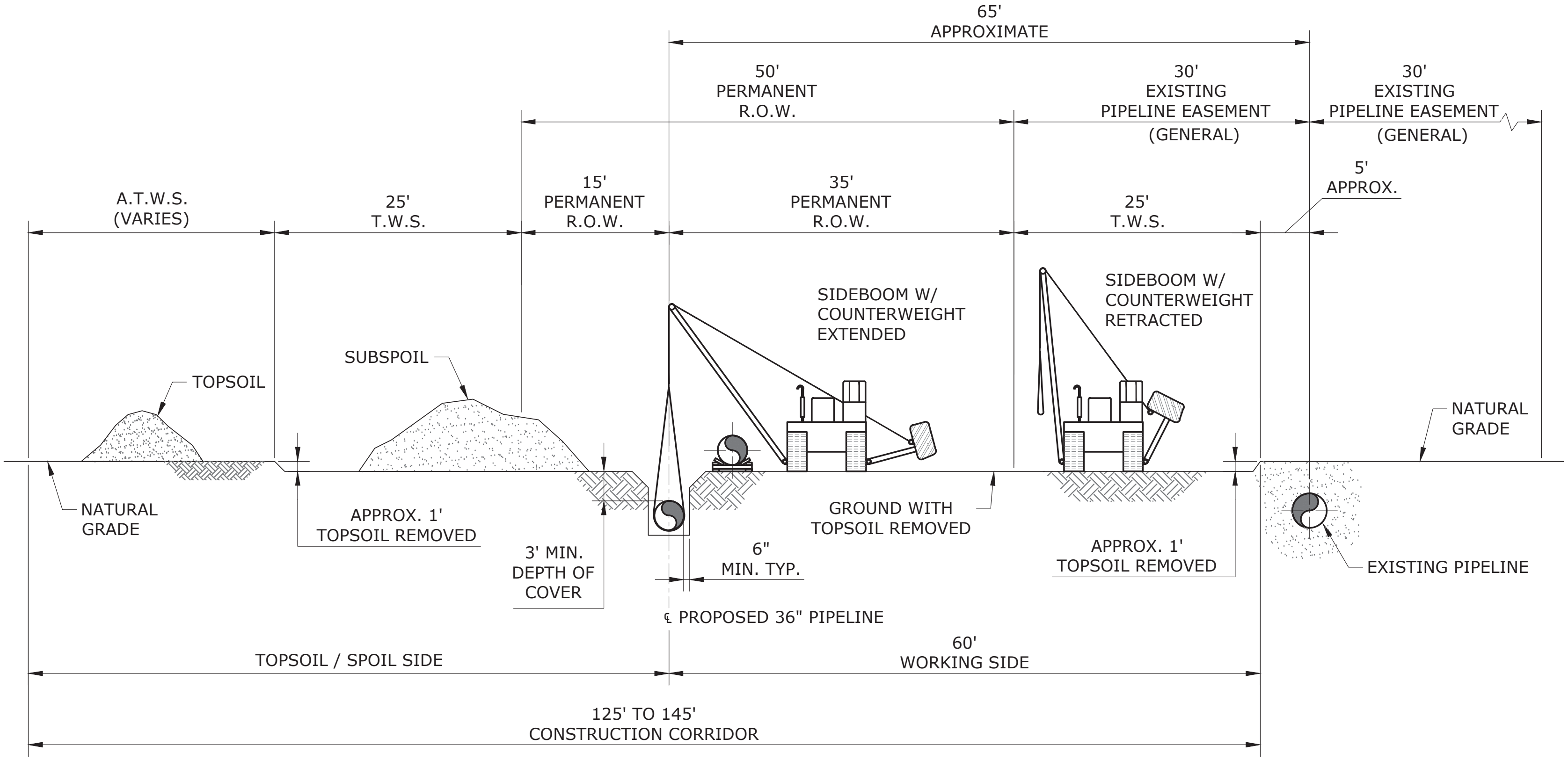


TYPICAL 125' TO 145' CONSTRUCTION
PROPOSED PIPELINE TO THE WEST OF EXISTING LINE

N.T.S.

NOTES:

1. THIS CONSTRUCTION METHOD APPLIES TO LOCATIONS WHERE THE APPLICABLE R.O.W. ARRANGEMENT CALLS FOR 15'-35' PERMANENT R.O.W.
2. THIS CONSTRUCTION METHOD APPLIES TO FORWARD & REVERSE PIPELINE LAY.
3. ALL SPOIL SHALL BE CONTAINED WITHIN THE CONFINES OF THE ROW.
4. THE PIPELINE COVER HAS A MINIMUM DEPTH OF 3FT. IF ROCK IS PRESENT, THE PIPE WILL NEED TO BE PLACED ON SAND BAGS AND THE CONTRACTOR WILL ACCOUNT FOR EXTRA DEPTH IN THE DITCH.
5. USE IN AREAS OF DRAIN TILE CROSSINGS, TOPSOIL SEGREGATION AND/ OR SIDE SLOPE.
6. TRAVELING ON TOP OR ACROSS EXISTING PIPELINE IS PROHIBITED WITHOUT WRITTEN PERMISSION.

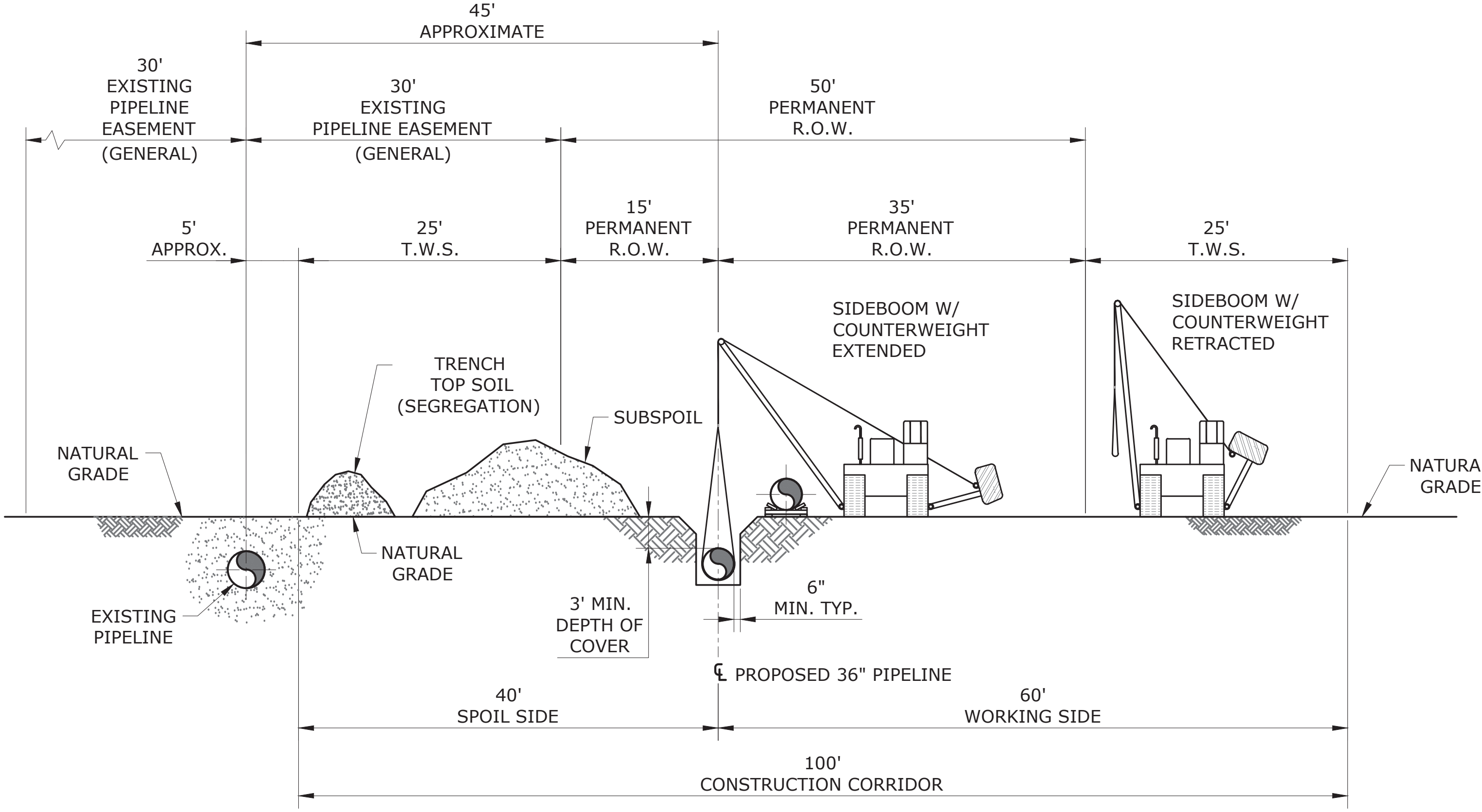
0	ISSUED FOR FERC FILING	29Oct15
REV.	DESCRIPTION	DATE

PROJ. ENG. KG	23Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL EXISTING PIPELINE ROW EASEMENT 125' TO 145' CONSTRUCTION CORRIDOR (WEST)	
CHECKED BY: DF	23Oct15	YR.: 2017		
DRAWN BY: RVE	23Oct15	W.O.		
SCALE: NTS	DATE	REV.: 0	LOC.: OHIO \ MICHIGAN	DWG. NO. S4NX-P-8004

IG.#

D-6

FOR63995 October 28, 2015 7:16pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8005_0.DWG



TYPICAL 100' CONSTRUCTION
PROPOSED PIPELINE TO THE EAST OF EXISTING LINE

N.T.S.

NOTES:

1. THIS CONSTRUCTION METHOD APPLIES TO LOCATIONS WHERE THE APPLICABLE R.O.W. ARRANGEMENT CALLS FOR 15'-35' PERMANENT R.O.W.
2. THIS CONSTRUCTION METHOD APPLIES TO FORWARD & REVERSE PIPELINE LAY.
3. ALL SPOIL SHALL BE CONTAINED WITHIN THE CONFINES OF THE ROW.
4. THE PIPELINE COVER HAS A MINIMUM DEPTH OF 3FT. IF ROCK IS PRESENT, THE PIPE WILL NEED TO BE PLACED ON SAND BAGS AND THE CONTRACTOR WILL ACCOUNT FOR EXTRA DEPTH IN THE DITCH.
5. USE IN AREAS OF DRAIN TILE CROSSINGS, TOPSOIL SEGREGATION AND/ OR SIDE SLOPE.
6. TRAVELING ON TOP OR ACROSS EXISTING PIPELINE IS PROHIBITED WITHOUT WRITTEN PERMISSION.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG.	KG	15Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL EXISTING PIPELINE ROW EASEMENT 100' CONSTRUCTION CORRIDOR (EAST)
CHECKED BY:	DC	15Oct15	YR.: 2017	
DRAWN BY:	RVE	15Oct15	W.O.	
SCALE:	NTS	DATE	REV.: 0	LOC.: OHIO \ MICHIGAN

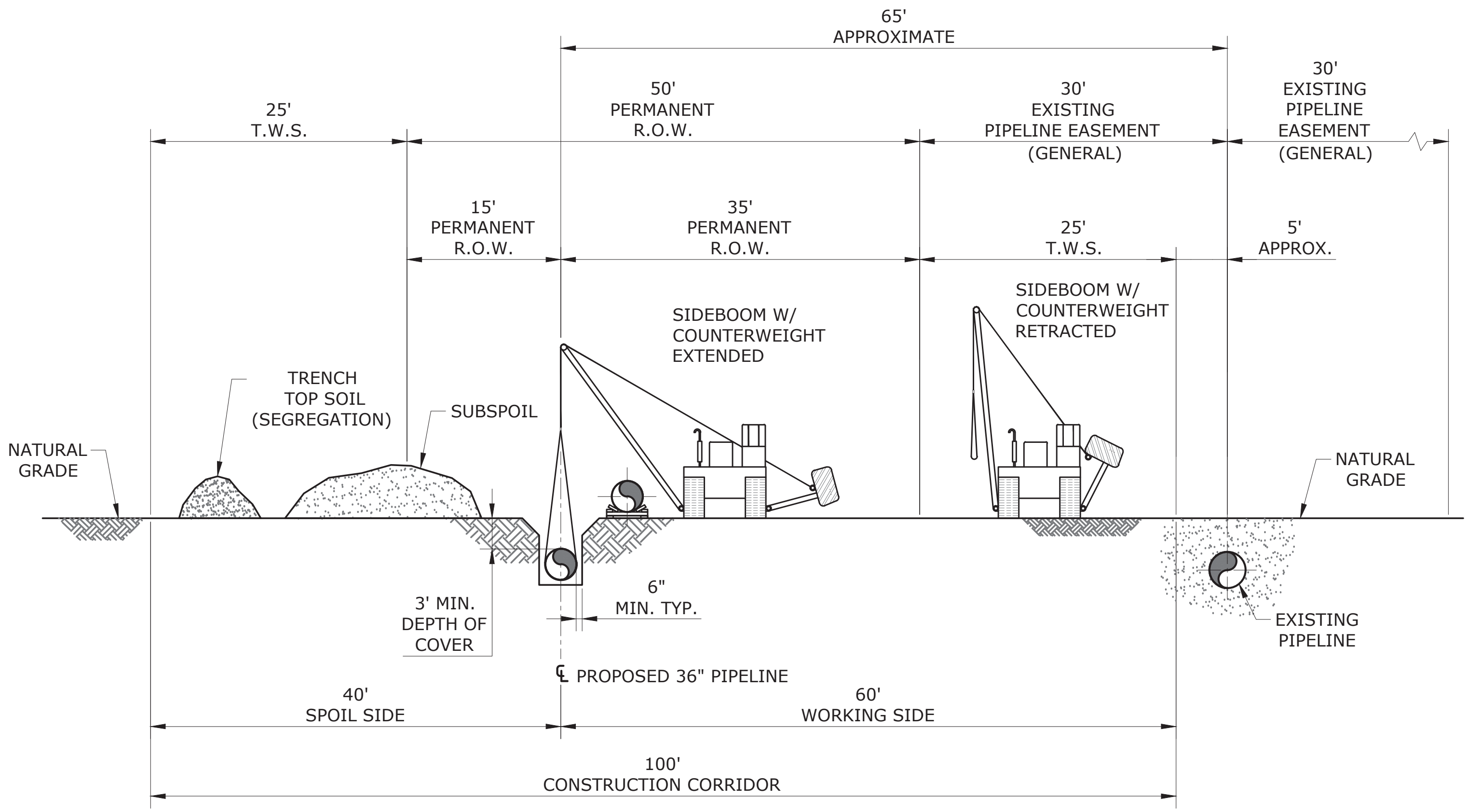
DWG. NO. S4NX-P-8005

IC.#

D-7

FOR63995 October 28, 2015 7:17pm

Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8006_0.DWG



TYPICAL 100' CONSTRUCTION
PROPOSED PIPELINE TO THE WEST OF EXISTING LINE

N.T.S.

NOTES:

1. THIS CONSTRUCTION METHOD APPLIES TO LOCATIONS WHERE THE APPLICABLE R.O.W. ARRANGEMENT CALLS FOR 15'-35' PERMANENT R.O.W.
2. THIS CONSTRUCTION METHOD APPLIES TO FORWARD & REVERSE PIPELINE LAY.
3. ALL SPOIL SHALL BE CONTAINED WITHIN THE CONFINES OF THE ROW.
4. THE PIPELINE COVER HAS A MINIMUM DEPTH OF 3FT. IF ROCK IS PRESENT, THE PIPE WILL NEED TO BE PLACED ON SAND BAGS AND THE CONTRACTOR WILL ACCOUNT FOR EXTRA DEPTH IN THE DITCH.
5. USE IN AREAS OF DRAIN TILE CROSSINGS, TOPSOIL SEGREGATION AND/ OR SIDE SLOPE.
6. TRAVELING ON TOP OR ACROSS EXISTING PIPELINE IS PROHIBITED WITHOUT WRITTEN PERMISSION.

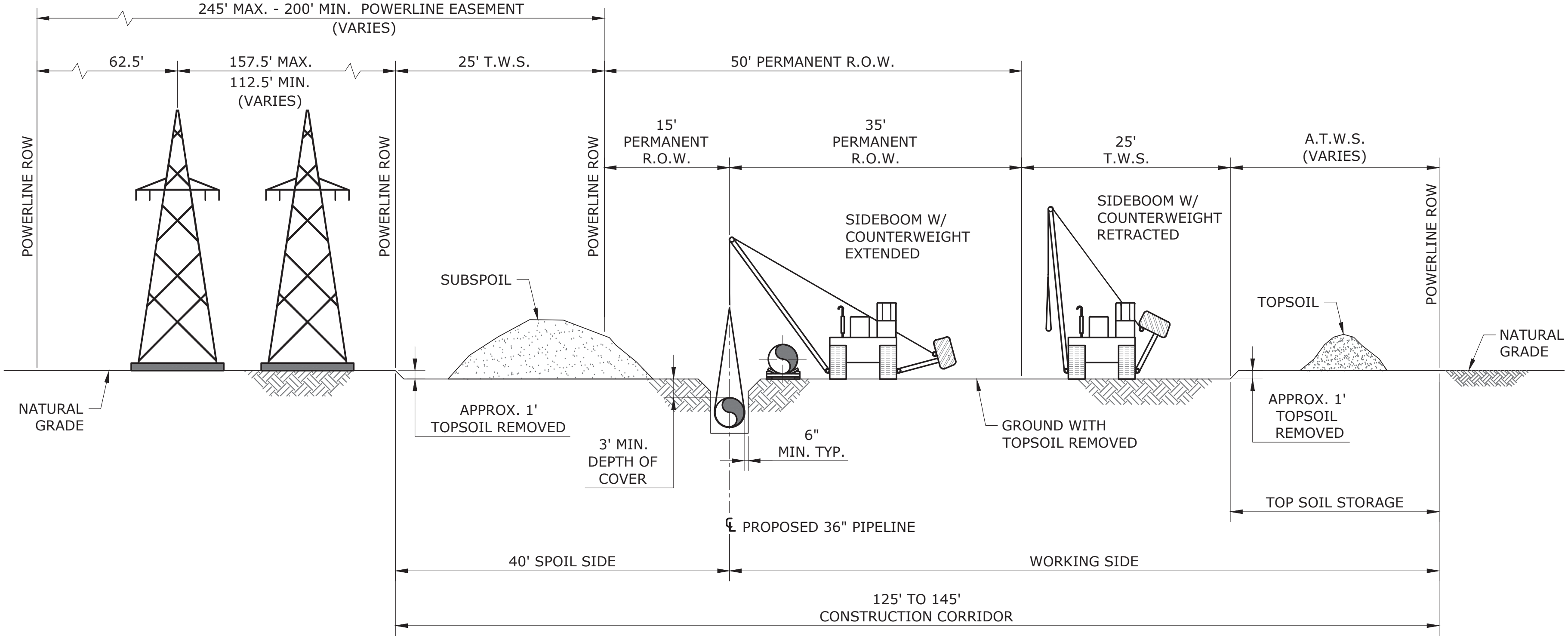
REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	15Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL EXISTING PIPELINE ROW EASEMENT 100' CONSTRUCTION CORRIDOR (WEST)
CHECKED BY: DC	15Oct15	YR.: 2017	
DRAWN BY: RVE	15Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: OHIO \ MICHIGAN

DWG. NO. S4NX-P-8006

IC.#

FOR63995 October 28, 2015 7:18pm
Filename: \\HOPPFIL014\H0_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8007-A_0.DWG



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 245' MAX - 200' MIN. POWERLINE EASEMENT

N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG.	KG	23Oct15	
CHECKED BY:	DF	23Oct15	YR.: 2017
DRAWN BY:	RVE	23Oct15	W.O.
SCALE:	NTS	DATE	REV.: 0

TITLE: NEXUS GAS TRANSMISSION PROJECT
TYPICAL MAINLINE CONSTRUCTION METHOD #1A
NORTH OR EAST OF POWERLINE EASEMENT

LOC.: COLUMBIANA COUNTY, OHIO

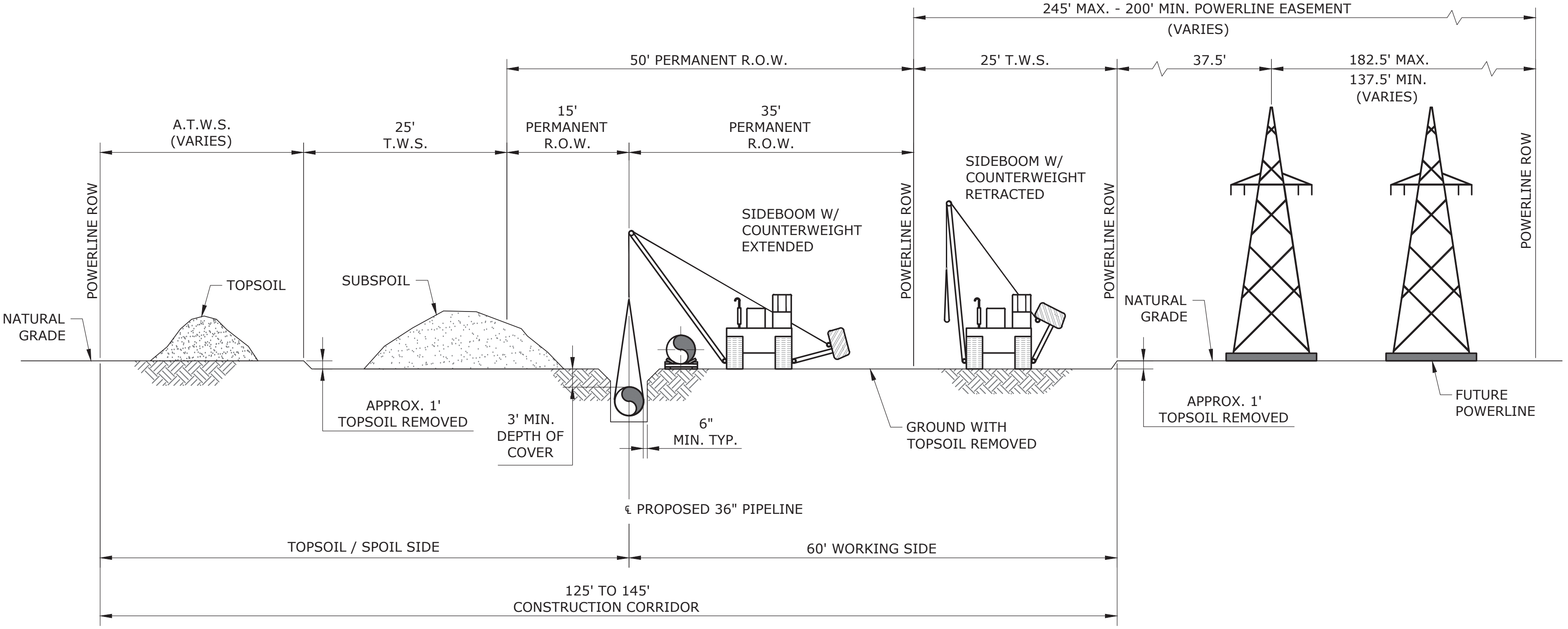
DWG. NO. S4NX-P-8007-A

IC.#

D-9

FOR63995 October 28, 2015 7:19pm

Filename: \\HOPPFIL014\H0_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8007-B_0.DWG



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 245' MAX - 200' MIN POWERLINE EASEMENT

N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	23Oct15		
CHECKED BY: DF	23Oct15	YR.: 2017	
DRAWN BY: RVE	23Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	

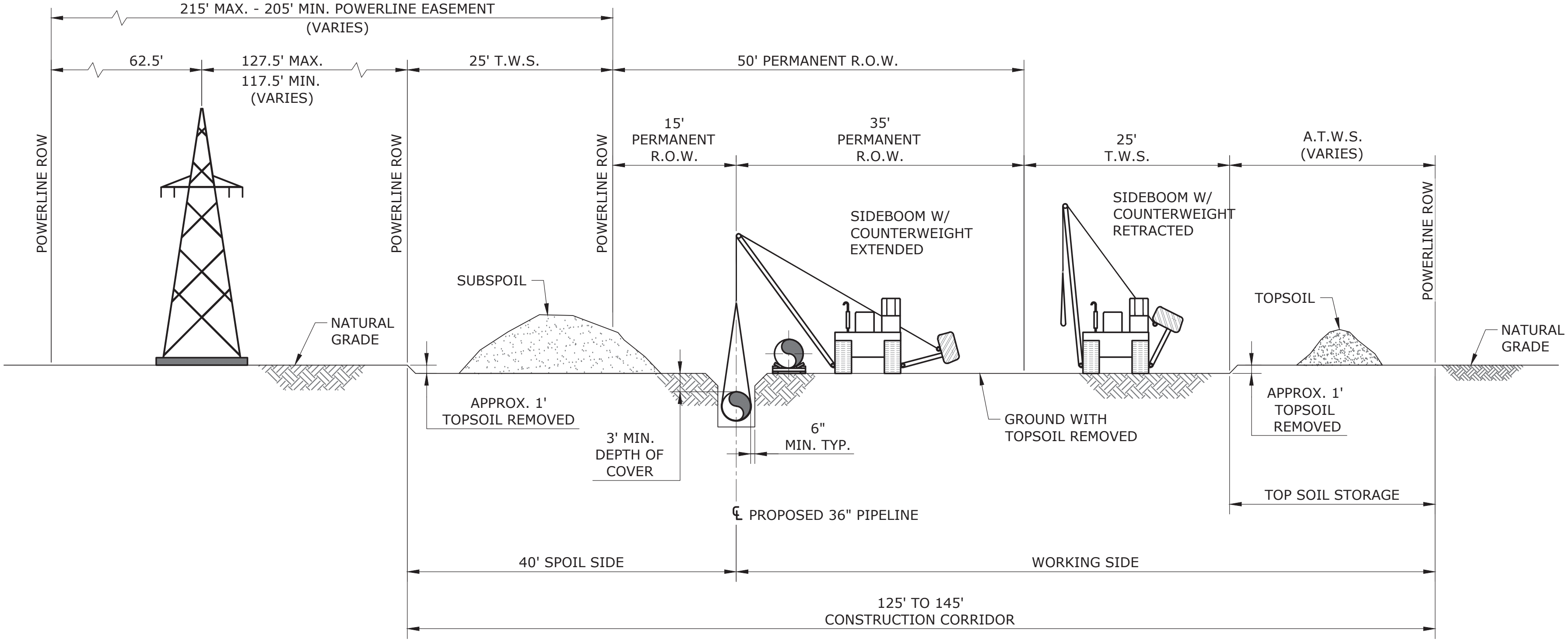
TITLE: NEXUS GAS TRANSMISSION PROJECT
TYPICAL MAINLINE CONSTRUCTION METHOD #1B
SOUTH OR WEST OF POWERLINE EASEMENT

LOC.: COLUMBIANA COUNTY, OHIO

DWG. NO. S4NX-P-8007-B

IG.#

FOR63995 October 28, 2015 7:21pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8008-A_0.DWG



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 215' MAX. - 205' MIN. POWERLINE EASEMENT

N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

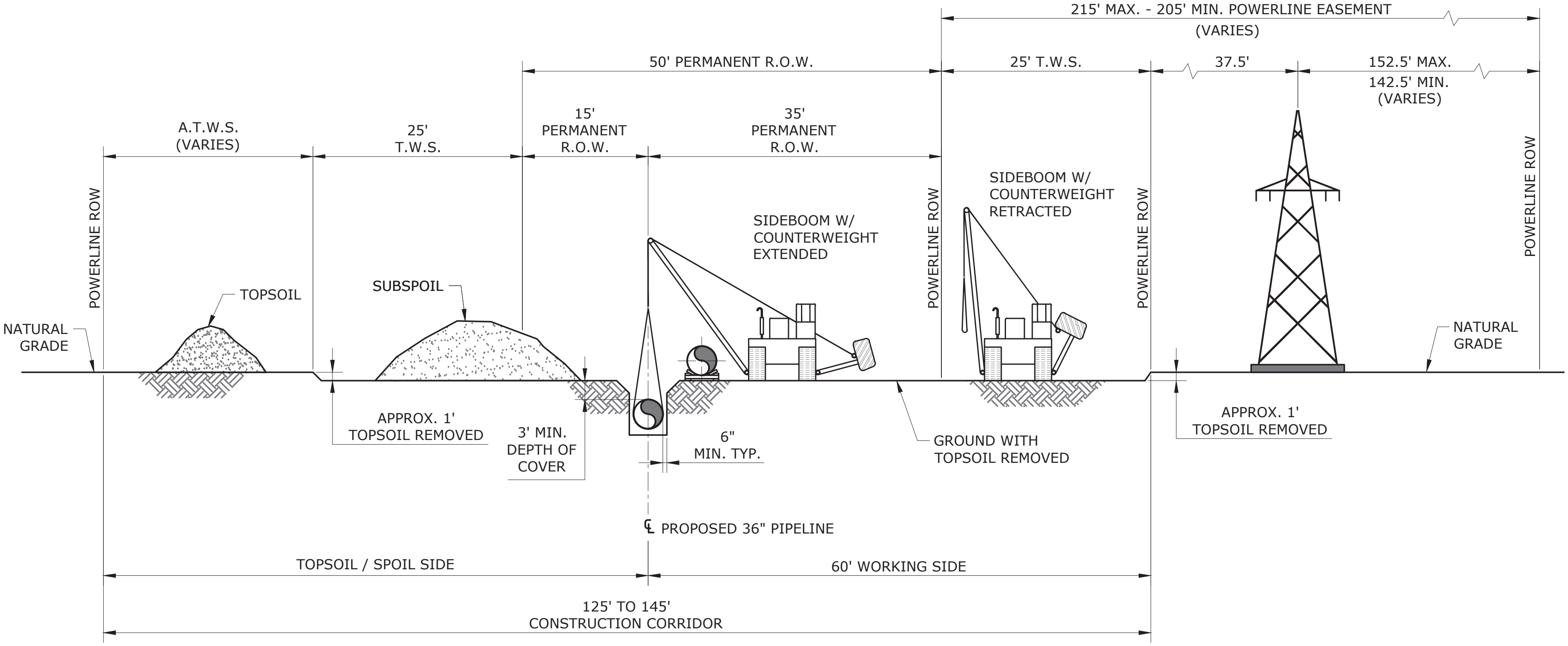
PROJ. ENG.	KG	23Oct15	
CHECKED BY:	DF	23Oct15	YR.: 2015
DRAWN BY:	RVE	23Oct15	W.O.
SCALE:	NTS	DATE	REV.: 0

TITLE: NEXUS GAS TRANSMISSION PROJECT
TYPICAL MAINLINE CONSTRUCTION METHOD #2A
NORTH OR EAST OF POWERLINE EASEMENT

LOC.: STARK COUNTY, OHIO

DWG. NO. S4NX-P-8008-A

IC.#



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 215' MAX. - 205' MIN. POWERLINE EASEMENT

N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	23Oct15	YR.: 2017	TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #2B SOUTH OR WEST OF POWERLINE EASEMENT
CHECKED BY: DF	23Oct15		
DRAWN BY: RVE	23Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: STARK COUNTY, OHIO

DWG. NO. S4NX-P-8008-B

IG.#

FOR63995 October 28, 2015 7:20pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8008-B_0.DWG

FOR63995 October 28, 2015 7:22pm
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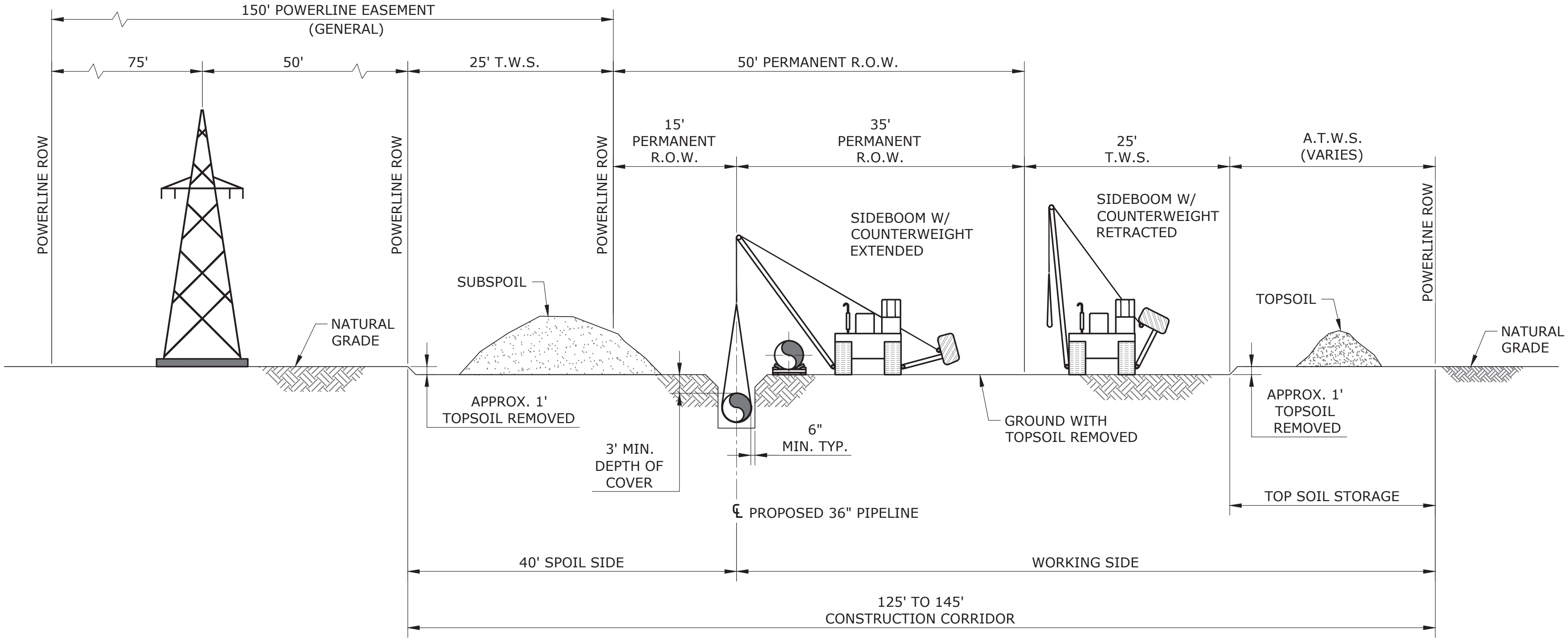


TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 150' POWERLINE EASEMENT

N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG.	KG	26Oct15	
CHECKED BY:	DC	26Oct15	YR.: 2017
DRAWN BY:	RVE	26Oct15	W.O.
SCALE:	NTS	DATE	REV.: 0

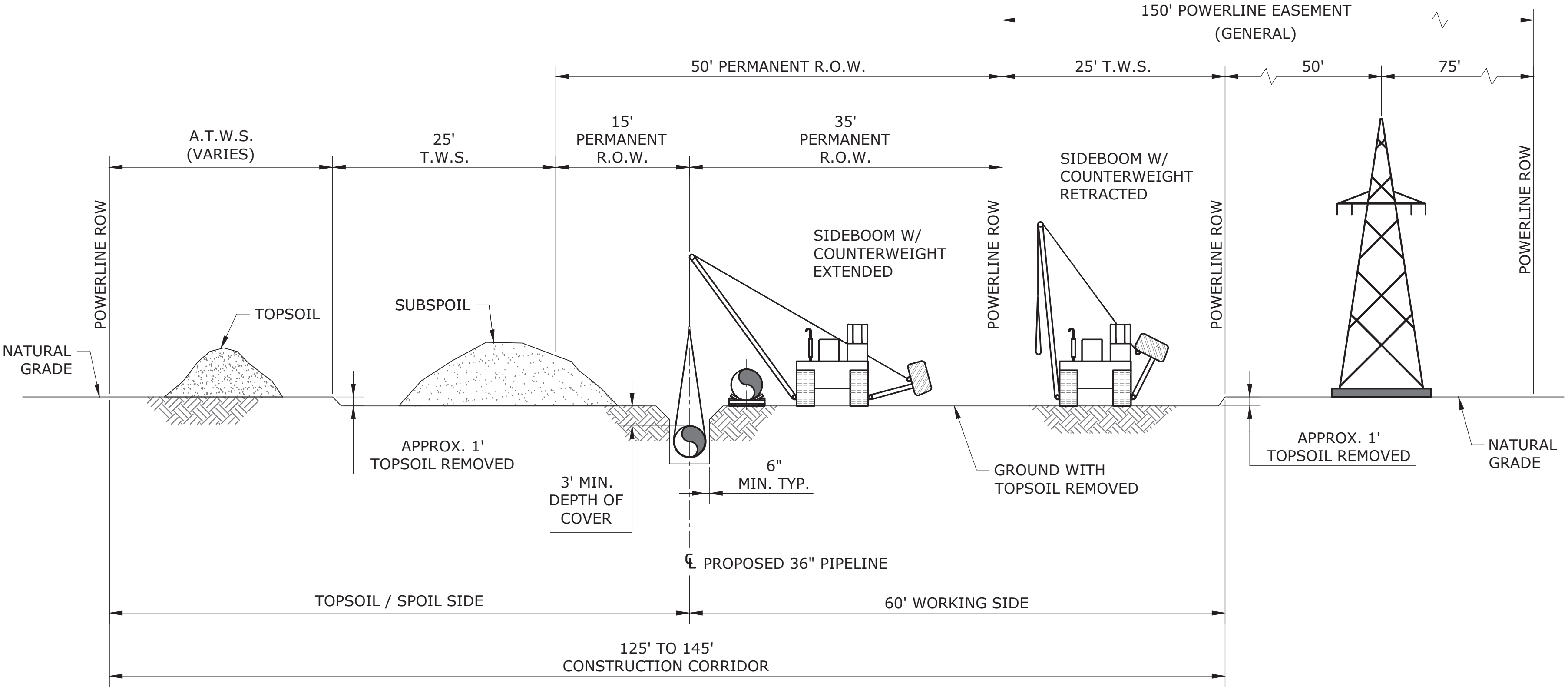
TITLE: NEXUS GAS TRANSMISSION PROJECT
TYPICAL MAINLINE CONSTRUCTION METHOD #3A
NORTH OR EAST OF POWERLINE EASEMENT

LOC.: SUMMIT COUNTY, OHIO

DWG. NO. S4NX-P-8009-A

IG.#

FOR63995 October 28, 2015 7:24pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8009B_0.DWG



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 150' POWERLINE EASEMENT

N.T.S.

0	ISSUED FOR FERC FILING	29Oct15
REV.	DESCRIPTION	DATE

PROJ. ENG.	KG	26Oct15	
CHECKED BY:	DC	26Oct15	YR.: 2017
DRAWN BY:	RVE	26Oct15	W.O.
SCALE:	NTS	DATE	REV.: 0

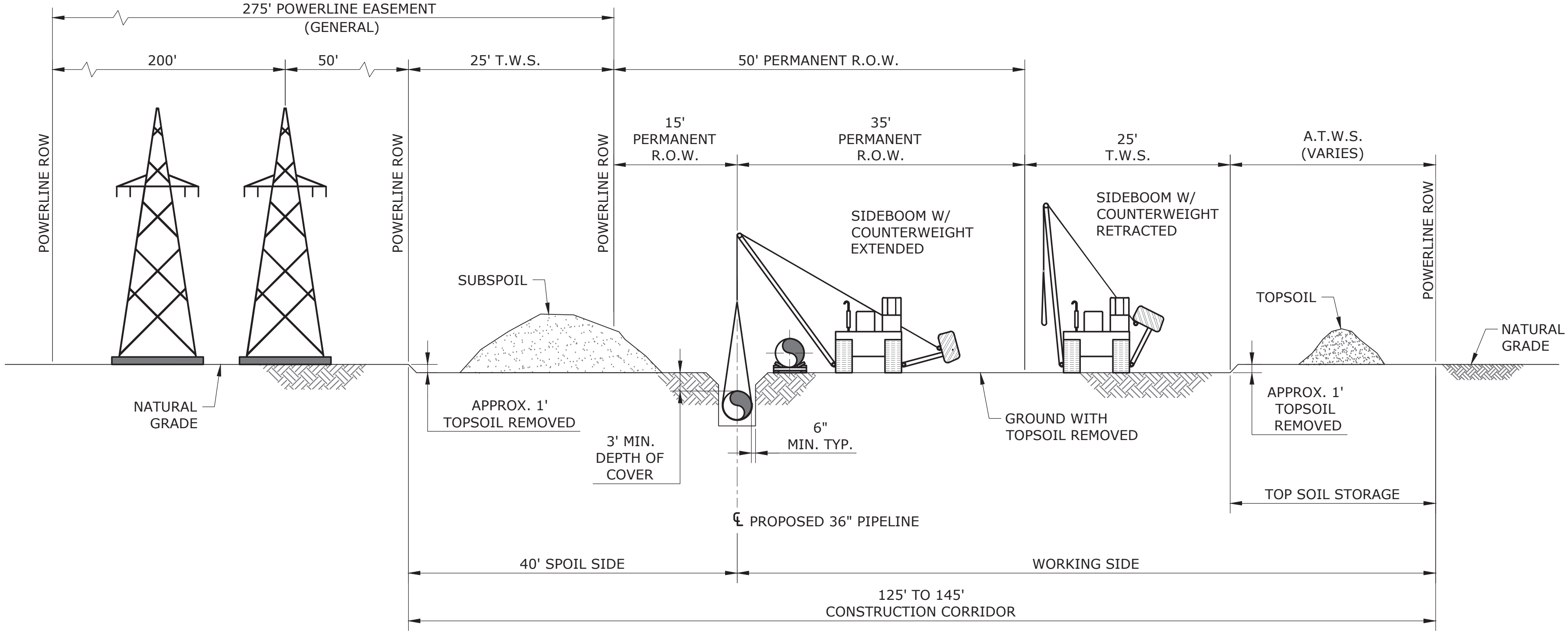
IC.#

TITLE: NEXUS GAS TRANSMISSION PROJECT
TYPICAL MAINLINE CONSTRUCTION METHOD #3B
SOUTH OR WEST OF POWERLINE EASEMENT

LOC.: SUMMIT COUNTY, OHIO

DWG. NO. S4NX-P-8009-B

FOR63995 October 28, 2015 7:25pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8010-A_0.DWG



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR
WITH 275' POWERLINE EASEMENT
N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG.	KG	26Oct15	
CHECKED BY:	DC	26Oct15	YR.: 2017
DRAWN BY:	RVE	26Oct15	W.O.
SCALE:	NTS	DATE	REV.: 0

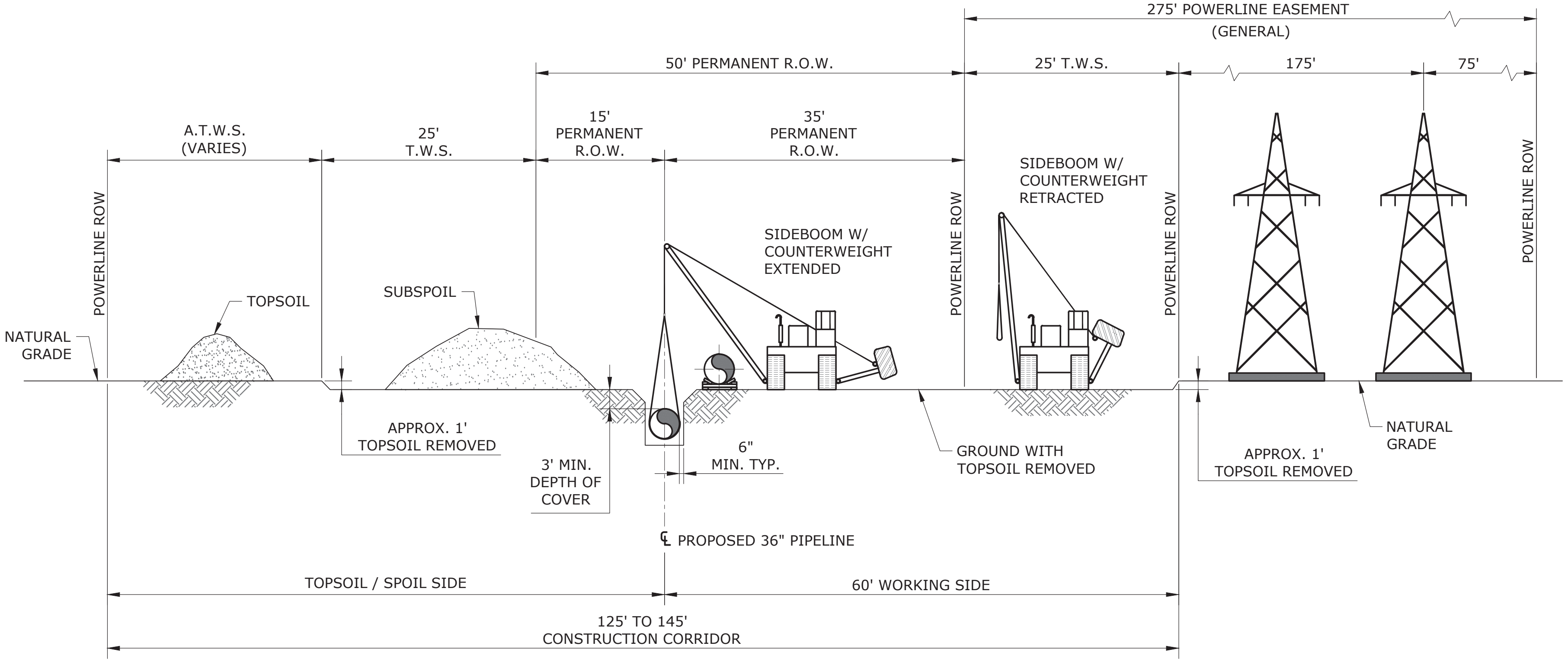
TITLE: NEXUS GAS TRANSMISSION PROJECT
TYPICAL MAINLINE CONSTRUCTION METHOD #4A
NORTH OR EAST OF POWERLINE EASEMENT

LOC.: WAYNE COUNTY, OHIO

DWG. NO. S4NX-P-8010-A

IC.#

FOR63995 October 28, 2015 7:26pm
Filename: \\HOPPFIL014\H0_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8010-B_0.DWG



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 275' POWERLINE EASEMENT

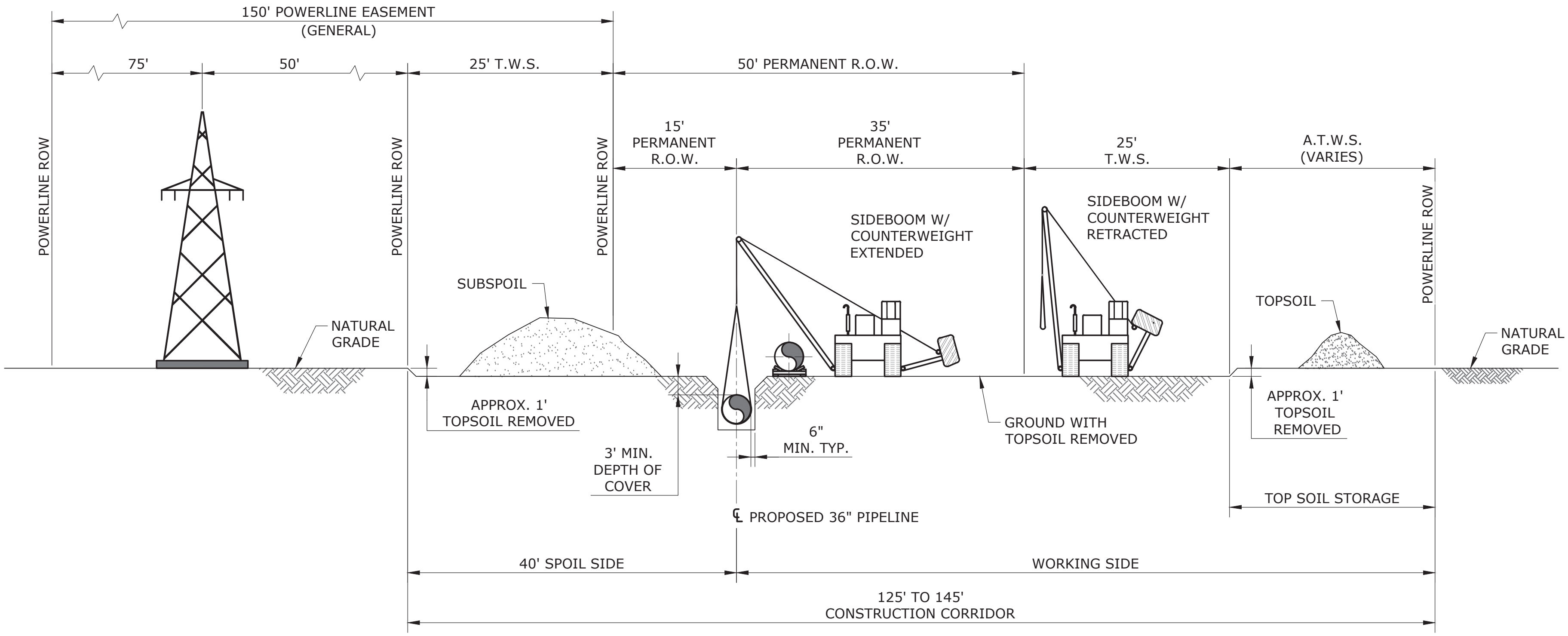
N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	26Oct15	YR.: 2017	TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #4B SOUTH OR WEST OF POWERLINE EASEMENT	
CHECKED BY: DC	26Oct15			
DRAWN BY: RVE	26Oct15	W.O.		
SCALE: NTS	DATE	REV.: 0	LOC.: WAYNE COUNTY, OHIO	DWG. NO. S4NX-P-8010-B

IC.#

FOR63995 October 28, 2015 7:27pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8011-A_0.DWG



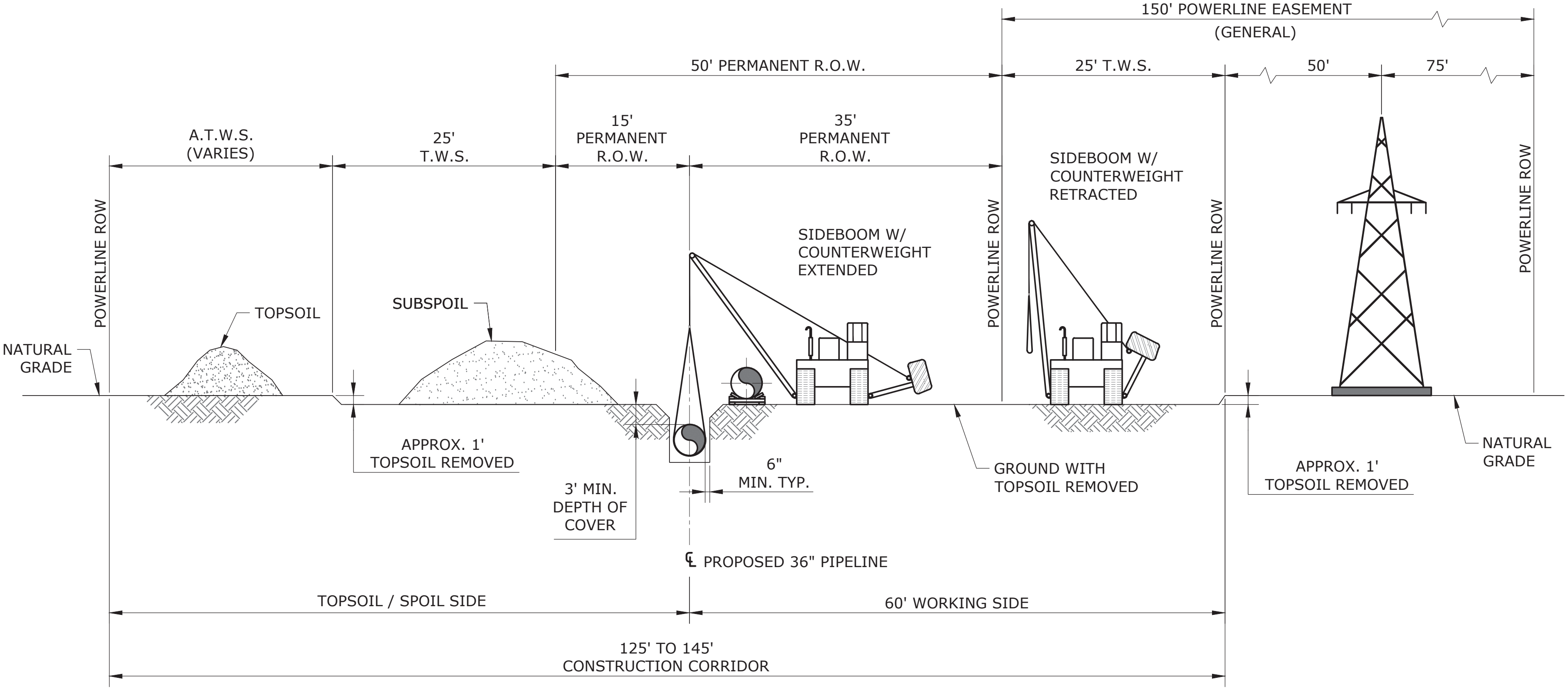
TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 150' POWERLINE EASEMENT

N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG.	KG	26Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #5A NORTH OR EAST OF POWERLINE EASEMENT	
CHECKED BY:	DC	26Oct15	YR.: 2017		
DRAWN BY:	RVE	26Oct15	W.O.		
SCALE:	NTS	DATE	REV.: 0	LOC.: MEDINA COUNTY, OHIO	DWG. NO. S4NX-P-8011-A

IC:#



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 150' POWERLINE EASEMENT

N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

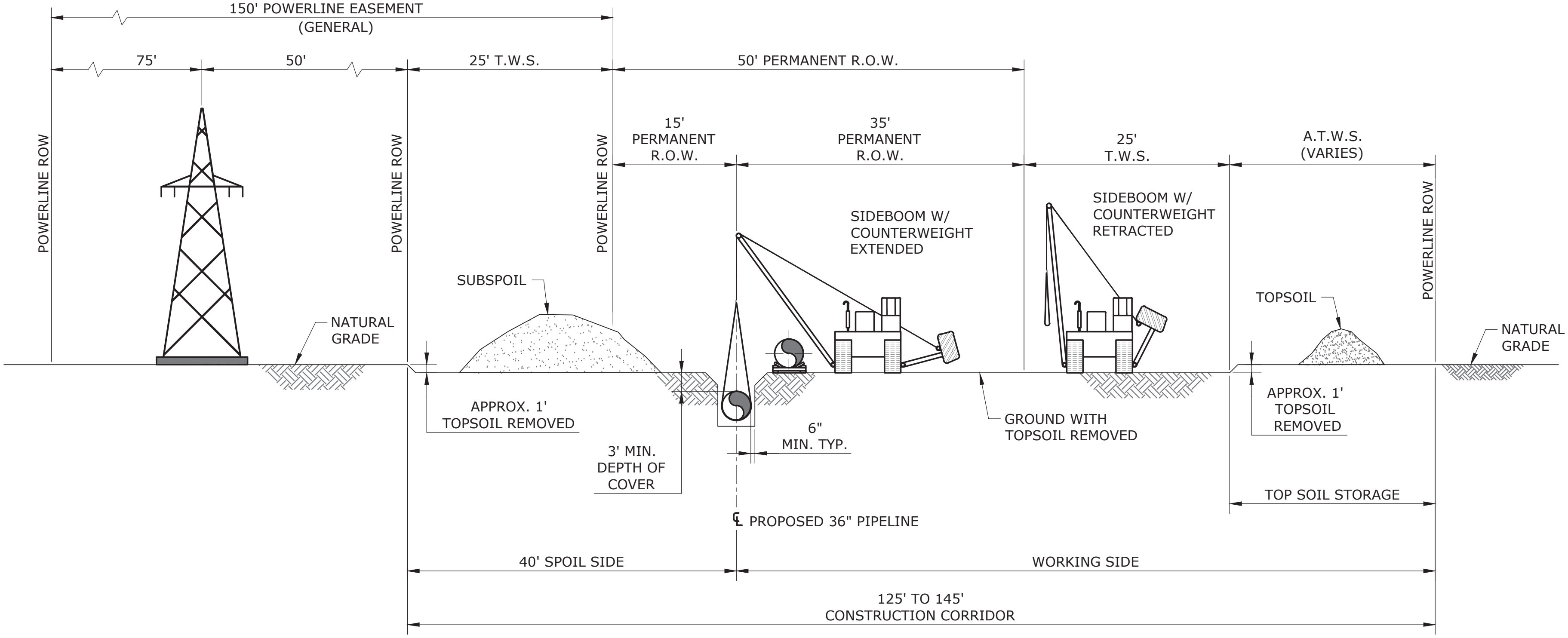
PROJ. ENG. KG	26Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #5B SOUTH OR WEST OF POWERLINE EASEMENT
CHECKED BY: DC	26Oct15	YR.: 2017	
DRAWN BY: RVE	26Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: MEDINA COUNTY, OHIO

DWG. NO. S4NX-P-8011-B

IC.#

FOR63995 October 28, 2015 7:28pm
Filename: \\HOPPFIL014\H0_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8011-B_0.DWG

FOR63995 October 28, 2015 7:29pm
Filename: \\HOPPFIL014\H0_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8012-A_0.DWG



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 150' POWERLINE EASEMENT

N.T.S.

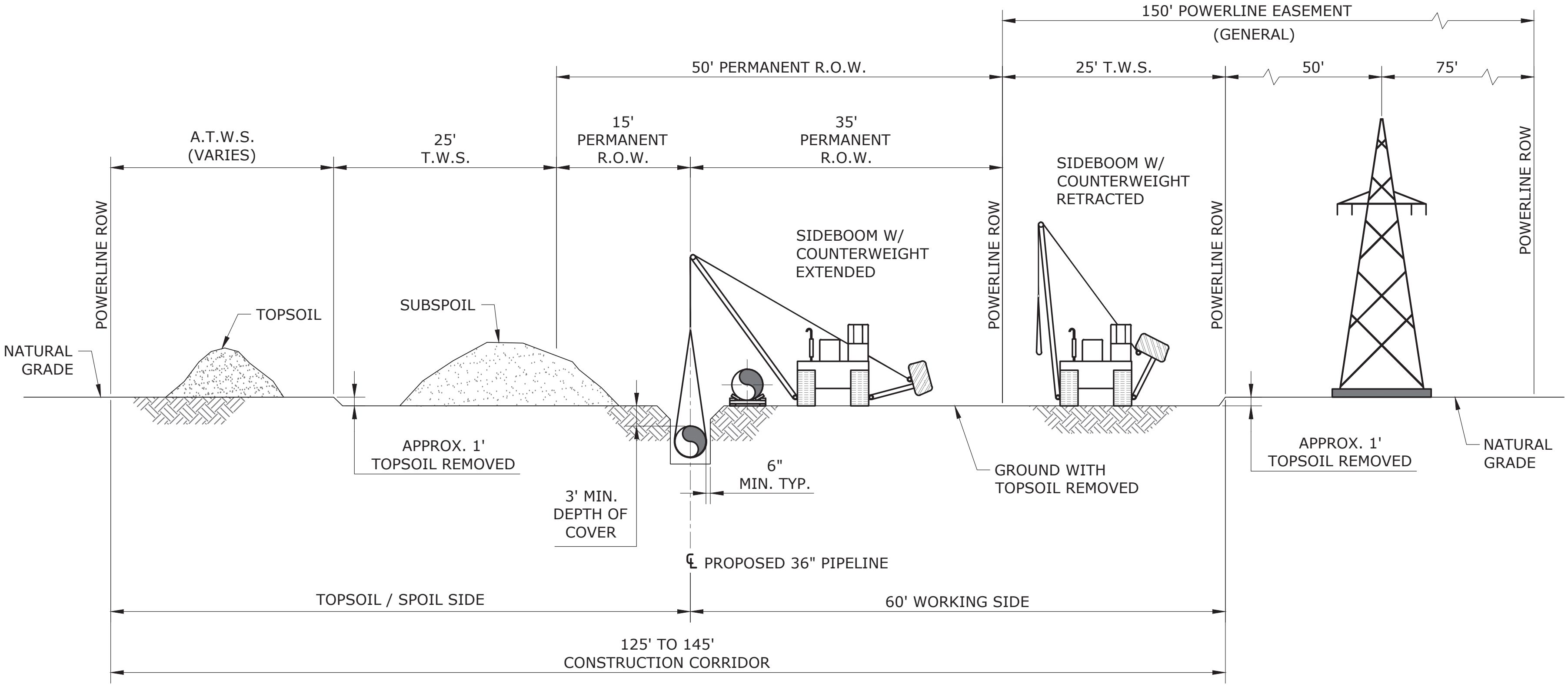
REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	26Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #6A NORTH OR EAST OF POWERLINE EASEMENT
CHECKED BY: DC	26Oct15	YR.: 2017	
DRAWN BY: RVE	26Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: LORAIN COUNTY, OHIO

DWG. NO. S4NX-P-8012-A

IC.#

FOR63995 October 28, 2015 7:30pm
Filename: \\HOPPFIL014\H0_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8012-B_0.DWG



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 150' POWERLINE EASEMENT

N.T.S.

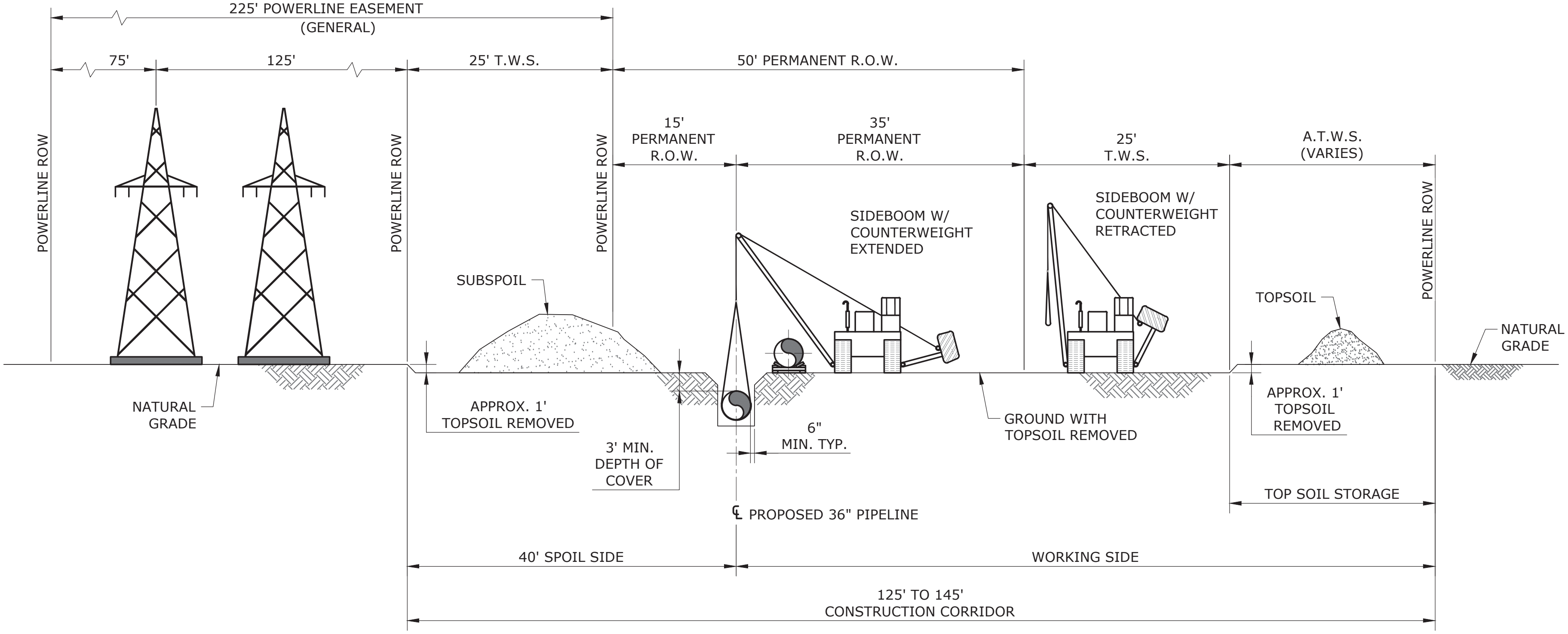
REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	26Oct15	YR.: 2017	TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #6B SOUTH OR WEST OF POWERLINE EASEMENT
CHECKED BY: DC	26Oct15	W.O.	
DRAWN BY: RVE	26Oct15		
SCALE: NTS	DATE	REV.: 0	LOC.: LORAIN COUNTY, OHIO

DWG. NO. S4NX-P-8012-B

IC.#

FOR63995 October 28, 2015 7:31pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8013A_0.DWG



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 225' POWERLINE EASEMENT

N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

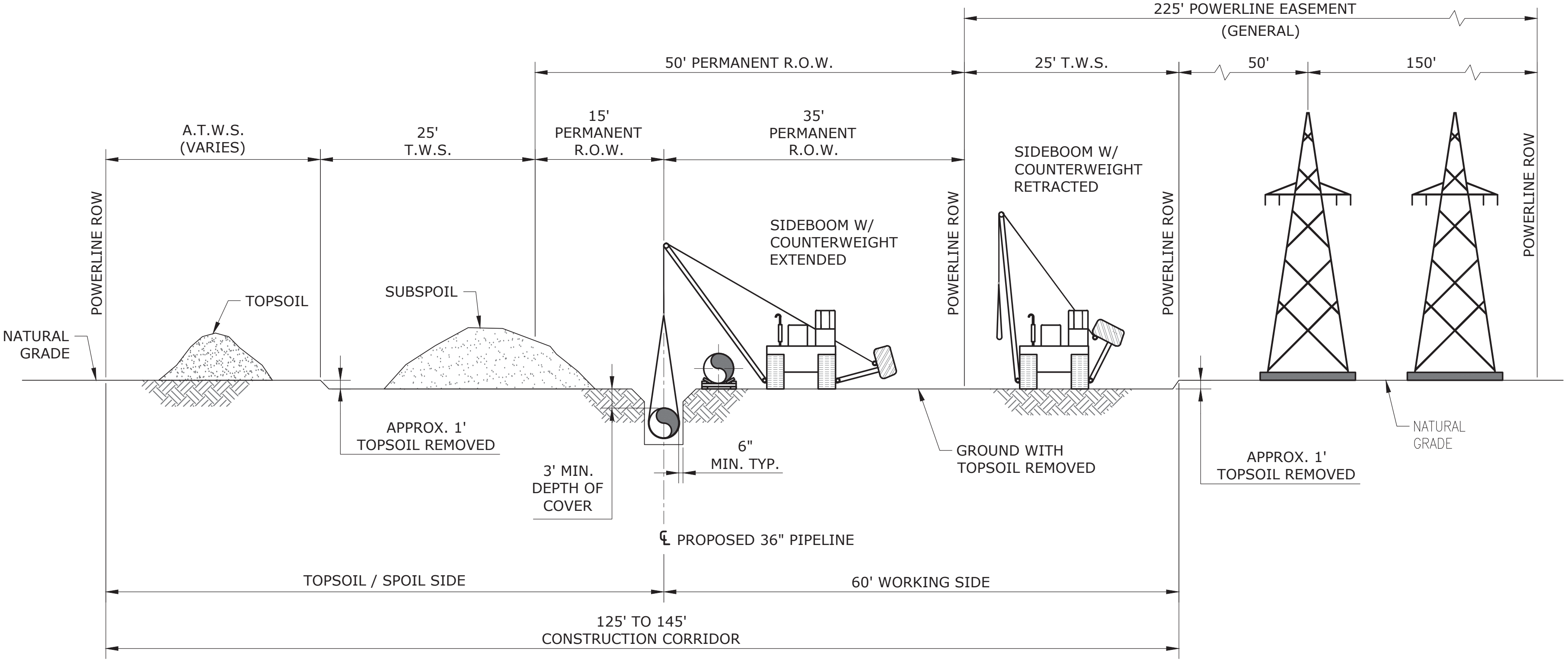
PROJ. ENG. KG	26Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #7A NORTH OR EAST OF POWERLINE EASEMENT
CHECKED BY: DC	26Oct15	YR.: 2017	
DRAWN BY: RVE	26Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: ERIE COUNTY, OHIO

DWG. NO. S4NX-P-8013-A

IC.#

D-21

FOR63995 October 28, 2015 7:32pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8013-B_0.DWG



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 225' POWERLINE EASEMENT

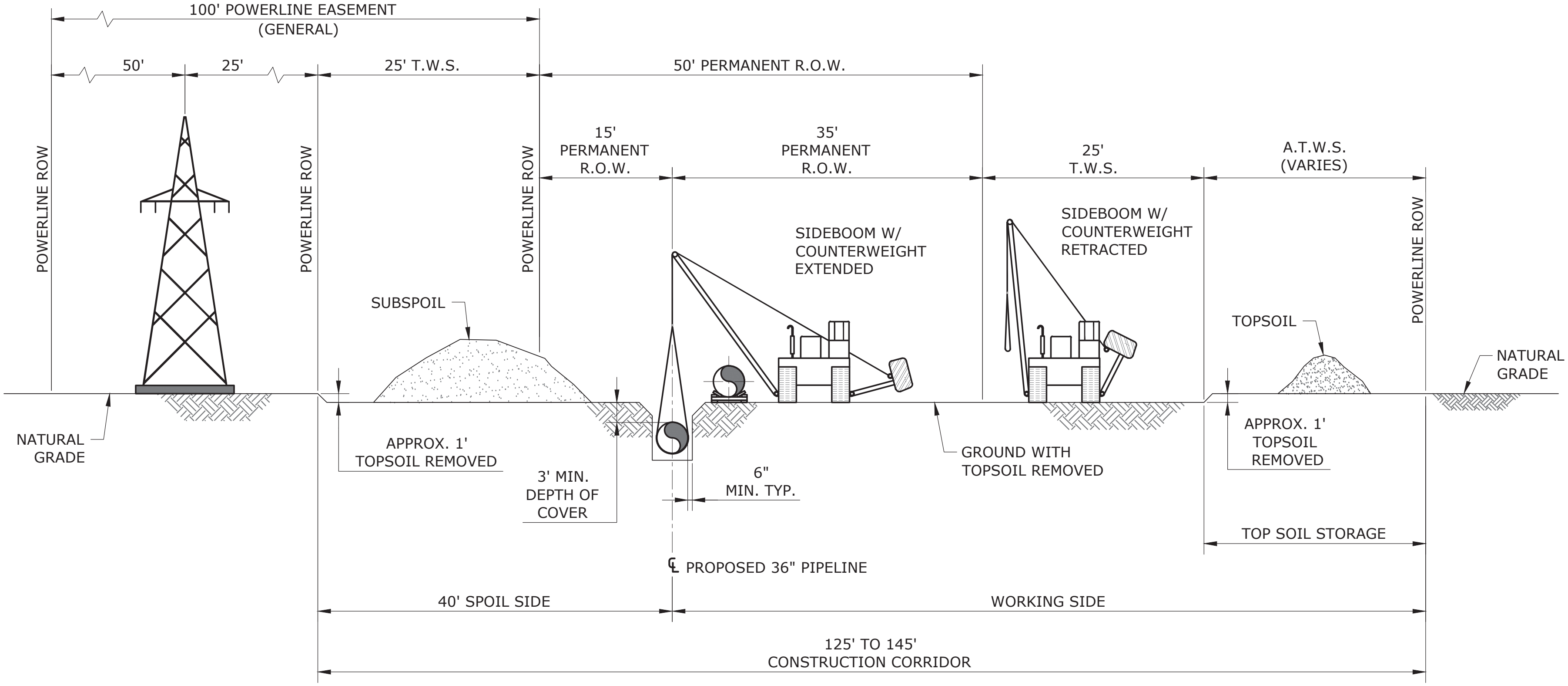
N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	26Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #7B SOUTH OR WEST OF POWERLINE EASEMENT	
CHECKED BY: DC	26Oct15	YR.: 2017		
DRAWN BY: RVE	26Oct15	W.O.		
SCALE: NTS	DATE	REV.: 0	LOC.: ERIE COUNTY, OHIO	DWG. NO. S4NX-P-8013-B

IC.#

FOR63995 October 29, 2015 2:39pm
Filename: \\HOPPFIL014\H0_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8014-A_0.DWG



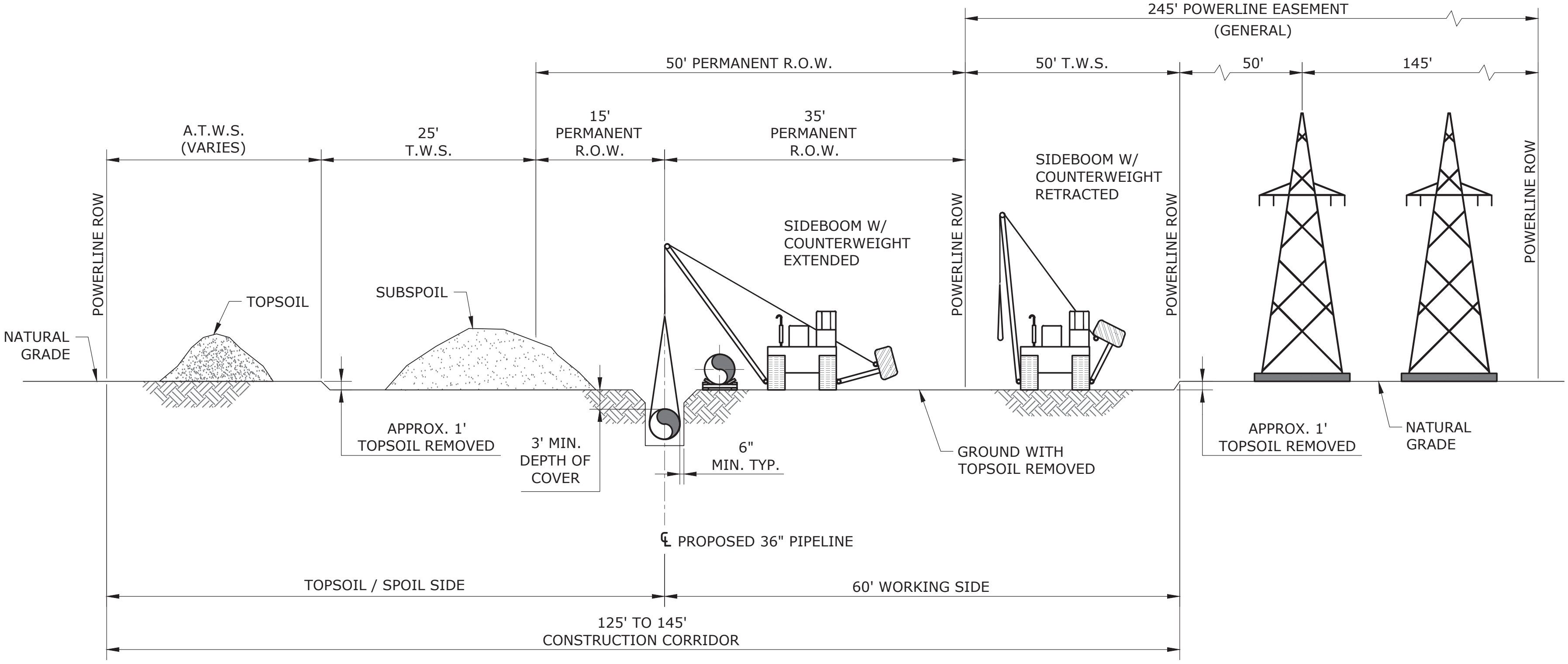
TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 100' POWERLINE EASEMENT

N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	23Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #8A NORTH OR EAST OF POWERLINE EASEMENT	
CHECKED BY: DF	23Oct15	YR.: 2017		
DRAWN BY: RVE	23Oct15	W.O.		
SCALE: NTS	DATE	REV.: 0	LOC.: WOOD COUNTY, OHIO	DWG. NO. S4NX-P-8014-A

IC.#



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 245' POWERLINE EASEMENT

N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	23Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #8B SOUTH OR WEST OF POWERLINE EASEMENT
CHECKED BY: DF	23Oct15	YR.: 2017	
DRAWN BY: RVE	23Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: WOOD COUNTY, OHIO

DWG. NO. S4NX-P-8014-B

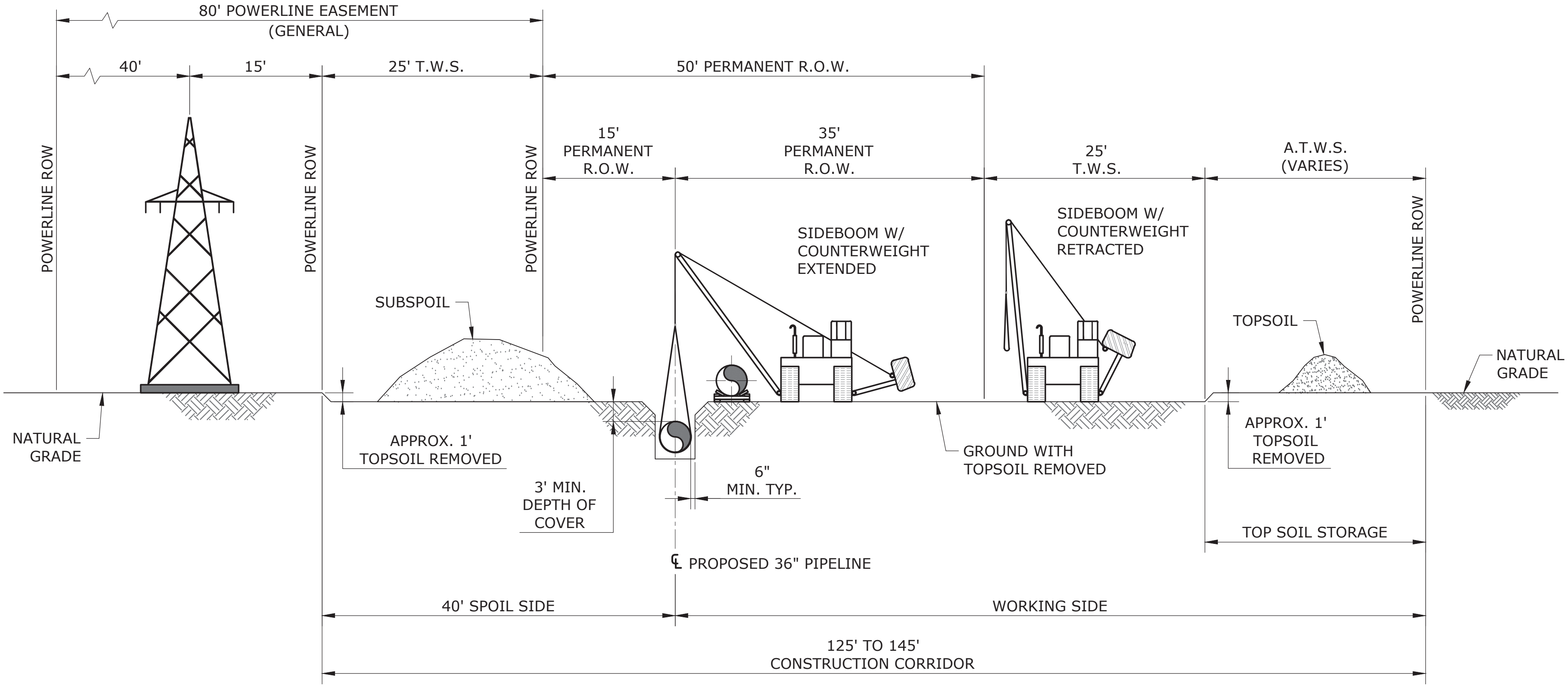
IC.#

FOR63995 October 29, 2015 2:31pm

Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8014-B_0.DWG

D-24

FOR63995 October 28, 2015 7:36pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8015-A_0.DWG



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 80' POWERLINE EASEMENT

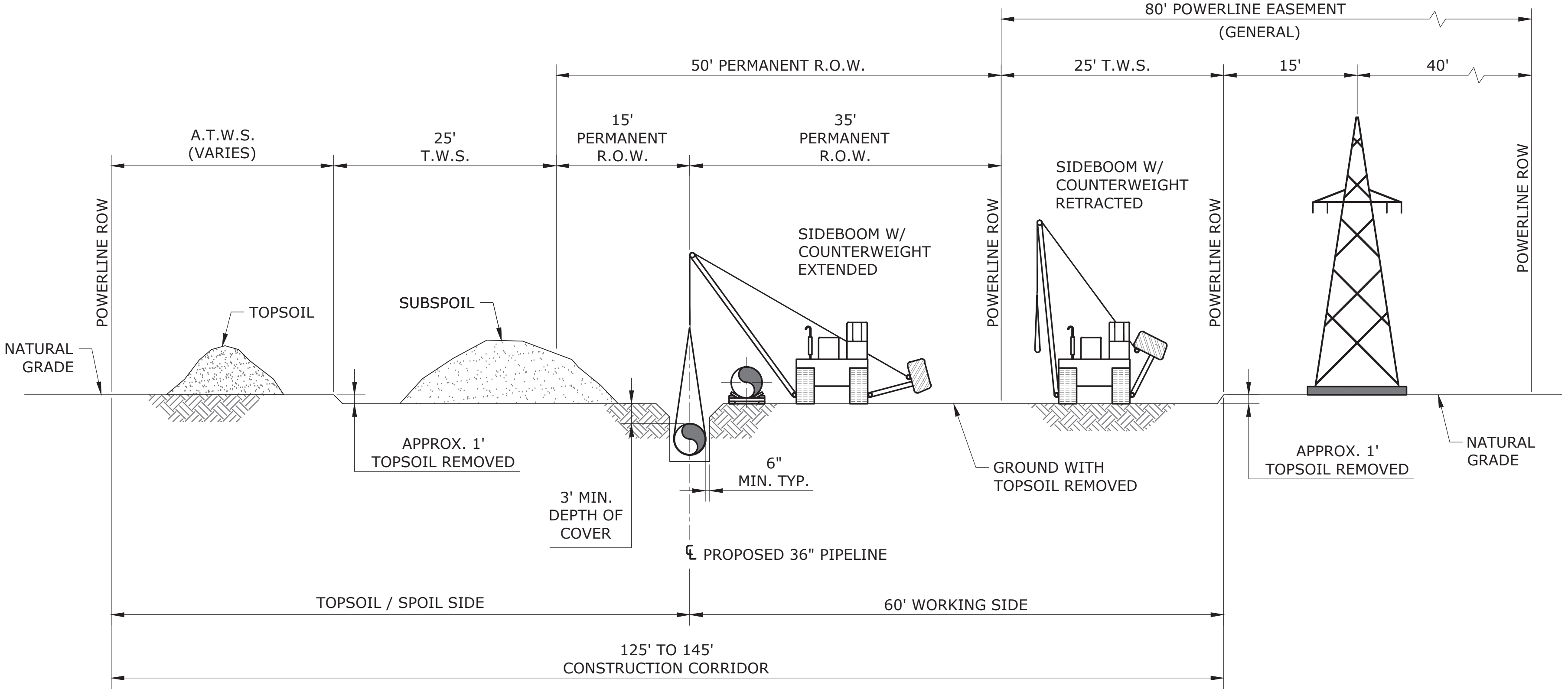
N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	26Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #9A NORTH OR EAST OF POWERLINE EASEMENT
CHECKED BY: DC	26Oct15	YR.: 2017	
DRAWN BY: RVE	26Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: LUCAS COUNTY, OHIO

DWG. NO. S4NX-P-8015-A

IG.#



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 80' POWERLINE EASEMENT

N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	26Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #9B SOUTH OR WEST OF POWERLINE EASEMENT
CHECKED BY: DC	26Oct15	YR.: 2017	
DRAWN BY: RVE	26Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: LUCAS COUNTY, OHIO

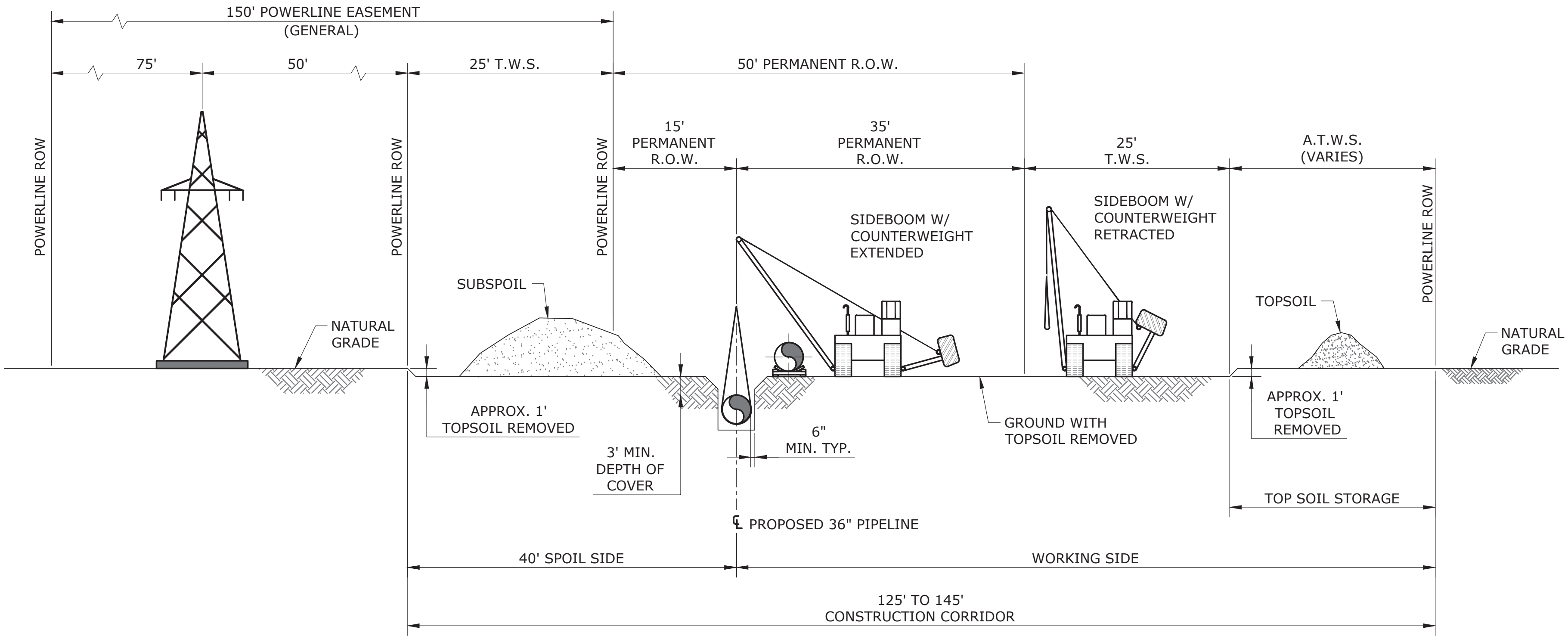
DWG. NO. S4NX-P-8015-B

IG.#

FOR63995 October 28, 2015 7:37pm

Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8015-B_0.DWG

FOR63995 October 28, 2015 7:38pm
Filename: \\HOPPFIL014\H0_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8016-A_0.DWG



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 150' POWERLINE EASEMENT

N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG.	KG	26Oct15	
CHECKED BY:	DC	26Oct15	YR.: 2017
DRAWN BY:	RVE	26Oct15	W.O.
SCALE:	NTS	DATE	REV.: 0

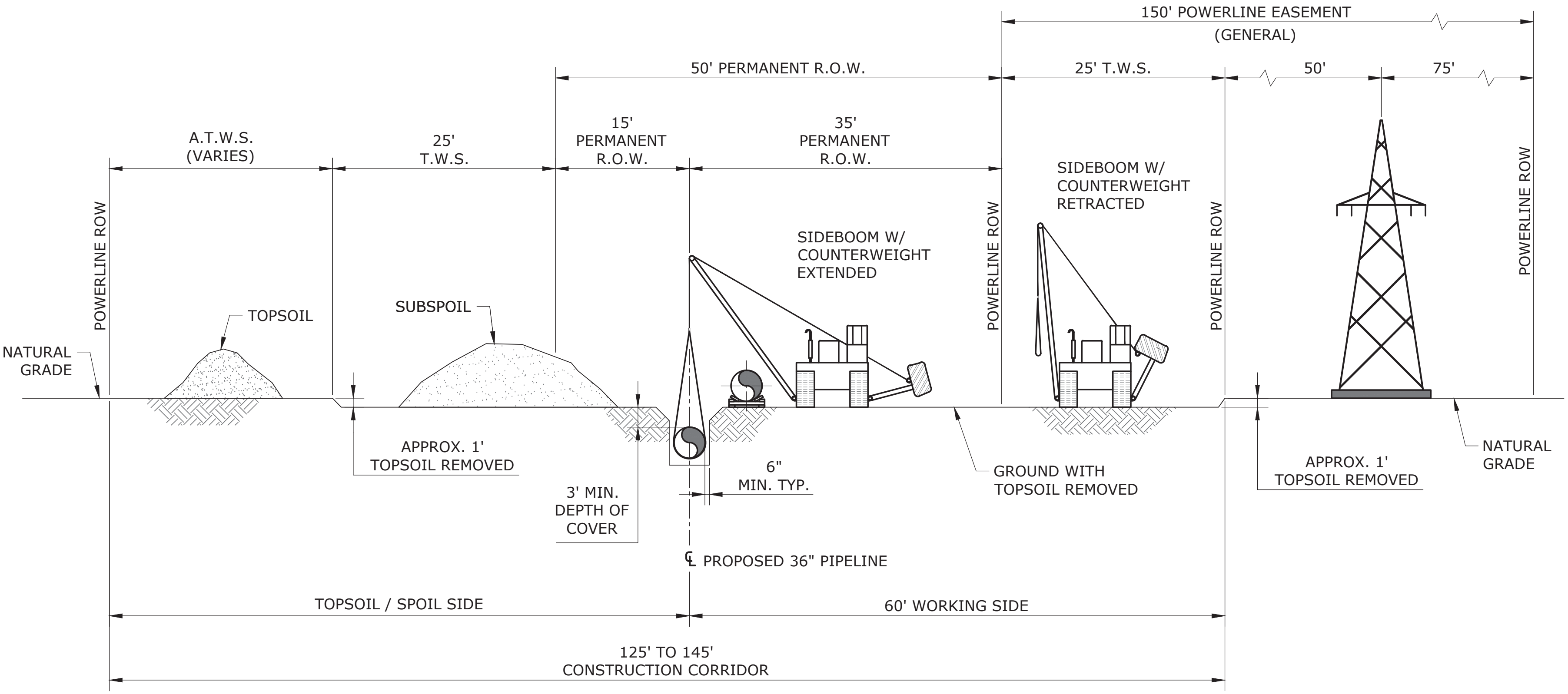
TITLE: NEXUS GAS TRANSMISSION PROJECT
TYPICAL MAINLINE CONSTRUCTION METHOD #10A
NORTH OR EAST OF POWERLINE EASEMENT

LOC.: FULTON COUNTY, OHIO

DWG. NO. S4NX-P-8016-A

IC.#

FOR63995 October 28, 2015 7:39pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8016-B_0.DWG



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 150' POWERLINE EASEMENT

N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG.	KG	26Oct15	
CHECKED BY:	DC	26Oct15	YR.: 2017
DRAWN BY:	RVE	26Oct15	W.O.
SCALE: NTS		DATE	REV.: 0

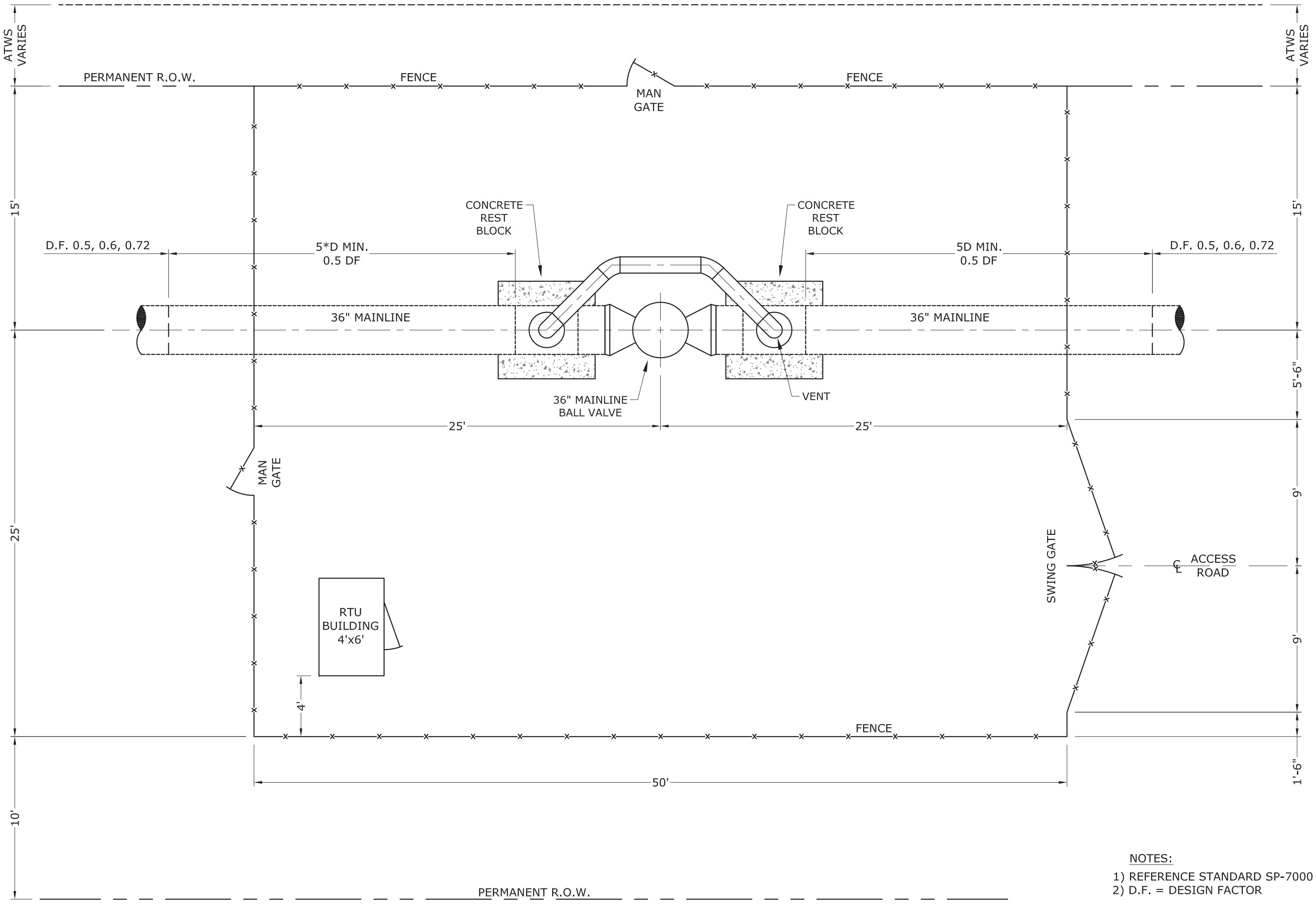
IC#

TITLE: NEXUS GAS TRANSMISSION PROJECT
TYPICAL MAINLINE CONSTRUCTION METHOD #10B
SOUTH OR WEST OF POWERLINE EASEMENT

LOC.: FULTON COUNTY, OHIO

DWG. NO. S4NX-P-8016-B

FOR63995
October 29, 2015 8:18am Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8017_0.DWG



NOTES:
1) REFERENCE STANDARD SP-7000 BLOCK VALVE ASSEMBLY.
2) D.F. = DESIGN FACTOR

IG.#	REV.#	DESCRIPTION	DATE
	0	ISSUED FOR FERC FILING	29Oct15

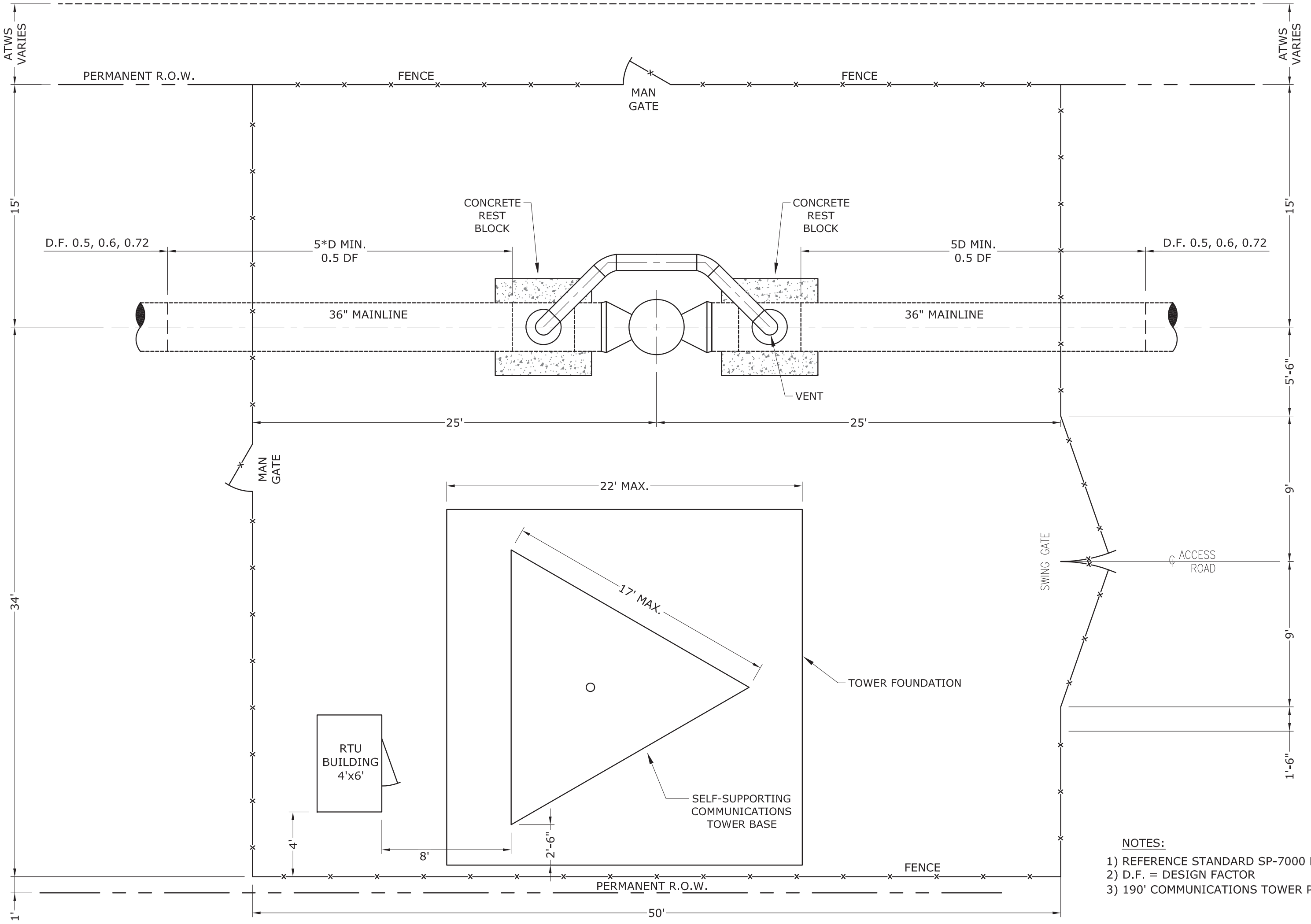
PROJ. ENG.	KG	26Oct15
CHECKED BY:	DC	26Oct15
DRAWN BY:	RVE	26Oct15
SCALE:	NTS	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
TYPICAL 36" MAINLINE VALVE
GENERAL PLOT PLAN

LOC.: OHIO / MICHIGAN
REV.: 0
YR.: 2017
W.O.
DWG.NO. S4NX-P-8017

D-29

FOR63995
October 29, 2015 8:22am Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8018_0.DWG



NOTES:

1) REFERENCE STANDARD SP-7000 BLOCK VALVE ASSEMBLY.
2) D.F. = DESIGN FACTOR
3) 190' COMMUNICATIONS TOWER PLANNED FOR MLV 16.

IG.#	REV.#	DESCRIPTION	DATE
	O	ISSUED FOR FERC FILING	29Oct15

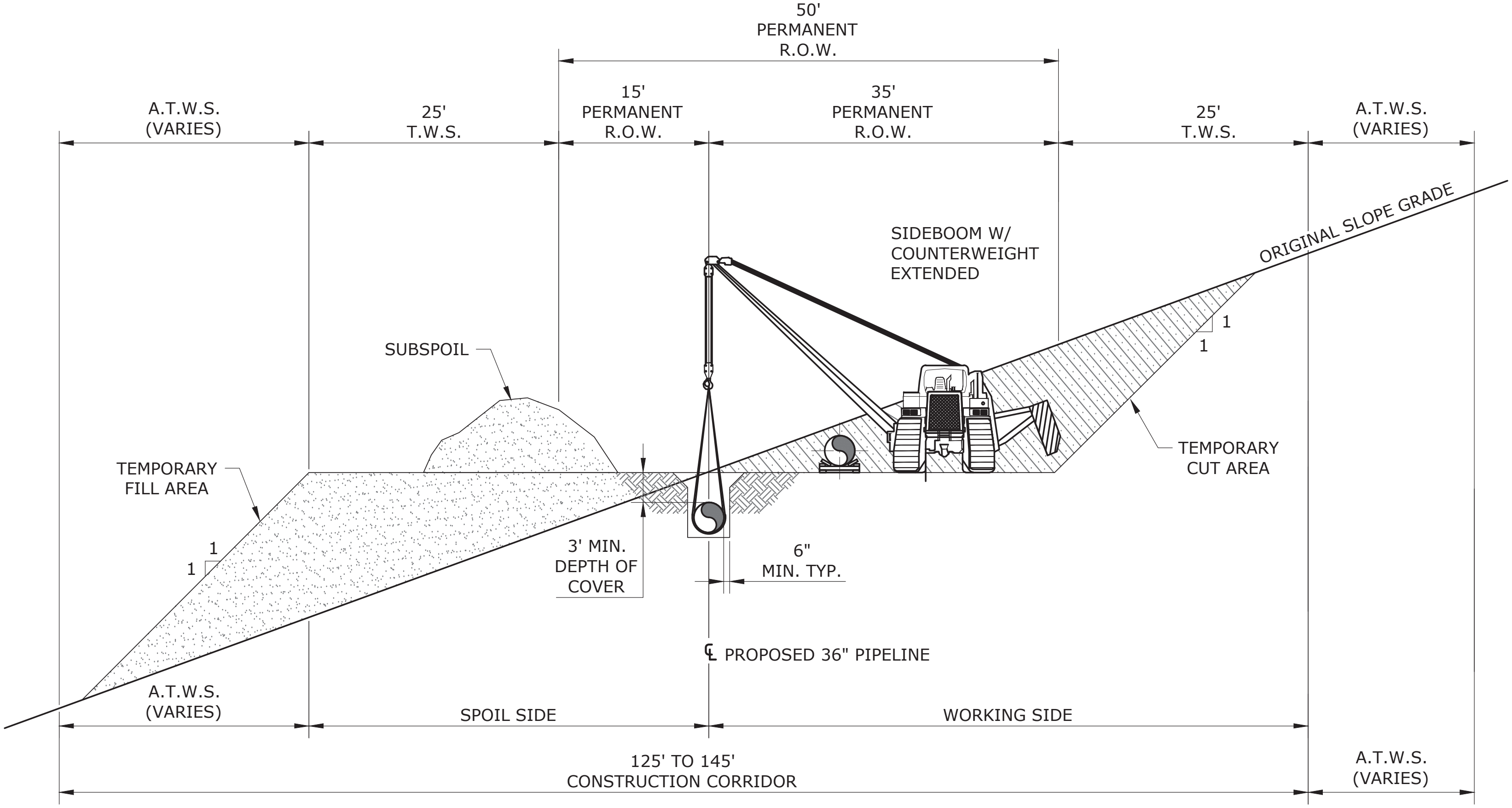
PROJ. ENG.	KG	26Oct15
CHECKED BY:	DC	26Oct15
DRAWN BY:	RVE	26Oct15
SCALE:	NTS	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
TYPICAL 36" MAINLINE VALVE
W/ 190' TOWER BASE – GENERAL PLOT PLAN

LOC.: OHIO / MICHIGAN
REV.: O
YR.: 2017
W.O.
DWG.NO. S4NX-P-8018

D-30

FOR63995 October 29, 2015 8:23am
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8019_0.DWG



TYPICAL 125' TO 145' SIDE SLOPE CONSTRUCTION

N.T.S.

ADDITIONAL TEMPORARY WORKSPACE		
SLOPE ANGLE	SPOIL SIDE	WORKING SIDE
0° - 10°	15	0
10° - 20°	25	0
20° - 30°	50	25

NOTES:

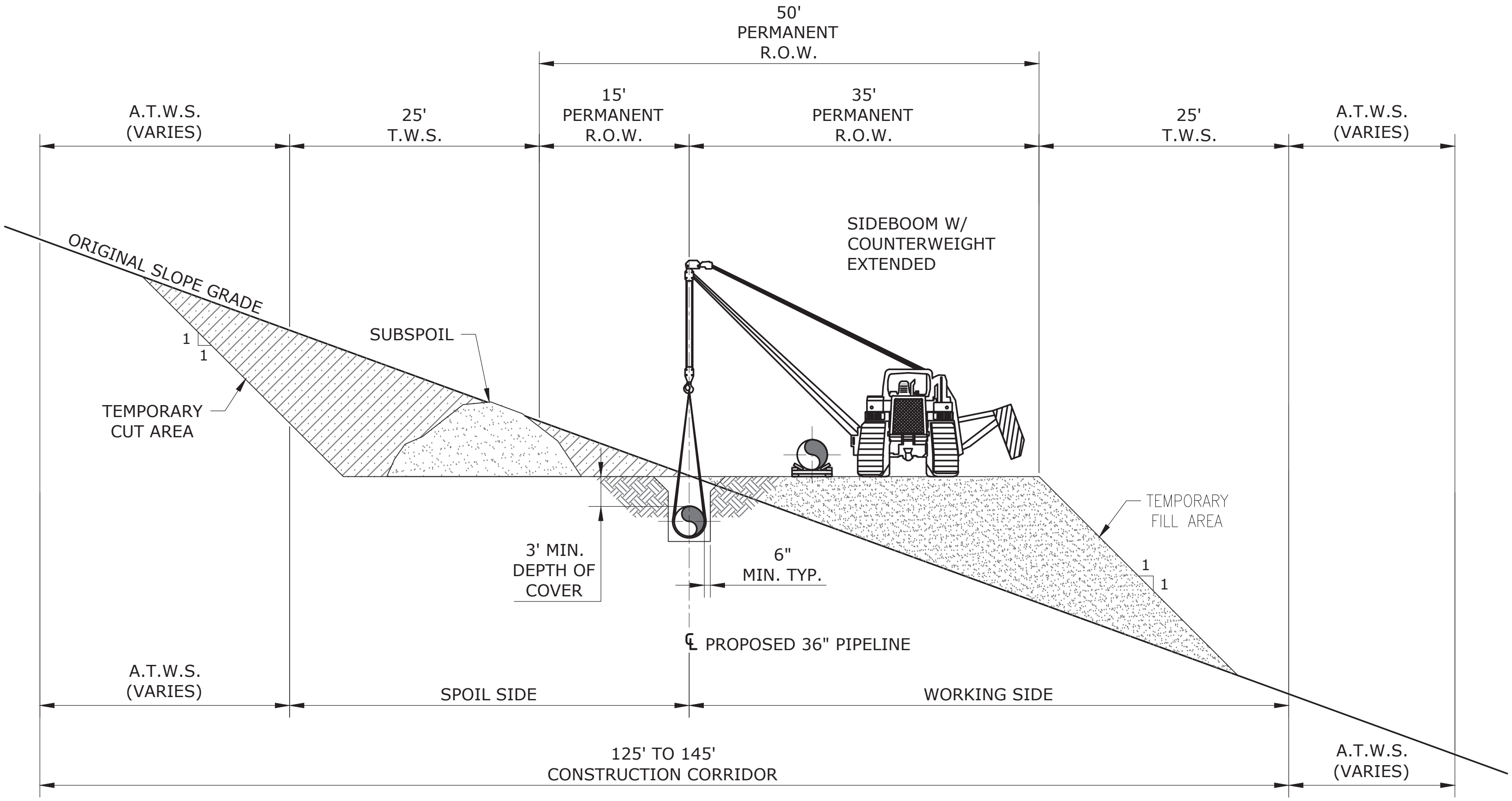
1. SEE ADDITIONAL TEMPORARY WORKSPACE TABLE.
2. REFERENCE EROSION & SEDIMENT CONTROL PLAN ES-0002 FOR TOPSOIL SEGREGATION AND EROSION CONTROL INSTALLATION.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	15Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL SIDE SLOPE CONSTRUCTION - RIGHT SIDE -	
CHECKED BY: DC	15Oct15	YR.: 2017		
DRAWN BY: RVE	15Oct15	W.O.		
SCALE: NTS	DATE	REV.: 0	LOC.: OHIO / MICHIGAN	DWG. NO. S4NX-P-8019

IG.#

FOR63995 October 29, 2015 8:24am
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8020_0.DWG



TYPICAL 125' TO 145' SIDE SLOPE CONSTRUCTION

N.T.S.

ADDITIONAL TEMPORARY WORKSPACE		
SLOPE ANGLE	SPOIL SIDE	WORKING SIDE
0° - 10°	15	0
10° - 20°	25	0
20° - 30°	50	25

NOTES:

1. SEE ADDITIONAL TEMPORARY WORKSPACE TABLE.
2. REFERENCE EROSION & SEDIMENT CONTROL PLAN ES-0002 FOR TOPSOIL SEGREGATION & EROSION CONTROL INSTALLATION.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

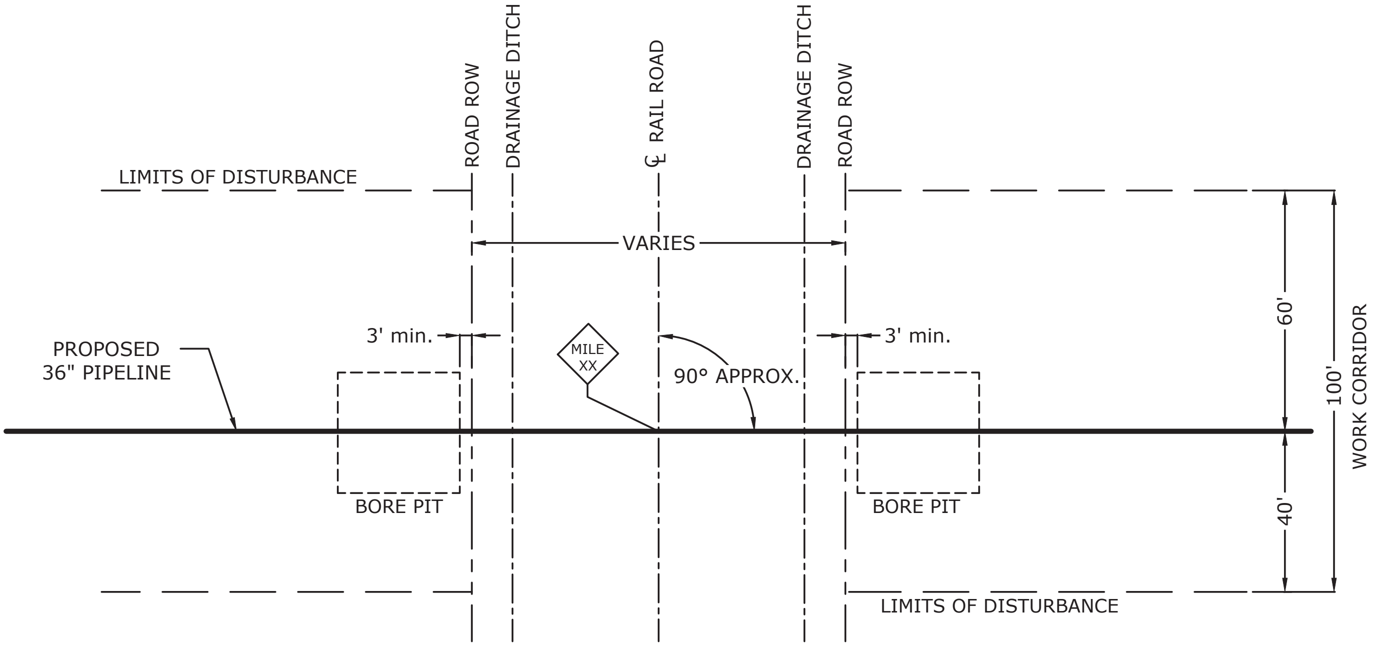
PROJ. ENG. KG	15Oct15		
CHECKED BY: DC	15Oct15	YR.: 2017	
DRAWN BY: RVE	15Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	

TITLE: NEXUS GAS TRANSMISSION PROJECT
TYPICAL SIDE SLOPE CONSTRUCTION
– LEFT SIDE –

LOC.: OHIO / MICHIGAN

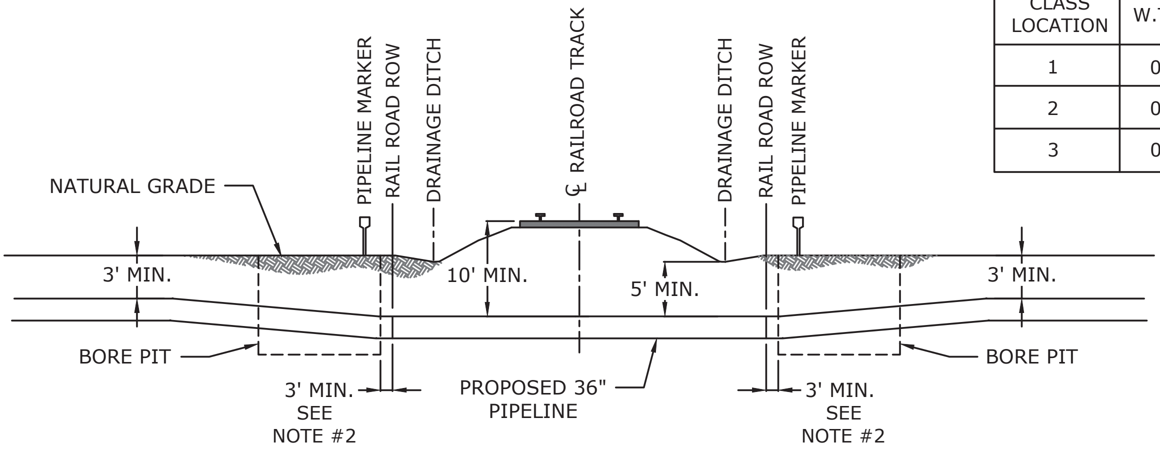
DWG. NO. S4NX–P–8020

IC.#



PLAN
NTS

WALL THICKNESS	
CLASS LOCATION	W.T. (IN)
1	0.515
2	0.618
3	0.741



PROFILE
NTS

ELI22282 October 29, 2015 10:53am
Filename: K:\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8021_0.DWG

NOTES:

1. PIPE SPECS WITHIN R/W:
   O.D.: 36"
   WALL: SEE TABLE
   GRADE: API 5L-X70
2. DEFINES MINIMUM FOOTAGE OF STRAIGHT PIPE OUTSIDE OF RAILROAD R/W BEFORE RETURNING PIPELINE TO 3FT MIN. COVER AND POSSIBLE PIPE MATERIAL CHANGE.
3. BORE PITS MAY HAVE ADDITIONAL SET BACKS FROM ROW TO AVOID POWER LINES OR OTHER UTILITIES.
4. CONSTRUCTION TO BE PERFORMED IN ACCORDANCE WITH APPROVED COUNTY/TOWNSHIP RAILROAD CROSSING PERMIT.
5. REFERENCE E&SCP DRAWING ES-0002 FOR TOPSOIL/SUBSOIL SEPARATION AND EROSION CONTROL INSTALLATION PROCEDURE.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

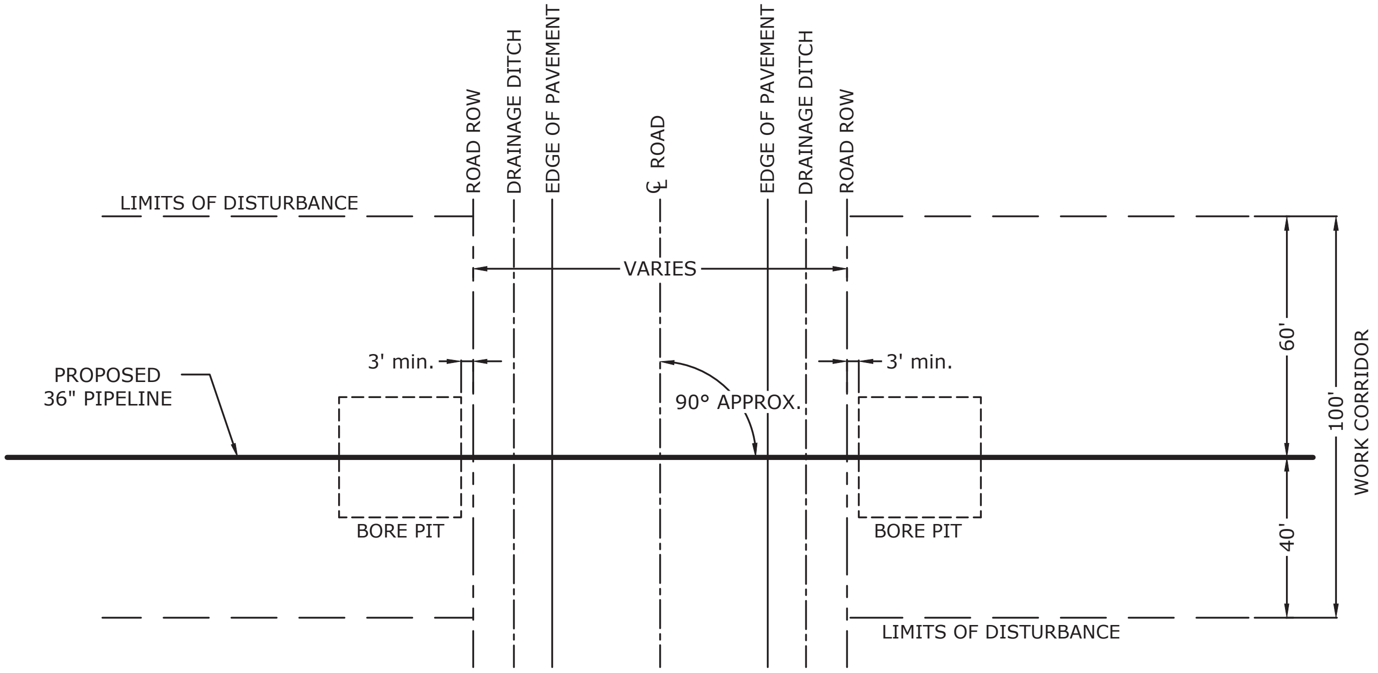
TITLE:
NEXUS GAS TRANSMISSION PROJECT
TYPICAL BORE RAILROAD CROSSING
CONTROL MEASURE DETAIL

PROJ. ENG.	KG	21Oct15
CHECKED BY:	DC	21Oct15
DRAWN BY:	RVE	21Oct15
SCALE:	NTS	YR.: 2017
W.O.		REV.: 0

LOC.: OHIO / MICHIGAN

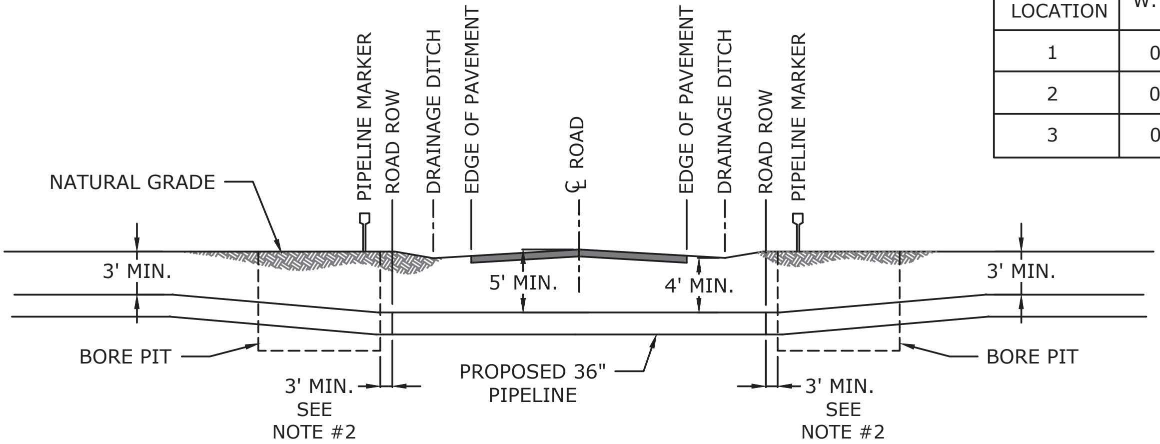
DWG. NO. S4NX-P-8021

IG.#



PLAN
NTS

WALL THICKNESS	
CLASS LOCATION	W.T. (IN)
1	0.515
2	0.618
3	0.741



PROFILE
NTS

NOTES:

1. PIPE SPECS WITHIN R/W:
   O.D.: 36"
   WALL: SEE TABLE
   GRADE: API 5L-X70
2. DEFINES MINIMUM FOOTAGE OF STRAIGHT PIPE OUTSIDE OF ROAD R/W BEFORE RETURNING PIPELINE TO 3FT MIN. COVER AND POSSIBLE PIPE MATERIAL CHANGE.
3. BORE PITS MAY HAVE ADDITIONAL SET BACKS FROM ROW TO AVOID POWER LINES OR OTHER UTILITIES.
4. CONSTRUCTION TO BE PERFORMED IN ACCORDANCE WITH APPROVED COUNTY/TOWNSHIP ROAD CROSSING PERMIT.
5. REFERENCE E&SCP DRAWING ES-0002 FOR TOPSOIL/SUBSOIL SEPARATION AND EROSION CONTROL INSTALLATION PROCEDURE.

LLI22282 October 29, 2015 10:53am
Filename: K:\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8022_0.DWG

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

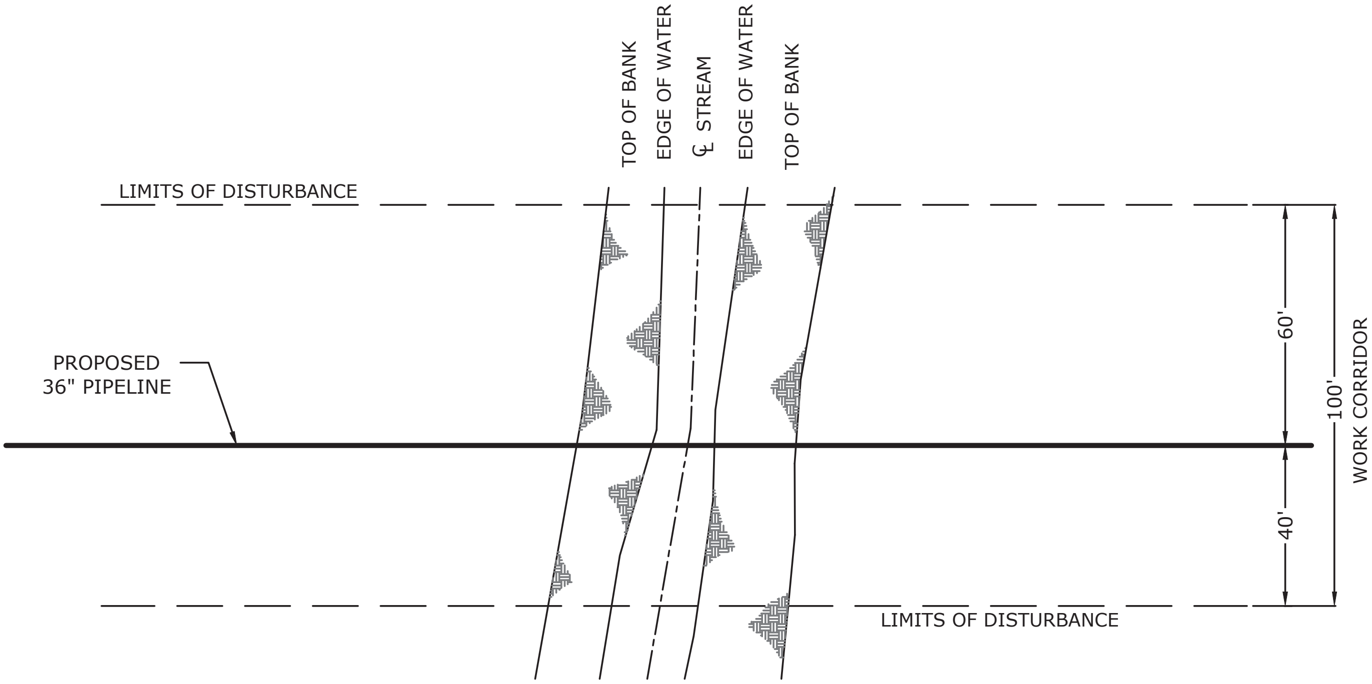
TITLE:
NEXUS GAS TRANSMISSION PROJECT
TYPICAL BORED ROAD CROSSING
CONTROL MEASURE DETAIL

PROJ. ENG.	KG	15Oct15
CHECKED BY:	DC	15Oct15
DRAWN BY:	RVE	15Oct15
SCALE:	NTS	YR.: 2017
W.O.		REV.: 0

LOC.: OHIO / MICHIGAN

DWG. NO. S4NX-P-8022

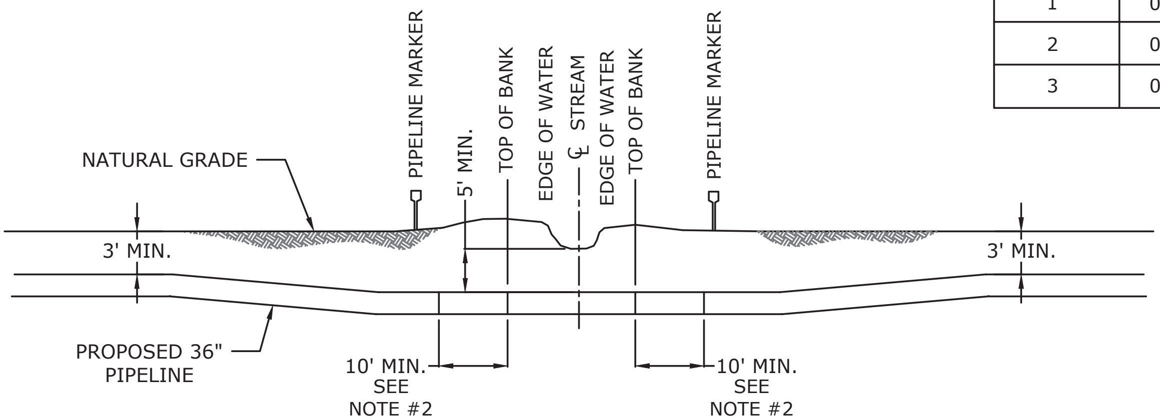
IG.#



PLAN
NTS

WALL THICKNESS

CLASS LOCATION	W.T. (IN)
1	0.515
2	0.618
3	0.741



PROFILE
NTS

NOTES:

1. PIPE SPECS WITHIN R/W:
   O.D.: 36"
   WALL: SEE TABLE
   GRADE: API 5L-X70
2. DEFINES MINIMUM FOOTAGE OF STRAIGHT PIPE OUTSIDE OF STREAM, TOP OF BANK BEFORE RETURNING PIPELINE TO 3FT MIN. COVER AND POSSIBLE PIPE MATERIAL CHANGE.

FOR63995 October 28, 2015 8:25pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8023_0.DWG

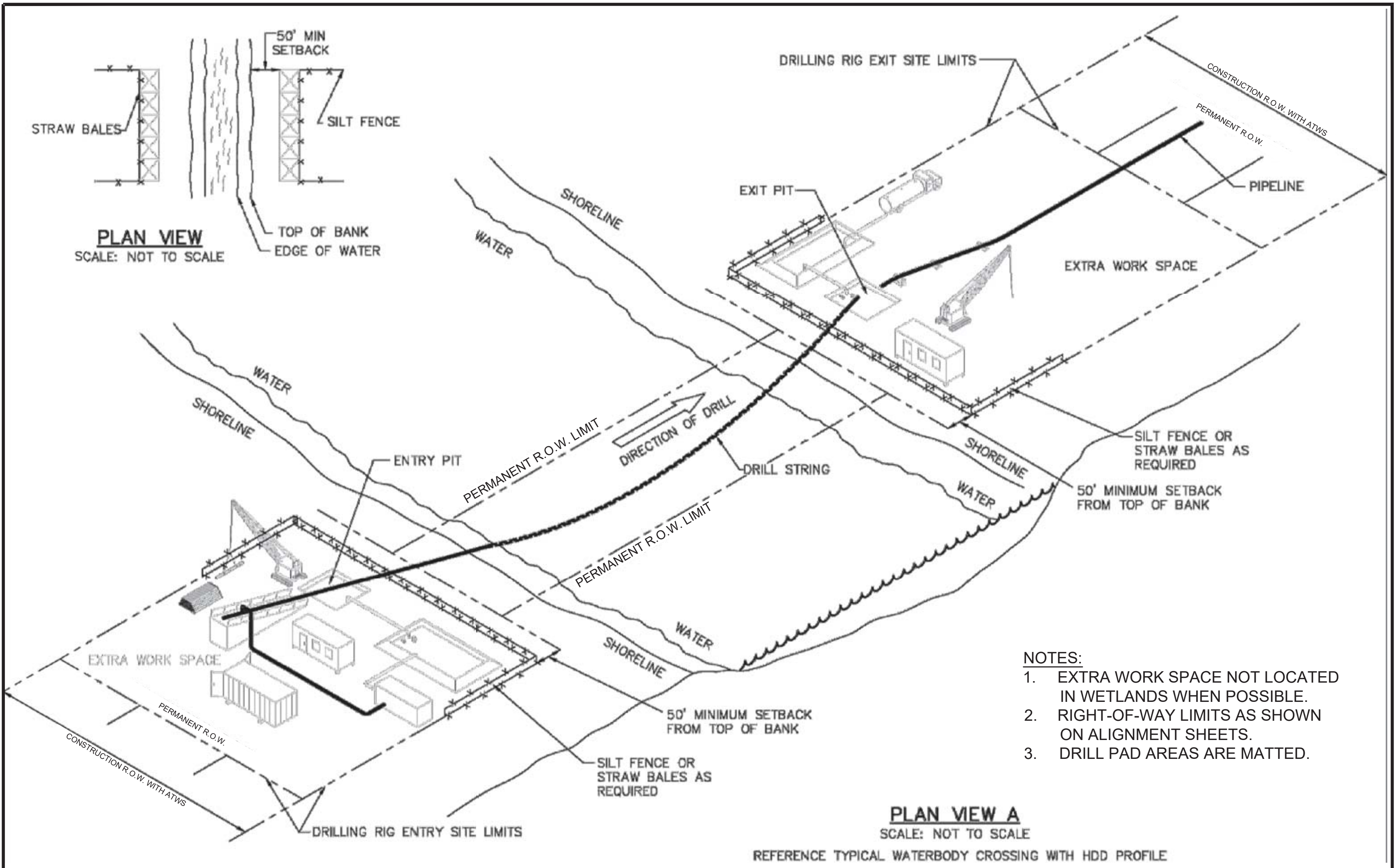
REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

TITLE:
NEXUS GAS TRANSMISSION PROJECT
TYPICAL STREAM CROSSING
CONTROL MEASURE DETAIL

LOC.: OHIO / MICHIGAN

PROJ. ENG.	KG	28Aug15
CHECKED BY:	DC	28Aug15
DRAWN BY:	RVE	28Aug15
SCALE:	NTS	YR.: 2017
W.O.		REV.: 0
DWG. NO.	S4NX-P-8023	

IG.#



PLAN VIEW
SCALE: NOT TO SCALE

NOTES:
1. EXTRA WORK SPACE NOT LOCATED IN WETLANDS WHEN POSSIBLE.
2. RIGHT-OF-WAY LIMITS AS SHOWN ON ALIGNMENT SHEETS.
3. DRILL PAD AREAS ARE MATTED.

PLAN VIEW A
SCALE: NOT TO SCALE
REFERENCE TYPICAL WATERBODY CROSSING WITH HDD PROFILE

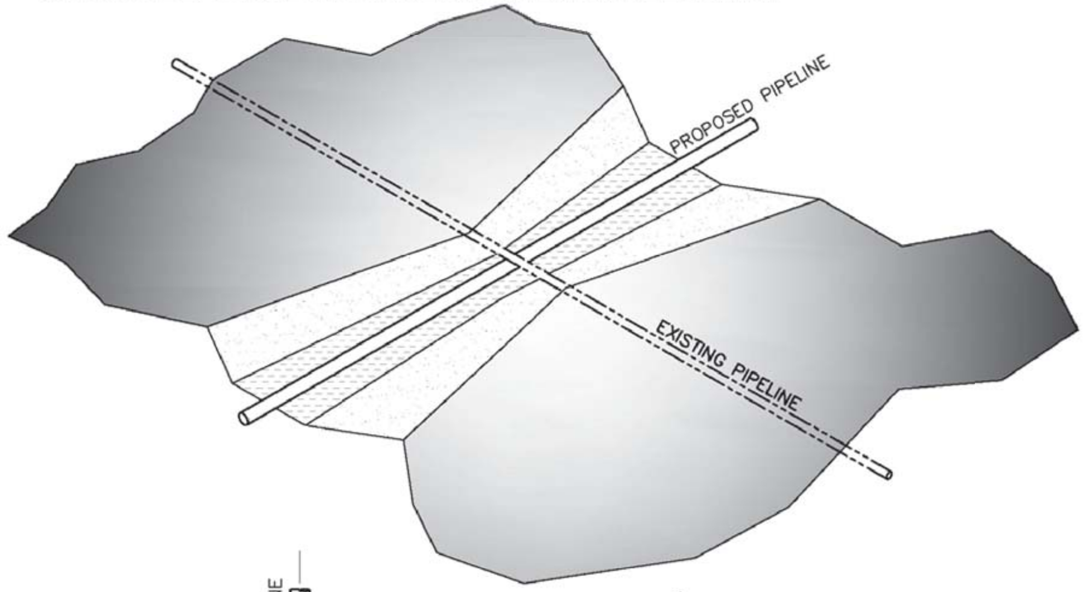
FOR63995 October 29, 2015 9:52am
Filename: \\HOPPFIL014\H0_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8024_0.DWG

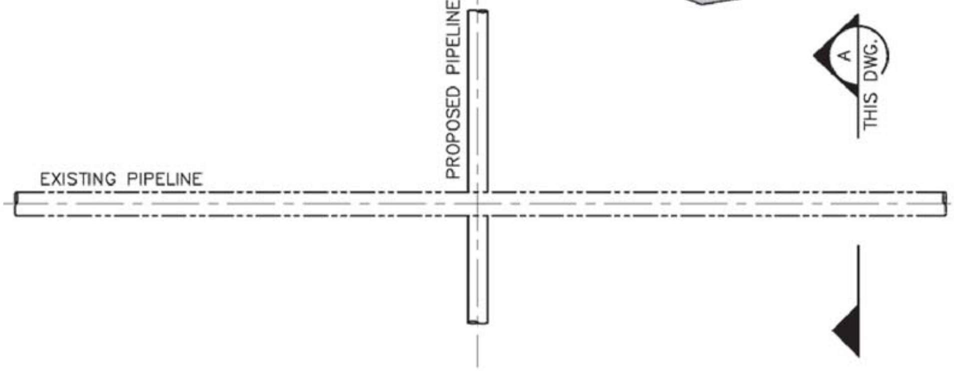
0	ISSUED FOR FERC FILING	29Oct15
REV.	DESCRIPTION	DATE

PROJ. ENG. KG	29Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL WATER BODY CONSTRUCTION DETAIL WITH HDD PLAN	
CHECKED BY: DF	29Oct15	YR.: 2017		
DRAWN BY: RVE	29Oct15	W.O.		
SCALE: NTS	DATE	REV.: 0	LOC.: OHIO / MICHIGAN	DWG. NO. S4NX-P-8024

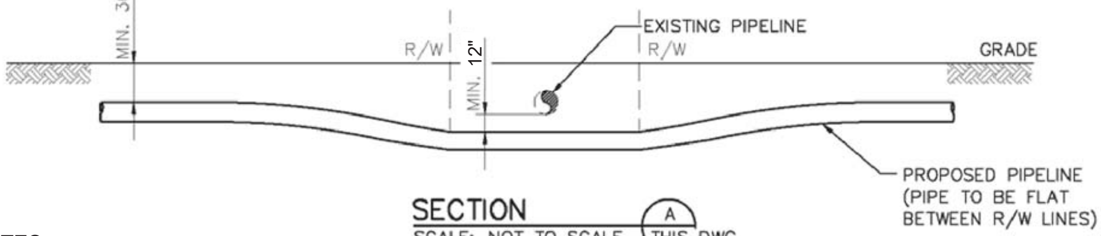
IC.#

ONSHORE PIPELINE CROSSING UNDER EXISTING PIPELINE





PLAN
SCALE: NOT TO SCALE



SECTION (A THIS DWG.)
SCALE: NOT TO SCALE

NOTES:

1. PROPOSED PIPE TO BE LAID TO ACCOMMODATE FREE-STRESS BENDING OR WILL BE FIELD BENDS.
2. TRENCH BACKFILL MATERIAL SHALL BE TAKEN FROM SPOIL PILE OR APPROVED BY PERMITTING AGENCY / LANDOWNER / EXISTING PIPELINE OWNER. ALL BACKFILL MATERIAL TO BE STABILIZED TO PREVENT EROSION.
3. IN WETLAND CROSSINGS WITH POORSOIL CONDITIONS, SANDBAGS OR CONCRETE MATS ARE TO BE USED BETWEEN PIPELINES TO MAINTAIN / ASSURE MINIMUM 24" SEPARATION.
4. TRENCH CONFIGURATION FOR NEW PIPELINE SHALL MINIMIZE SPAN REQUIREMENTS FOR EXISTING LINE AT THE POINT OF CROSSING. TRENCH LAYOUT SHALL FLARE OUTWARD TO NORMAL SIDEWALL CONFIGURATION BEYOND PIPE CROSSING.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

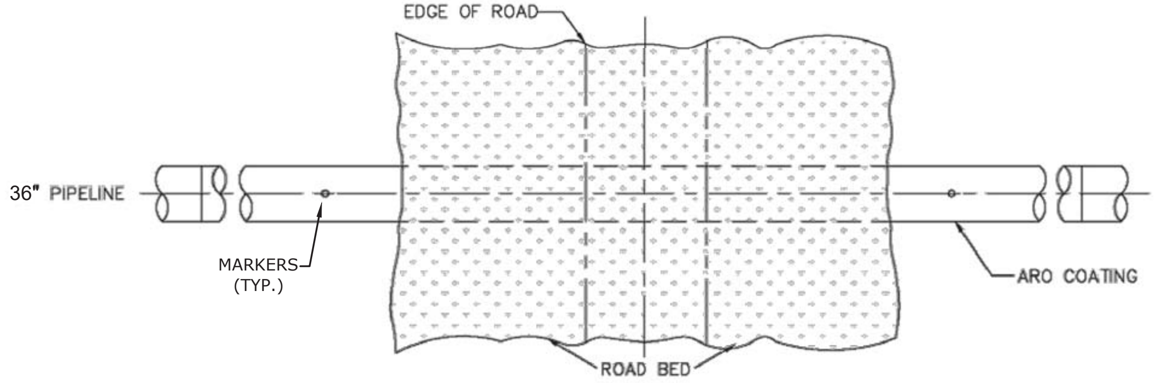
TITLE:
NEXUS GAS TRANSMISSION PROJECT
TYPICAL FOREIGN PIPELINE CROSSING
CONSTRUCTION DETAIL

LOC.: OHIO / MICHIGAN

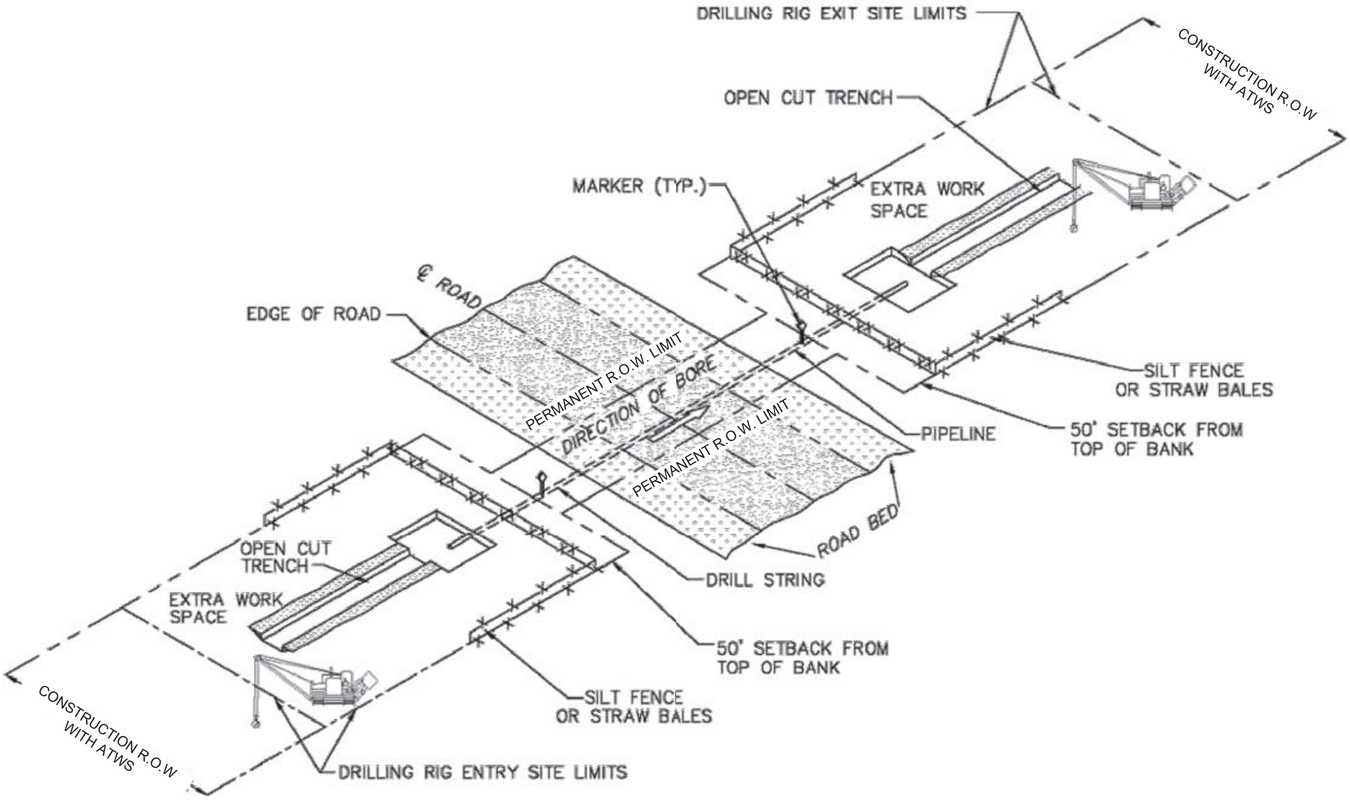
PROJ. ENG.	KG	29Oct15
CHECKED BY:	DF	29Oct15
DRAWN BY:	RVE	29Oct15
SCALE:	NTS	YR.: 2017
W.O.		REV.: 0
DWG. NO.	S4NX-P-8025	

ELI22282 October 29, 2015 10:51am
Filename: K:\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8025_0.DWG

IG.#



PLAN VIEW
SCALE: NOT TO SCALE



PLAN VIEW 'A'
SCALE: NOT TO SCALE

NOTES:

1. EXTRA WORK SPACE NOT LOCATED IN WETLAND WHEN POSSIBLE AND PRACTICAL.
2. RIGHT-OF-WAY LIMITS AS SHOWN ON ALIGNMENT SHEETS.
3. WORK AREA WILL BE TEMPORARILY MATTED FOR MARSH AREAS.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

TITLE:
NEXUS GAS TRANSMISSION PROJECT
TYPICAL BORED ROAD CROSSING
CONSTRUCTION DETAIL

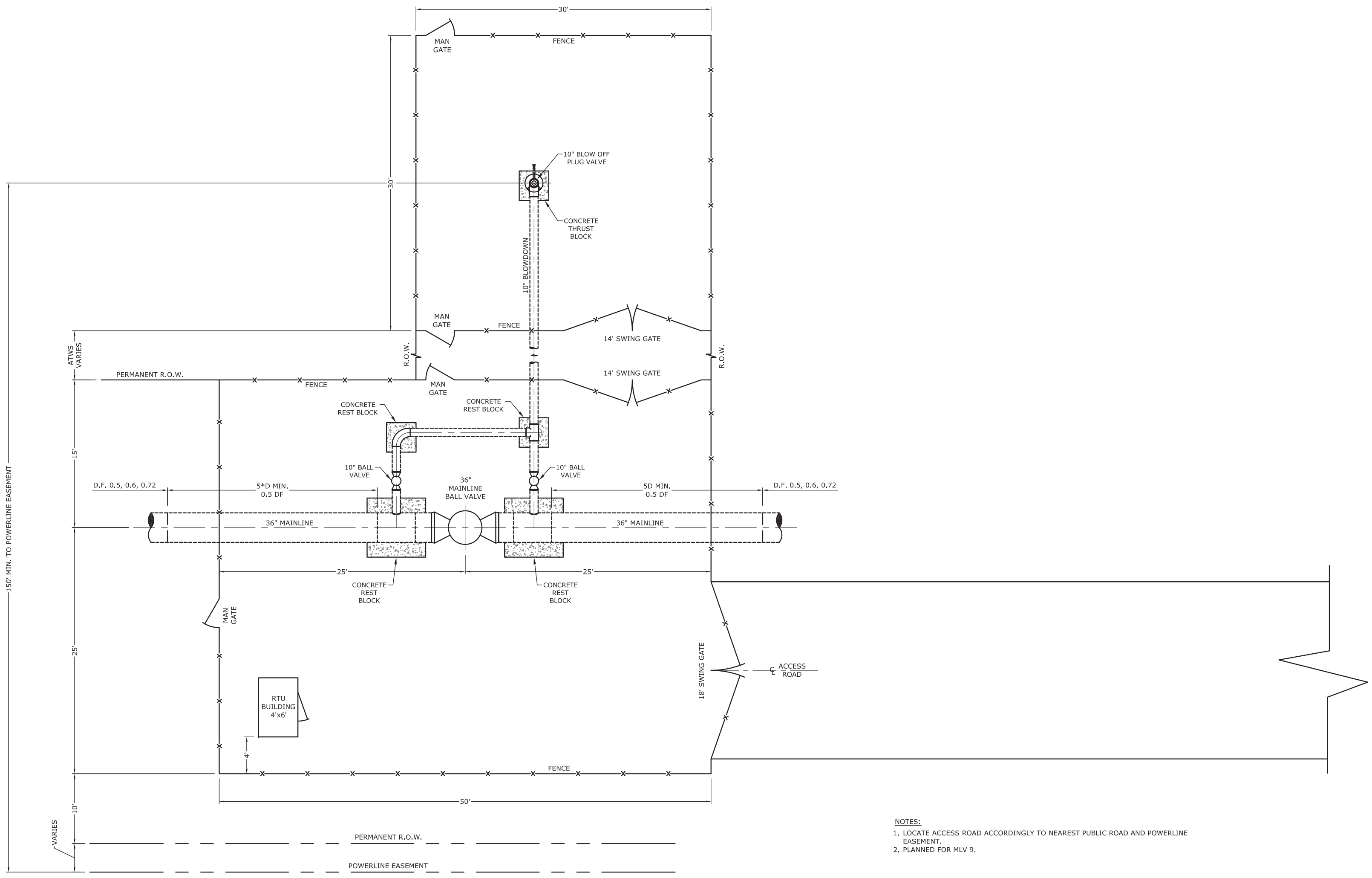
LOC.: OHIO / MICHIGAN

PROJ. ENG.	KG	29Oct15
CHECKED BY:	DF	29Oct15
DRAWN BY:	RVE	29Oct15
SCALE:	NTS	YR.: 2017
W.O.		REV.: 0
DWG. NO.	S4NX-P-8026	

FOR63995 October 29, 2015 9:59am
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8026_0.DWG

IG.#

FOR63995
October 29, 2015 8:28am Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8027_0.DWG



NOTES:

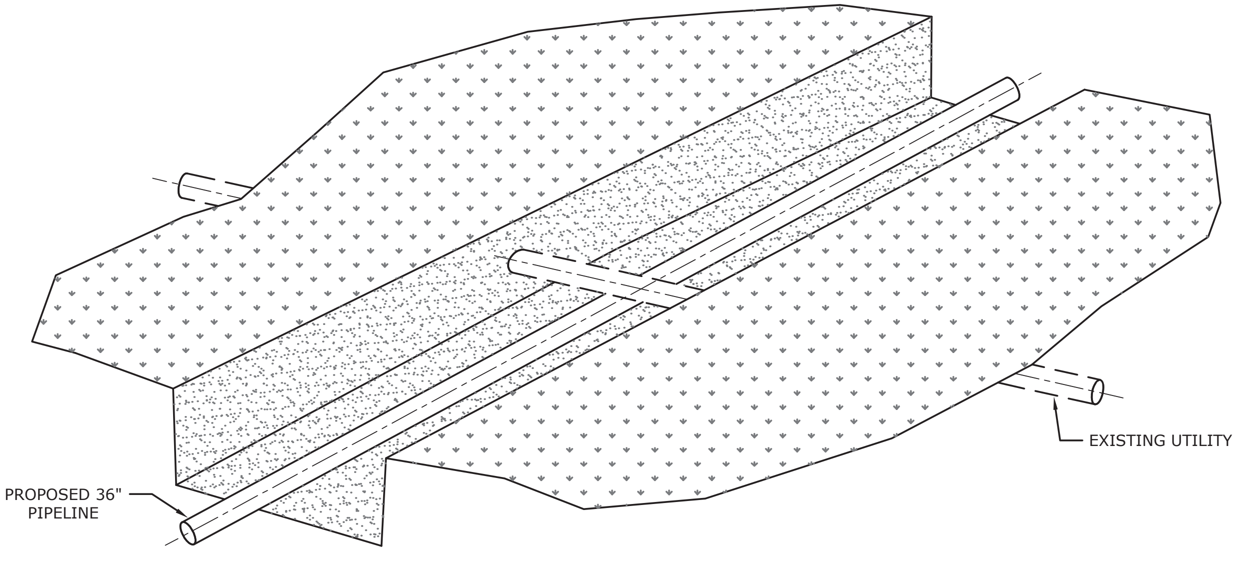
1. LOCATE ACCESS ROAD ACCORDINGLY TO NEAREST PUBLIC ROAD AND POWERLINE EASEMENT.
2. PLANNED FOR MLV 9.

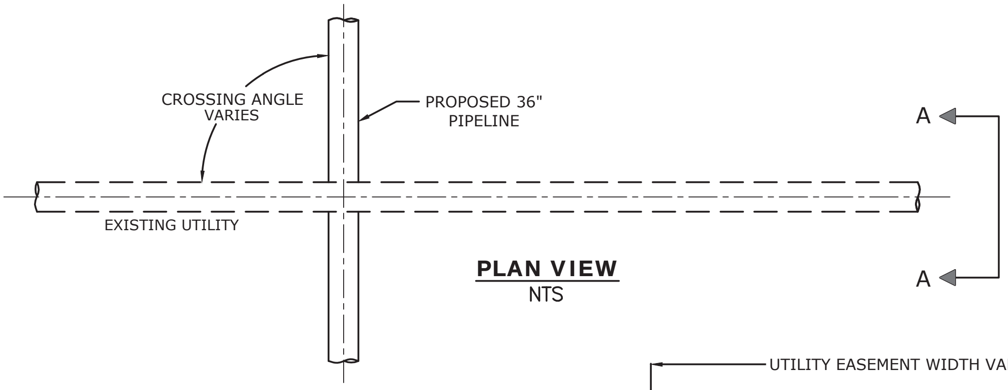
IG.#	REV.#	DESCRIPTION	DATE
	0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG.	KG	08Oct15
CHECKED BY:	DC	08Oct15
DRAWN BY:	RVE	08Oct15
SCALE:	NTS	DATE

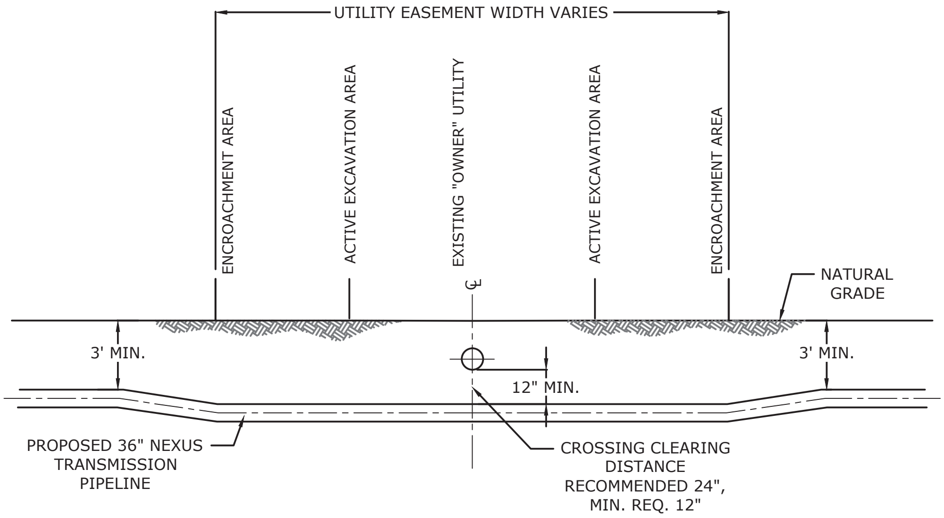
TITLE:
NEXUS GAS TRANSMISSION PROJECT
TYPICAL 36" MAINLINE VALVE PLOT PLAN WITH REMOTE
BLOW-OFF LOCATION – GENERAL PLOT PLAN

LOC.: OHIO / MICHIGAN
REV.: 0
YR.: 2017
W.O.
DWG.NO. S4NX-P-8027





PLAN VIEW
NTS



PROFILE
SEC. A-A
NTS

NOTES:

1. PROPOSED PIPE TO BE LAID TO ACCOMMODATE FREE-STRESS BENDING OR WILL BE FIELD BENDS.
2. TRENCH BACKFILL MATERIAL SHALL BE TAKEN FROM SPOIL PILE OR APPROVED BY PERMITTING AGENCY/LANDOWNER/EXISTING PIPELINE OWNER. ALL BACKFILL MATERIAL TO BE STABILIZED TO PREVENT EROSION.
3. IN WETLAND CROSSINGS WITH POORSOIL CONDITION, SANDBAGS OR CONCRETE MATS ARE TO BE USED BETWEEN PIPELINES TO MAINTAIN MINIMUM 12" SEPERATION.
4. TRENCH CONFIGURATION FOR NEW PIPELINE SHALL MINIMIZE SPAN REQUIRMENTS FOR EXISTING LINE AT THE POINT OF CROSSING.

0	ISSUED FOR FERC FILING	29Oct15
REV.	DESCRIPTION	DATE

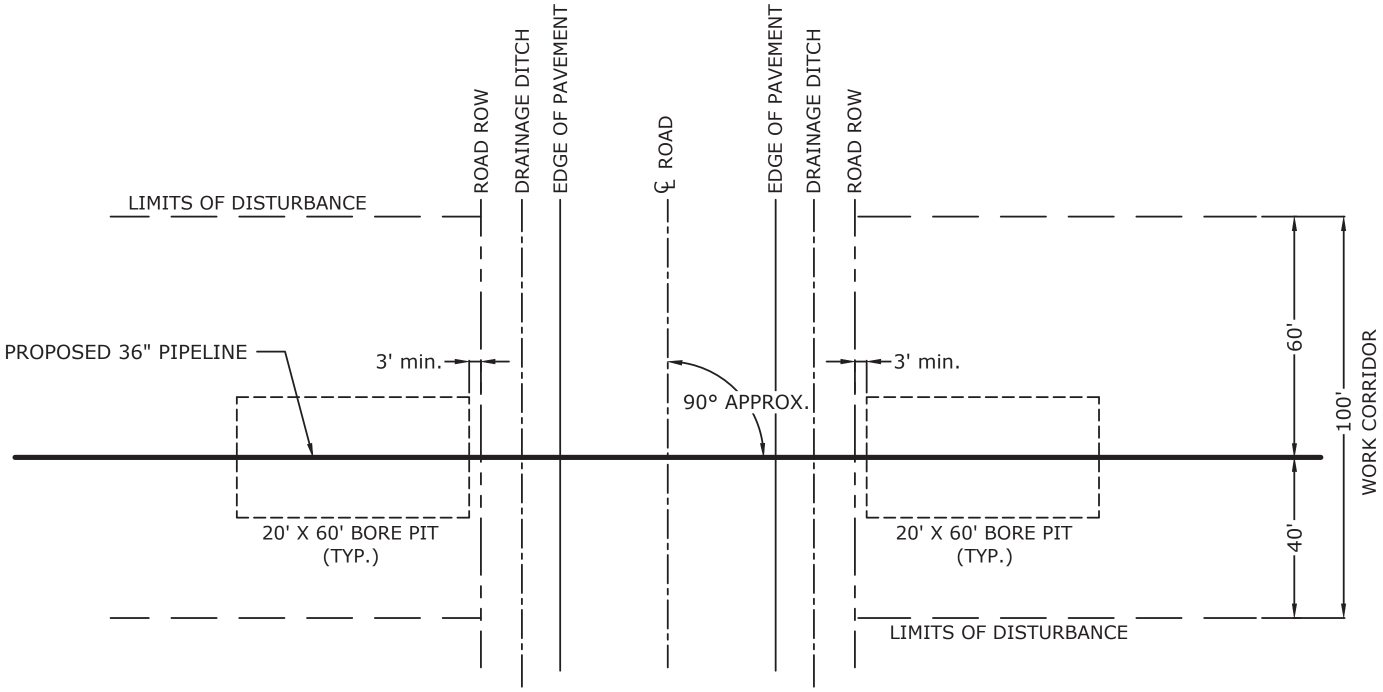
ELI22282 October 29, 2015 10:52am
Filename: K:\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8029_0.DWG

IG.#

TITLE:
NEXUS GAS TRANSMISSION PROJECT
TYPICAL PIPELINE CONSTRUCTION DETAIL
CROSSING WITH EXISTING UTILITY

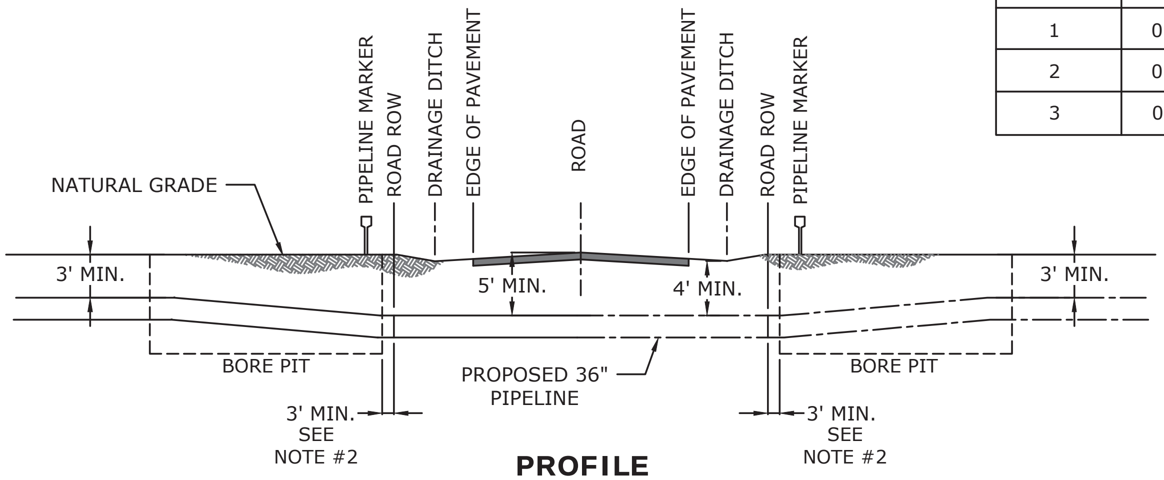
LOC.: OHIO / MICHIGAN

PROJ. ENG.	KG	2Sept15
CHECKED BY:	PW	2Sept15
DRAWN BY:	RVE	2Sept15
SCALE: NTS		YR.: 2017
W.O.		REV.: 0
DWG. NO.	S4NX-P-8029	



PLAN
NTS

WALL THICKNESS	
CLASS LOCATION	W.T. (IN)
1	0.515
2	0.618
3	0.741



PROFILE
NTS

NOTES:

1. PIPE SPECS WITHIN R/W:
   O.D.: 36"
   WALL: SEE TABLE
   GRADE: API 5L-X70
2. DEFINES MINIMUM FOOTAGE OF STRAIGHT PIPE OUTSIDE OF ROAD R/W BEFORE RETURNING PIPELINE TO 3FT MIN. COVER AND POSSIBLE PIPE MATERIAL CHANGE.
3. BORE PITS MAY HAVE ADDITIONAL SET BACKS FROM ROW TO AVOID POWER LINES OR OTHER UTILITIES.
4. CONSTRUCTION TO BE PERFORMED IN ACCORDANCE WITH APPROVED COUNTY/TOWNSHIP ROAD CROSSING PERMIT.
5. REFERENCE E&SCP DRAWING ES-0002 FOR TOPSOIL/SUBSOIL SEPARATION & EROSION CONTROL INSTALLATION PROCEDURES.

FOR63995 October 29, 2015 8:30am
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8030_0.DWG

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

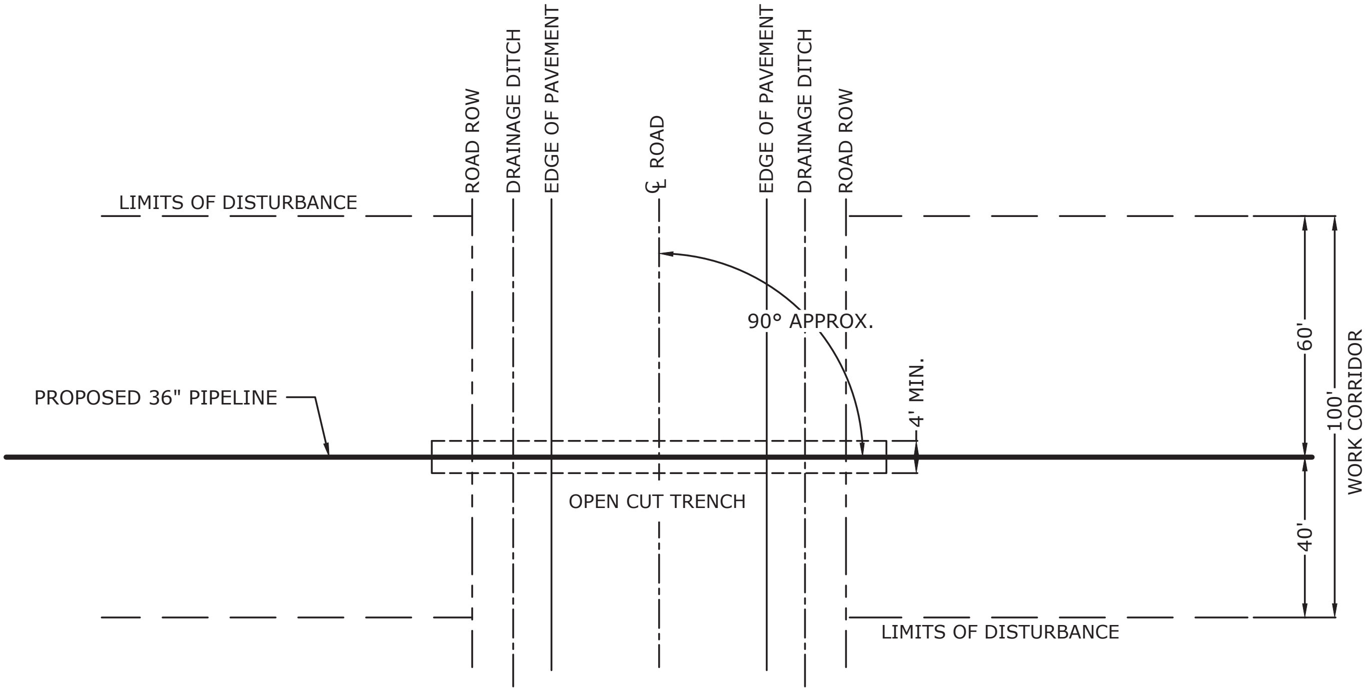
TITLE:
NEXUS GAS TRANSMISSION PROJECT
TYPICAL BORED ROAD CROSSING
COUNTY/ TOWNSHIP ROAD

PROJ. ENG.	KG	15Oct15
CHECKED BY:	DC	15Oct15
DRAWN BY:	RVE	15Oct15
SCALE:	NTS	YR.: 2017
W.O.		REV.: 0

LOC.: OHIO / MICHIGAN

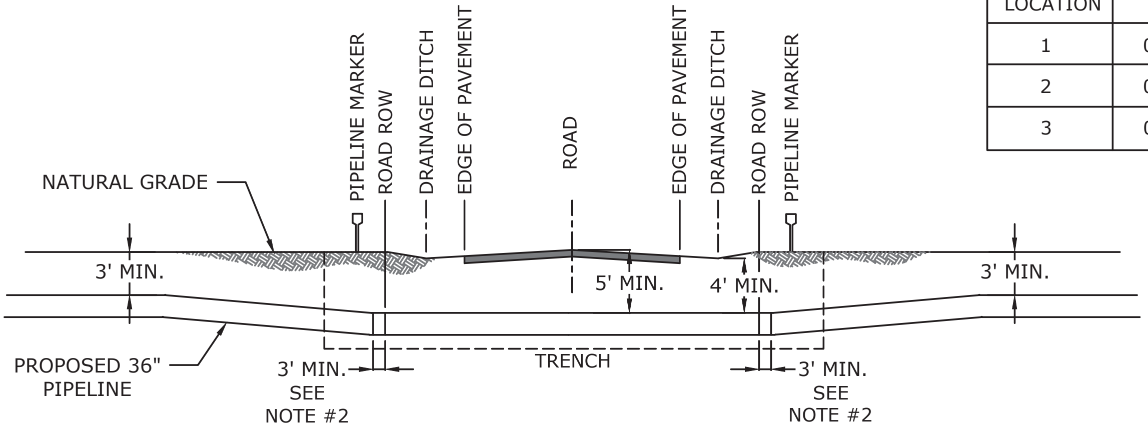
DWG. NO. S4NX-P-8030

IG.#



PLAN
NTS

WALL THICKNESS	
CLASS LOCATION	W.T. (IN)
1	0.515
2	0.618
3	0.741



PROFILE
NTS

NOTES:

1. PIPE SPECS WITHIN R/W:
   O.D.: 36"
   WALL: SEE TABLE
   GRADE: API 5L-X70
2. DEFINES MINIMUM FOOTAGE OF STRAIGHT PIPE OUTSIDE OF ROAD R/W BEFORE RETURNING PIPELINE TO 3FT MIN. COVER AND POSSIBLE PIPE MATERIAL CHANGE.
3. CONSTRUCTION TO BE PERFORMED IN ACCORDANCE WITH APPROVED COUNTY/TOWNSHIP ROAD CROSSING PERMIT.
4. TRENCH EXCAVATION TO BE BACKFILLED WITH CONTROLLED DENSITY FILL TO AVOID ROAD SETTLEMENT.
5. REFERENCE E&SCP DRAWING ES-0002 FOR TOPSOIL/SUBSOIL SEPARATION & EROSION CONTROL INSTALLATION PROCEDURES.

FOR63995 October 29, 2015 8:31am
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8031_0.DWG

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

TITLE:
NEXUS GAS TRANSMISSION PROJECT
TYPICAL "OPEN CUT" ROAD CROSSING
COUNTY/TOWNSHIP ROAD

PROJ. ENG.	KG	15Oct15
CHECKED BY:	DC	15Oct15
DRAWN BY:	RVE	15Oct15
SCALE:	NTS	YR.: 2017
W.O.		REV.: 0

LOC.: OHIO / MICHIGAN

DWG. NO. S4NX-P-8031

IG.#

APPENDIX E

CONSTRUCTION, RESTORATION, AND MITIGATION PLANS

E-1: NGT PROJECT BLASTING PLAN
E-2: TEAL PROJECT BLASTING PLAN
E-3: NGT PROJECT DRAIN TILE MITIGATION PLAN
E-4: HDD DESIGN REPORT AND HDD MONITORING AND INADVERTENT RETURN CONTINGENCY PLAN
E-5: NGT RESIDENTIAL CONSTRUCTION PLANS

APPENDIX E-1

NGT PROJECT BLASTING PLAN

NEXUS Gas Transmission, LLC

NEXUS Project

FERC Docket No. CP16-__-000

BLASTING PLAN

November 2015

NEXUS Project Blasting Plan

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ACRONYMS AND ABBREVIATIONS

amsl	above mean seal level
CFR	Code of Federal Regulation
CI	Chief Inspector
FERC	Federal Energy Regulatory Commission
ms	milliseconds
msl	mean sea level
NEXUS	NEXUS Gas Transmission, LLC
Project	NEXUS Project
ROW	right-of-way

1.0 INTRODUCTION

This Blasting Plan outlines the procedures and safety measures that NEXUS Gas Transmission, LLC's ("NEXUS") contractor will adhere to while implementing blasting activities, should they be required, during the construction of the NEXUS Project. The contractor will be required to submit a detailed blasting plan to NEXUS prior to construction that is consistent with the provisions in this Blasting Plan and construction specification CS-PL1-7.8 (Appendix A).

2.0 PRE-BLAST INSPECTION

As required by FERC, NEXUS will conduct pre-blast surveys, with landowner permission, to assess the conditions of structures, wells, springs, and utilities within 150 feet of the proposed construction right-of-way. Should local or state ordinances require inspections in excess of 150 feet from the work area, the local or state ordinances will prevail. The survey will include:

- Informal discussions to familiarize the adjacent property owners with blasting effects and planned precautions to be taken on this project;
- Determination of the existence and location of site specific structures, utilities, septic systems, and wells;
- Detailed examination, photographs, and/or video records of adjacent structures and utilities; and
- Detailed mapping and measurement of large cracks, crack patterns, and other evidence of structural distress.

The results will be summarized in a condition report that will include photographs and be completed prior to the commencement of blasting.

3.0 MONITORING OF BLASTING ACTIVITIES

During blasting, the NEXUS contractor will take precautions to minimize damage to adjacent areas and structures. Precautions include:

- Dissemination of blast warning signals in the area of blasting;
- Use of blasting mats or other suitable cover (such as subsoil) to prevent fly-rock and possible damage to public, adjacent structures and natural resources;
- Posting warning signals, flags, or barricades;
- Following federal and state procedures and regulations for safe storage, handling, loading, firing, and disposal of explosive materials; and Controlling excessive vibration by limiting the size of charges and by using charge delays, which stagger or sequence the detonation times for each charge.

If the contractor has to blast near buildings or wells, a qualified independent contractor will inspect structures and wells within 150 feet, or farther if required by local or state regulations, of the construction right-of-way prior to blasting, and with landowner permission. Post-blast inspections by a NEXUS representative will also be performed as warranted. All blasting will be performed by registered licensed blasters and monitored by experienced blasting inspectors. Recording seismographs will be installed by the contractor at selected monitoring stations under the observation of NEXUS personnel. During construction, the contractor will submit blast reports for each blast and keep detailed records as described in Section 4.7.

Ground vibration and air overpressure effects of each blast will be monitored by seismographs.

If a charge greater than eight pounds per delay is used, the distance of monitoring will be in accordance with the U.S. Bureau of Mines Report of Investigations 8507.

To maximize its responsiveness to the concerns of affected landowners, NEXUS will evaluate all complaints of well or structural damage associated with construction activities, including blasting. NEXUS will staff a landowner hotline to receive landowner questions or concerns. The toll-free landowner hotline is (844)589-3655. The landowner hotline will be staffed Monday through Friday from 7 A.M. to 5 P.M. and on Saturday from 7 A.M. to 12 P.M. by NEXUS ROW personnel. Outside of these hours, a call forwarding system will be available to receive calls and page the complaint resolution coordinator. All calls will be returned within 24 hours of receipt. In the unlikely event that blasting activities temporarily impair well water, NEXUS will provide alternative sources of water or otherwise compensate the owner. If well or structural damage is substantiated, NEXUS will either compensate the owner for damages or arrange for a new well to be drilled.

4.0 BLASTING SPECIFICATIONS

The potential for blasting along the pipeline segments to affect any wetland, municipal water supply, waste disposal site, well, septic system, spring, karst cavity or abandoned underground mine, will be minimized by controlled blasting techniques and by using mechanical methods for rock excavation as much as possible.

If blasting is required in proximity to these features, the blasting will be designed and controlled to focus the energy of the blasting to the rock within the trench and to limit ground accelerations outside the trench. This should minimize fracturing of the rock outside of the trench. However, even if new fractures do develop in the rock outside of the trench, the ground accelerations are not expected to be high enough to produce ground displacement along these fractures that would be high enough (a) to open these fractures and significantly increase the permeability of the rock in the vicinity of these features or (b) to cause subsidence around these features, particularly karst cavities and abandoned underground mines.

Controlled blasting techniques have been effectively employed by NEXUS and other companies to protect active gas pipelines up to within 25 feet of trench excavation. The following sections present details of procedures for powder blasting that will be implemented in blasting areas along the NEXUS Project route.

4.1 General Provisions

The contractor will provide all personnel, labor, and equipment to perform necessary blasting operations related to the work. The contractor will provide a permitted blaster possessing all permits required by the states in which blasting is required during construction, and having a working knowledge of state and local laws and regulations that pertain to explosives.

Project blasting will be done in accordance with all applicable state and local laws; and regulations applicable to obtaining, transporting, storing, handling, blast initiation, ground motion monitoring, and disposal of explosive materials and/or blasting agents.

Any failure to comply with the appropriate law and/or regulations is the sole liability of the contractor. The contractor and the contractor's permitted blaster shall be responsible for the conduct of all blasting operations, which shall be subject to inspection requirements.

Affected landowners will be contacted prior to any blasting activities.

4.2 Storage of Explosives and Related Materials

Explosives and related materials shall be stored in approved facilities required under the provisions contained in 27 CFR Part 55 and all other applicable regulations. The handling of explosives may be performed by the person holding a permit to use explosives or by other employees under his or her direct supervision provided that such employees are at least 21 years of age.

4.3 Pre-Blast Operations

The contractor is required to submit a planned schedule of blasting operations to the CI or his designated representative for approval, prior to commencement of any blasting or pre-blast operation, which indicates the maximum charge weight per delay, hole size, spacing, depth, and blast layout. If blasting is to be conducted adjacent to an existing utility, approval from the operator and NEXUS must be obtained in regard to blasting parameters. The contractor shall provide this schedule to the CI at least 3 working days prior to any pre-blast operation for approval and use. Where residences are within 50 feet of the blasting operation, the CI may require notification in excess of 5 days. The blasting schedule is to include the blast geometry, drill hole dimensions, type and size of charges, stemming, and delay patterns and should also include a location survey of any dwelling or structures that may be affected by the proposed operation. Face material shall be carefully examined before drilling to determine the possible presence of unfired explosive material. Drilling shall not be started until all remaining butts of old holes are examined for unexploded charges, and if any are found, they shall be re-fired before work proceeds. No person shall be allowed to deepen the drill holes that have contained explosives.

A maximum loading factor shall not exceed the site specific allowable pounds of explosive per cubic yard of rock. However, should the loading fail to effectively break up the rock, a higher loading factor may be allowed if the charge weight per delay is reduced by a proportional amount and approved by the CI.

4.4 Discharging Explosives

Persons authorized to prepare explosive charges or conduct blasting operations shall use every reasonable precaution, including, but not limited to, warning signals, flags, barricades, or woven wire mats to ensure the safety of the general public and workmen.

The contractor shall obtain NEXUS's approval and provide them at least 72-hour notice prior to the use of any explosives. The contractor shall comply with local and state requirements for pre-blast notifications, such as "One Call", which requires a 72-hour notice.

Whenever blasting is being conducted in the vicinity of gas, electric, water, fire alarm, telephone, telegraph and steam utilities, the blaster shall notify the appropriate representatives of such utilities a minimum of 24 hours in advance of blasting. Verbal notice shall be confirmed with written notice. In an emergency, the local authority issuing the original permit may waive this time limit.

Blasting operations, except by special permission of the authority having jurisdiction, shall be conducted during daylight hours.

When blasting is done in congested areas or in proximity to a significant natural resource, structure, railway, or highway or any other installation that may be damaged, the blast shall be backfilled before firing or covered with a mat, constructed so that it is capable of preventing fragments from being thrown. In addition, all other possible precautions shall be taken to prevent damage to livestock and other property and inconvenience to the property owner or tenant during blasting operation. Any rock scattered outside the right-of-way by blasting operations shall immediately be hauled off or returned to the right-of-way.

Precautions shall be taken to prevent accidental discharge of electric blasting caps from currents induced by radar and radio transmitters, lightning, adjacent power lines, dust and snow storms, or other sources of extraneous electricity. These precautions, per 29 CFR 1926.900(k), shall include:

- Detonators shall be short-circuited in holes which have been primed and shunted until wired into the blasting circuit;

- Suspension of all blasting operations and removal of all personnel from the blasting area during the approach and progress of an electrical storm;

- The posting of all signs warning against the use of mobile radio transmitters on all roads within 350 feet (107 m) of blasting operations;

- Ensuring that mobile radio transmitters which are less than 100 feet away from electric blasting caps, in other than original containers, shall be de-energized and effectively locked, and

- Observance of the latest recommendations with regard to blasting in the vicinity of radio transmitters or power lines, as set forth in the IME Safety Library Publication No. 20, Safety Guide for the Prevention of Radio Frequency Radiation Hazards in the Use of Electric Blasting Caps.

No blast shall be fired until the blaster in charge has made certain that all surplus explosive materials are in a safe place, all persons and equipment are at a safe distance or under sufficient cover, and that an adequate warning signal has been given.

Only the person making leading wire connections in electrical firing shall fire the shot. All connections should be made from the bore hole back to the source of firing current, and the leading wires shall remain shorted until the charge is to be fired. After firing an electric blast from a blasting machine, the leading wires shall be immediately disconnected from the machine and short-circuited. If there are any misfires while using cap and fuse, all persons shall remain away from the charge for at least one hour. If electrical blasting caps are used and a misfire occurs, this waiting period may be reduced to 30 minutes. Misfires shall be handled under the direction of the person in charge of the blasting and all wires shall be carefully traced in search for the unexploded charges.

Explosives shall not be extracted from a hole that has once been charged or has misfired unless it is impossible to detonate the unexploded charge by insertion of a fresh additional primer.

4.5 Waterbody Crossing Blasting Procedures

To facilitate planning for blasting activities for waterbody crossings, rock drills or test excavations may be used in waterbodies to test the ditch-line during mainline blasting operations to evaluate the presence of rock in the trench-line. The excavation of the test pit or rock drilling is not included in the time window requirements for completing the crossing. For testing and any subsequent blasting operations, stream flow will be maintained through the site. When blasting is required, FERC timeframes for completing in-stream construction begin when the removal of blast rock from the waterbody is started. If, after removing the blast rock, additional blasting is required, a new timing window will be determined in consultation with the Environmental Inspector. If blasting impedes the flow of the waterbody, the contractor can use a backhoe to restore the stream flow without triggering the timing window. During blasting operations, the contractor shall comply with the waterbody crossing procedures specified in the NEXUS Project Erosion and Sedimentation Control Plan as well as any project-specific permit conditions.

4.6 Disposal of Explosive Materials

All explosive materials that are obviously deteriorated or damaged shall not be used and shall be destroyed according to applicable local, state, and federal requirements.

Empty containers and packages, and paper on fiberboard packing materials that have previously contained explosive materials shall not be reused for any purpose. Such packaging materials shall be destroyed by burning at an approved outdoor location or by other approved method. All personnel shall remain at a safe distance from the disposal area.

All other explosive materials will be transported from the job site in approved magazines per local and/or state regulations.

4.7 Blasting Records

A record of each blast shall be made and submitted, along with seismograph reports, to the NEXUS CI. The record shall contain the following minimum data for each blast:

- Name of company or contractor;
- Location, date and time of blast;
- Name, signature, and license number of contractor and of blaster in charge;
- Type of material blasted;
- Number of holes, depth of burden and stemming, and spacing;
- Diameter and depth of holes;
- Volume of rock in shot;
- Types of explosives used, specific gravity, energy release, pounds of explosive per delay, and total pounds of explosive per shot;
- Delay type, interval, total number of delays, and holes per delay;
- Maximum amount of explosives per delay period of 17 ms or greater;
- Power factor;
- Method of firing and type of circuit;
- Direction and distance in feet to nearest structure and utility owned or leased by the person conducting the blasting;
- Weather conditions;
- Type and height or length of stemming;
- If mats or other protection were used; and
- Type of detonators used and delay periods used.

The person taking the seismograph reading shall accurately indicate exact location of the seismograph, if used, and shall also show the distance of the seismograph from the blast.

Seismograph records, where required, should include:

- Name of person and firm operating and analyzing the seismograph record;
- Seismograph serial number;

- Seismograph reading; and
- Maximum number of holes per delay period of 17 ms or greater.

5.0 POST-BLAST INSPECTION

NEXUS ROW representative in conjunction with the CI and/or an independent contractor, with landowner permission, will examine the condition of structures within 150 feet, or as required by state or local ordinances, of the construction area after completion of blasting operations to identify any changes in the conditions of these properties or confirm any damages noted by the landowner. The independent contractor with landowner approval will conduct a re-sampling of wells within 150 feet, or as required by state or local ordinances, of the construction area. Should any damage or change occur during the blasting operations, an additional survey of the affected property will be performed before the continuation of blasting operations.

6.0 REFERENCES

Occupational Safety and Health Administration blasting requirements 29 CFR 1926.900(k)

Ohio Fire Code – Section 1301:7-7.

Ohio Administrative Code (OAC) Chapter 4123:1-5-29 Explosives and Blasting.

APPENDIX A

- ***CONSTRUCTION SPECIFICATION – ONSHORE PIPELINES AND METER STATIONS - ROCK EXCAVATION***

Spectra Energy

ILLNESS ZERO INJURY

Construction Specification

Spec. Number: **CS-PL1-7.8**		
Master Issue Date: **01/20/2014**	*Section* **I** *of* **I**	
Sub-Document Date: **01/20/2014**	*Page* **1** *of* **5**	

Title: **ONSHORE PIPELINES AND METER STATIONS – ROCK EXCAVATION**

TITLE	APPROVAL
Accountable Group:	*Rick Crabtree 12/2/2013 3:54:18 PM*
Technical Champion:	*Robert W. Guerrero 1/20/2014 4:58:25 PM*
TITLE	**RATIFICATION**
SET-US Operating Company:	*Alan K Lambeth 1/17/2014 11:09:50 AM*
Union Gas Operating Company:	*N/A*
Westcoast (SET-WEST) Operating Company:	*N/A*

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7 ROCK EXCAVATION

7A Pre-requisites for Use of Explosives

Prior to the use of any explosives, the Contractor shall:

7A1 Submit a blasting procedure/plan a minimum of two (2) weeks prior to any blasting activities and receive Company approval. The blasting procedure shall take into account adjacent pipelines, power lines and specific requirements outlined in the Contract Documents and shall include as a minimum:

7A1.1 Storage of explosives

7A1.2 Transportation of explosives

7A1.3 Inspection of drilling areas

7A1.4 Loading of explosives

7A1.5 Non-electric detonation methods - Electric detonation methods are not acceptable.

7A1.6 Control of fly-rock during blasting, including mat placement if used

7A1.7 Security procedures

7A1.8 Sequence of events leading up the detonation of explosives

7A1.9 Proposed hours of blasting

7A1.10 True distances to buildings or operating pipelines

7A1.11 Maximum charge mass per delay interval

7A1.12 Borehole diameters

7A1.13 Hole pattern, burden, and spacing

7A1.14 Borehole depth, subgrade depth, and unloaded collar length

7A1.15 Sketch showing borehole loading details

7A1.16 Explosive names, properties, and delay sequences

7A1.17 Calculated powder factor (weight per volume of rock), based on explosive energy of 1000 calories per gram

7A1.18 Geology description

7A1.19 Borehole stemming depth

7A1.20 Special conditions or variations for grade rock, trench rock, underwater blasting, and blasting at undercrossings of existing utilities

7A1.21 Blast to open face

7A2 Obtain Company approval and provide a notice of 72 hours prior to detonation of any explosives.

7A3 Obtain approval from the Company if the blasting parameters vary from the requirements set out in this specification or the Contract Documents.

7B Use of Explosives

7B1 The Contractor shall secure and comply with all the applicable permits required for the handling, transportation, storage, and use of explosives.

7B2 The Contractor shall not endanger life, livestock, or adjacent properties.

7B3 The Contractor shall minimize inconveniences to the property owners or tenants during all phases of blasting.

7B4 The Contractor shall provide physical protection to any above-grade utilities and equipment in the area of the blast.

7B5 The Company is to be given the opportunity to set up any required monitoring equipment.

7B6 The Contractor shall provide monitoring equipment to ensure vibrations are limited to two inches per second (50 mm/s) PPV, when measured at dwellings, buildings, structures, and power line towers. For power line towers, this limit applies to the greatest of the three vectors; otherwise this limit is the vector sum of the three planes. The Contractor limits vibrations to one inch per second (25 mm/s) PPV for vibration-sensitive structures specified by the Company. In no case shall vibration amplitude exceed 0.004 in (0.15 mm).

7B7 Any blasting in close proximity to existing in-service piping is to be in accordance with the Contract Documents.

7B8 Charge loading is to be spread in order to obtain the optimum breakage of rock. The Contractor shall attempt to achieve a fragmentation rate of at least 75% of the trench rock to less than 6 in (150 mm) in diameter.

7B9 All delay connectors used shall have a delay interval of at least seventeen milliseconds.

7B10 There are to be no loaded holes left overnight, and the site is inspected after each blast for any un-detonated charges.

7B11 The Contractor shall discuss the blasting plan with the Company prior to each blast, including the maximum charge weight per delay, hole sizes, spacing, depths and layout. Upon completion of blasting each day, the Contractor shall provide the Company with the following for each blast:

7B11.1 Blasting Contractor license number

7B11.2 Date, time, and location of blast

7B11.3 Hole sizes, spacing, depths, layout, and volume of rock in blast

7B11.4 Delay type, interval, total number of delays, and holes per delay

7B11.5 Explosive type, specific gravity, energy release, weight of explosive per delay, and total weight of explosive per shot

7B11.6 Powder factor

7B11.7 Copies of any seismographic data

7C Evaluation of Close-In Blasts

The following additional limitations apply for blasting at distances of less than 25 feet from the pipeline. These criteria were extrapolated from a 1970 US Bureau of Mines Study on cratering in granite and refined based on a 2004 failure investigation.

7C1 Blasting on Pipeline Right-of-Way

Blasting should not be allowed on the pipeline right-of-way except when conducted for the benefit of the Company and under the supervision of a Company representative or qualified Blasting Inspector familiar with the Company's blasting requirements.

7C2 Minimum Offset From Blast Holes to Pipeline

7C2.1 No blast holes should be loaded at an offset of less than 25 feet from the centerline of an in-service pipeline except in cases where precise measurements are taken to ensure that the pipeline will have at least one foot of Clearance (C) from the theoretical area surrounding the blast hole in which the ground could be permanently deformed by the blast under worst case conditions.

7C2.2 This theoretical area is a conical shape originating at the bottom of the blast hole and extending out at an angle up to the ground surface as depicted in Figure BLAST1 below.

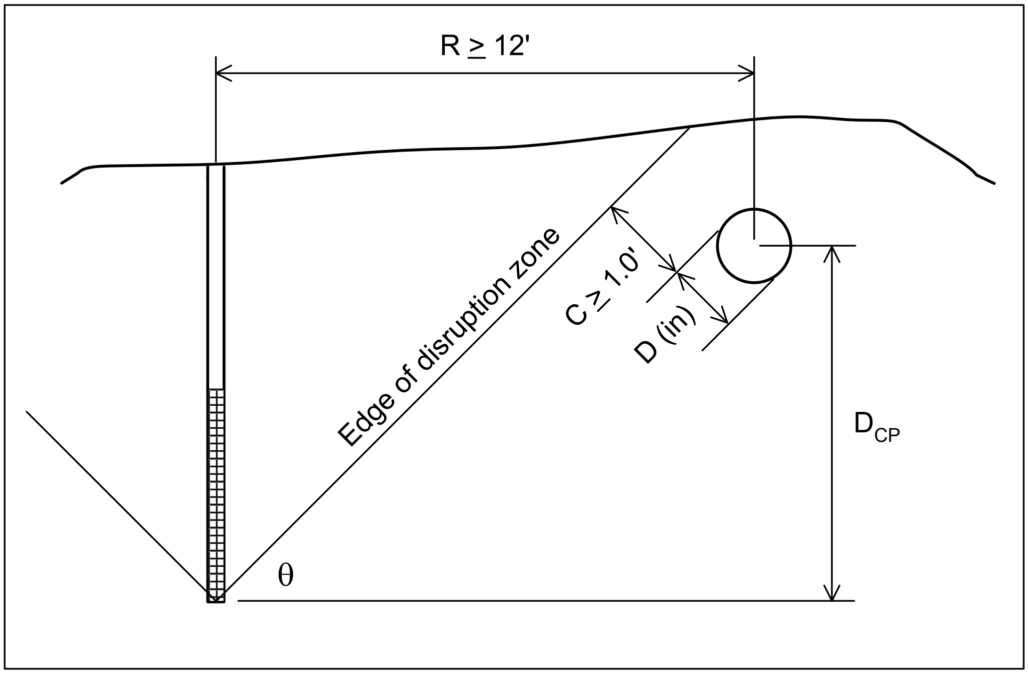

FIGURE BLAST1 – SEPARATION FROM BLAST HOLE

7C2.3 The clearance C can be calculated by:

$$C = R \times \sin\theta - D_{CP} \times \cos\theta - \frac{D}{24}$$

with D in inches and the other dimensions in feet, and where θ is the angle from the horizontal of the theoretical zone of permanent disruption.

7C2.4 The disruption zone angle θ shall be taken to be 32°, except when both of the following special circumstances hold. If both of these conditions hold, the disruption zone angle θ may be taken to be 45°.

7C2.4.1 Charge weight per delay does not exceed 0.9 times the ordinary maximum allowable charge weight and

7C2.4.2 Charge weight per delay in pounds must not be greater than effective hole depth in feet, divided by 2.5 lb/ft (Example: for 15-ft hole depth, maximum charge no greater than 15 ft / 2.5 lb/ft = 6 lb).

7C2.5 If the calculated clearance C would be less than 1 foot, the minimum offset distance must be increased accordingly. The minimum offset R to achieve 1 foot clearance is:

$$R = \frac{1\,ft}{\sin\theta} + \frac{D}{24 \times \sin\theta} + \frac{D_{cp}}{\tan\theta} \quad \text{, or:}$$

- θ = 32°: $R = 1.887\,ft + \frac{D}{12.718} + 1.6 \times D_{cp}$
- θ = 45°: $R = 1.414\,ft + \frac{D}{16.971} + D_{cp}$

7C2.6 When blast holes are angled from the vertical, this can have the effect of directing the disruption from the blast in one direction (the surface acts as a free face, allowing movement in that direction). For this reason, blast holes within 25 feet of an existing pipeline must be drilled vertically or angled away from the pipeline as the hole gets deeper.

7C2.7 In all cases, the absolute minimum offset R is 12 feet.

7D Mechanical Rock Removal

7D1 Mechanical rock removal shall occur between the hours of 7:00 am and 7:00 pm, unless otherwise specified by the Company.

7D2 The Contractor shall achieve a fragmentation rate of at least 75% of the trench rock to less than 6 in (150 mm) in diameter.

APPENDIX E-2

TEAL PROJECT BLASTING PLAN

TEXAS EASTERN APPALACHIAN LEASE PROJECT

BLASTING PLAN

November 2015

Texas Eastern Appalachian Lease Project
Blasting Plan

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ACRONYMS AND ABBREVIATIONS

amsl	above mean seal level
CFR	Code of Federal Regulation
CI	Chief Inspector
FERC	Federal Energy Regulatory Commission
ms	milliseconds
msl	mean sea level
NEXUS	NEXUS Gas Transmission, LP
Project	Texas Eastern Appalachian Lease Project
ROW	right-of-way
TEALP	Texas Eastern Appalachian Lease Project
TETLP	Texas Eastern Transmission, LP

1.0 INTRODUCTION

Texas Eastern Transmission, LP ("Texas Eastern"), an indirect wholly owned subsidiary of Spectra Energy Partners, LP. Blasting Plan outlines the procedures and safety measures that Texas Eastern, LP's ("Texas Eastern's") contractor will adhere to while implementing blasting activities, should they be required, during construction of the Texas Eastern Appalachian Lease Project ("TEAL Project" or "Project"). The contractor will be required to submit a detailed blasting plan to Texas Eastern prior to construction that is consistent with the provisions in this Blasting Plan and construction specifications CS-PL-1-7.7 (Appendix A).

2.0 PRE-BLAST INSPECTION

As required by FERC, Texas Eastern will conduct pre-blast surveys, with landowner permission, to assess the conditions of structures, wells, springs, and utilities within 150 feet of the proposed construction right-of-way. Should local or state ordinances require inspections in excess of 150 feet from the work area, the local or state ordinances will prevail. The survey will include:

- Informal discussions to familiarize the adjacent property owners with blasting effects and planned precautions to be taken on this project;
- Determination of the existence and location of site specific structures, utilities, septic systems, and wells;
- Detailed examination, photographs, and/or video records of adjacent structures and utilities; and
- Detailed mapping and measurement of large cracks, crack patterns, and other evidence of structural distress.

The results will be summarized in a condition report that will include photographs and be completed prior to the commencement of blasting.

3.0 MONITORING OF BLASTING ACTIVITIES

During blasting, the Texas Eastern contractor will take precautions to minimize damage to adjacent areas and structures. Precautions include:

- Dissemination of blast warning signals in the area of blasting;
- Use of blasting mats or other suitable cover (such as subsoil) to prevent fly-rock and possible damage to public, adjacent structures and natural resources;
- Posting warning signals, flags, or barricades;
- Following federal and state procedures and regulations for safe storage, handling, loading, firing, and disposal of explosive materials; and

Excessive vibration will be controlled by limiting the size of charges and by using charge delays, which stagger or sequence the detonation times for each charge.

If the contractor has to blast near buildings or wells, a qualified independent contractor will inspect structures and wells within 150 feet, or farther if required by local or state regulations, of the construction right-of-way prior to blasting, and with landowner permission. Post-blast inspections by a Texas Eastern representative will also be performed as warranted. All blasting will be performed by registered licensed blasters and monitored by experienced blasting inspectors. Recording seismographs will be installed by the contractor at selected monitoring stations under the observation of Texas Eastern personnel. During construction, the contractor will submit blast reports for each blast and keep detailed records as described in Section 4.7.

Ground vibration and air overpressure effects of each blast will be monitored by seismographs.

If a charge greater than eight pounds per delay is used, the distance of monitoring will be in accordance with the U.S. Bureau of Mines Report of Investigations 8507.

To maximize its responsiveness to the concerns of affected landowners, Texas Eastern will evaluate all complaints of well or structural damage associated with construction activities, including blasting. A toll-free landowner hotline will be established by Texas Eastern for landowners to use in reporting complaints or concerns. In the unlikely event that blasting activities temporarily impair well water, Texas Eastern will provide alternative sources of water or otherwise compensate the owner. If well or structural damage is substantiated, Texas Eastern will either compensate the owner for damages or arrange for a new well to be drilled.

4.0 BLASTING SPECIFICATIONS

The potential for blasting along the pipeline segments to affect any wetland, municipal water supply, waste disposal site, well, septic system, or spring will be minimized by controlled blasting techniques and by using mechanical methods for rock excavation as much as possible. Controlled blasting techniques have been effectively employed by Texas Eastern and other companies to protect active gas pipelines up to within 12 feet of trench excavation. The following sections present details of procedures for powder blasting that will be implemented in blasting areas along the Project route.

4.1 General Provisions

The contractor will provide all personnel, labor, and equipment to perform necessary blasting operations related to the work. The contractor will provide a permitted blaster possessing all permits required by the states in which blasting is required during construction, and having a working knowledge of state and local laws and regulations that pertain to explosives.

Project blasting will be done in accordance with all applicable state and local laws; and regulations applicable to obtaining, transporting, storing, handling, blast initiation, ground motion monitoring, and disposal of explosive materials and/or blasting agents.

Any failure to comply with the appropriate law and/or regulations is the sole liability of the contractor. The contractor and the contractor’s permitted blaster shall be responsible for the conduct of all blasting operations, which shall be subject to inspection requirements.

Affected landowners will be contacted prior to any blasting activities.

4.2 Storage of Explosives and Related Materials

Explosives and related materials shall be stored in approved facilities required under the provisions contained in 27 CFR Part 55 and all other applicable regulations. The handling of explosives may be performed by the person holding a permit to use explosives or by other employees under his or her direct supervision provided that such employees are at least 21 years of age.

4.3 Pre-Blast Operations

The contractor is required to submit a planned schedule of blasting operations to the CI or his designated representative for approval, prior to commencement of any blasting or pre-blast operation, which indicates the maximum charge weight per delay, hole size, spacing, depth, and blast layout. If blasting is to be conducted adjacent to an existing Texas Eastern Transmission, LP ("TETLP"), approval must be received from the TETLP Transmission Department. The contractor shall provide this schedule to the CI at least 3 working days prior to any pre-blast operation for approval and use. Where residences are within 50 feet of the blasting operation, the CI may require notification in excess of 5 days. The blasting schedule is to include the blast geometry, drill hole dimensions, type and size of charges, stemming, and delay patterns and should also include a location survey of any dwelling or structures that may be affected by the proposed operation. Face material shall be carefully examined before drilling to determine the possible presence of unfired explosive material. Drilling shall not be started until all remaining butts of old holes are examined for unexploded charges, and if any are found, they shall be re-fired before work proceeds. No person shall be allowed to deepen the drill holes that have contained explosives.

A maximum loading factor shall not exceed the site specific allowable pounds of explosive per cubic yard of rock. However, should the loading fail to effectively break up the rock, a higher loading factor may be allowed if the charge weight per delay is reduced by a proportional amount and approved by the CI.

4.4 Discharging Explosives

Persons authorized to prepare explosive charges or conduct blasting operations shall use every reasonable precaution, including, but not limited to, warning signals, flags, barricades, or woven wire mats to ensure the safety of the general public and workmen.

The contractor shall obtain Texas Eastern's approval and provide them at least 72-hour notice prior to the use of any explosives. The contractor shall comply with local and state requirements for pre-blast notifications, such as "One Call", which requires a 72-hour notice.

Whenever blasting is being conducted in the vicinity of gas, electric, water, fire alarm, telephone, telegraph and steam utilities, the blaster shall notify the appropriate representatives of such utilities a minimum of 24 hours in advance of blasting. Verbal notice shall be confirmed with written notice. In an emergency, the local authority issuing the original permit may waive this time limit.

Blasting operations, except by special permission of the authority having jurisdiction, shall be conducted during daylight hours.

When blasting is done in congested areas or in proximity to a significant natural resource, structure, railway, or highway or any other installation that may be damaged, the blast shall be backfilled before firing or covered with a mat, constructed so that it is capable of preventing fragments from being thrown. In addition, all other possible precautions shall be taken to prevent damage to livestock and other property and inconvenience to the property owner or tenant during blasting operation. Any rock scattered outside the right-of-way by blasting operations shall immediately be hauled off or returned to the right-of-way.

Precautions shall be taken to prevent accidental discharge of electric blasting caps from currents induced by radar and radio transmitters, lightning, adjacent power lines, dust and snow storms, or other sources of extraneous electricity. These precautions, per 29 CFR 1926.900(k), shall include:

- Detonators shall be short-circuited in holes which have been primed and shunted until wired into the blasting circuit;
- Suspension of all blasting operations and removal of all personnel from the blasting area during the approach and progress of an electrical storm;
- The posting of all signs warning against the use of mobile radio transmitters on all roads within 350 feet (107 m) of blasting operations;
- Ensuring that mobile radio transmitters which are less than 100 feet away from electric blasting caps, in other than original containers, shall be deenergized and effectively locked, and
- Observance of the latest recommendations with regard to blasting in the vicinity of radio transmitters or power lines, as set forth in the IME Safety Library Publication No. 20, Safety Guide for the Prevention of Radio Frequency Radiation Hazards in the Use of Electric Blasting Caps.

No blast shall be fired until the blaster in charge has made certain that all surplus explosive materials are in a safe place, all persons and equipment are at a safe distance or under sufficient cover, and that an adequate warning signal has been given.

Only the person making leading wire connections in electrical firing shall fire the shot. All connections should be made from the bore hole back to the source of firing current, and the leading wires shall remain shorted until the charge is to be fired. After firing an electric blast from a blasting machine, the leading wires shall be immediately disconnected from the machine and short-circuited. If there are any misfires while using cap and fuse, all persons shall remain away from the charge for at least one hour. If electrical blasting caps are used and a misfire occurs, this waiting period may be reduced to 30 minutes. Misfires shall be handled under the direction of the person in charge of the blasting and all wires shall be carefully traced in search for the unexploded charges.

Explosives shall not be extracted from a hole that has once been charged or has misfired unless it is impossible to detonate the unexploded charge by insertion of a fresh additional primer.

4.5 Waterbody Crossing Blasting Procedures

To facilitate planning for blasting activities for waterbody crossings, rock drills or test excavations may be used in waterbodies to test the ditch-line during mainline blasting operations to evaluate the presence of rock in the trench-line. The excavation of the test pit or rock drilling is not included in the time window requirements for completing the crossing. For testing and any subsequent blasting operations, stream flow will be maintained through the site. When blasting is required, FERC timeframes for completing in-stream construction begin when the removal of blast rock from the waterbody is started. If, after removing the blast rock, additional blasting is required, a new timing window will be determined in consultation with the Environmental Inspector. If blasting impedes the flow of the waterbody, the contractor can use a backhoe to restore the stream flow without triggering the timing window. During blasting operations, the contractor shall comply with the waterbody crossing procedures specified in the NEXUS Project Erosion and Sedimentation Control Plan as well as any project-specific permit conditions.

4.6 Disposal of Explosive Materials

All explosive materials that are obviously deteriorated or damaged shall not be used and shall be destroyed according to applicable local, state, and federal requirements.

Empty containers and packages, and paper on fiberboard packing materials that have previously contained explosive materials shall not be reused for any purpose. Such packaging materials shall be destroyed by burning at an approved outdoor location or by other approved method. All personnel shall remain at a safe distance from the disposal area.

All other explosive materials will be transported from the job site in approved magazines per local and/or state regulations.

4.7 Blasting Records

A record of each blast shall be made and submitted, along with seismograph reports, to the TETLP CI. The record shall contain the following minimum data for each blast:

- Name of company or contractor;
- Location, date and time of blast;
- Name, signature, and license number of contractor and of blaster in charge;
- Type of material blasted;
- Number of holes, depth of burden and stemming, and spacing;
- Diameter and depth of holes;
- Volume of rock in shot;
- Types of explosives used, specific gravity, energy release, pounds of explosive per delay, and total pounds of explosive per shot;

- Delay type, interval, total number of delays, and holes per delay;
- Maximum amount of explosives per delay period of 17 ms or greater;
- Power factor;
- Method of firing and type of circuit;
- Direction and distance in feet to nearest structure and utility owned or leased by the person conducting the blasting;
- Weather conditions;
- Type and height or length of stemming;
- If mats or other protection were used; and
- Type of detonators used and delay periods used.

The person taking the seismograph reading shall accurately indicate exact location of the seismograph, if used, and shall also show the distance of the seismograph from the blast.

Seismograph records, where required, should include:

- Name of person and firm operating and analyzing the seismograph record;
- Seismograph serial number;
- Seismograph reading; and
- Maximum number of holes per delay period of 17 ms or greater.

5.0 POST-BLAST INSPECTION

An independent contractor, with landowner permission, will examine the condition of structures within 150 feet, or as required by state or local ordinances, of the construction area after completion of blasting operations to identify any changes in the conditions of these properties or confirm any damages noted by the landowner. The independent contractor with landowner approval will conduct a re-sampling of wells within 150 feet, or as required by state or local ordinances, of the construction area. In the event that damage or change should occur during blasting operations, an additional survey of the affected property will be performed before the continuation of blasting operations.

6.0 REFERENCES

Occupational Safety and Health Administration blasting requirements 29 CFR 1926.900(k)

Ohio Fire Code – Section 1301:7-7.
Ohio Administrative Code (OAC) Chapter 4123:1-5-29 Explosives and Blasting.

APPENDIX A

- ***BLASTING SPECIFICATIONS***

Spectra Energy

Construction Specification

Spec. Number: **CS-PL1-7.8**		
Master Issue Date: **01/20/2014**	*Section* **I** *of* **I**	
Sub-Document Date: **01/20/2014**	*Page* **1** *of* **5**	

Title: **ONSHORE PIPELINES AND METER STATIONS – ROCK EXCAVATION**

TITLE	APPROVAL
Accountable Group:	*Rick Crabtree 12/2/2013 3:54:18 PM*
Technical Champion:	*Robert W. Guerrero 1/20/2014 4:58:25 PM*
TITLE	**RATIFICATION**
SET-US Operating Company:	*Alan K Lambeth 1/17/2014 11:09:50 AM*
Union Gas Operating Company:	*N/A*
Westcoast (SET-WEST) Operating Company:	*N/A*

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7 ROCK EXCAVATION

7A Pre-requisites for Use of Explosives

Prior to the use of any explosives, the Contractor shall:

7A1 Submit a blasting procedure/plan a minimum of two (2) weeks prior to any blasting activities and receive Company approval. The blasting procedure shall take into account adjacent pipelines, power lines and specific requirements outlined in the Contract Documents and shall include as a minimum:

7A1.1 Storage of explosives

7A1.2 Transportation of explosives

7A1.3 Inspection of drilling areas

7A1.4 Loading of explosives

7A1.5 Non-electric detonation methods - Electric detonation methods are not acceptable.

7A1.6 Control of fly-rock during blasting, including mat placement if used

7A1.7 Security procedures

7A1.8 Sequence of events leading up the detonation of explosives

7A1.9 Proposed hours of blasting

7A1.10 True distances to buildings or operating pipelines

7A1.11 Maximum charge mass per delay interval

7A1.12 Borehole diameters

7A1.13 Hole pattern, burden, and spacing

7A1.14 Borehole depth, subgrade depth, and unloaded collar length

7A1.15 Sketch showing borehole loading details

7A1.16 Explosive names, properties, and delay sequences

7A1.17 Calculated powder factor (weight per volume of rock), based on explosive energy of 1000 calories per gram

7A1.18 Geology description

7A1.19 Borehole stemming depth

7A1.20 Special conditions or variations for grade rock, trench rock, underwater blasting, and blasting at undercrossings of existing utilities

7A1.21 Blast to open face

7A2 Obtain Company approval and provide a notice of 72 hours prior to detonation of any explosives.

7A3 Obtain approval from the Company if the blasting parameters vary from the requirements set out in this specification or the Contract Documents.

7B Use of Explosives

7B1 The Contractor shall secure and comply with all the applicable permits required for the handling, transportation, storage, and use of explosives.

7B2 The Contractor shall not endanger life, livestock, or adjacent properties.

7B3 The Contractor shall minimize inconveniences to the property owners or tenants during all phases of blasting.

7B4 The Contractor shall provide physical protection to any above-grade utilities and equipment in the area of the blast.

7B5 The Company is to be given the opportunity to set up any required monitoring equipment.

7B6 The Contractor shall provide monitoring equipment to ensure vibrations are limited to two inches per second (50 mm/s) PPV, when measured at dwellings, buildings, structures, and power line towers. For power line towers, this limit applies to the greatest of the three vectors; otherwise this limit is the vector sum of the three planes. The Contractor limits vibrations to one inch per second (25 mm/s) PPV for vibration-sensitive structures specified by the Company. In no case shall vibration amplitude exceed 0.004 in (0.15 mm).

7B7 Any blasting in close proximity to existing in-service piping is to be in accordance with the Contract Documents.

7B8 Charge loading is to be spread in order to obtain the optimum breakage of rock. The Contractor shall attempt to achieve a fragmentation rate of at least 75% of the trench rock to less than 6 in (150 mm) in diameter.

7B9 All delay connectors used shall have a delay interval of at least seventeen milliseconds.

7B10 There are to be no loaded holes left overnight, and the site is inspected after each blast for any un-detonated charges.

7B11 The Contractor shall discuss the blasting plan with the Company prior to each blast, including the maximum charge weight per delay, hole sizes, spacing, depths and layout. Upon completion of blasting each day, the Contractor shall provide the Company with the following for each blast:

7B11.1 Blasting Contractor license number

7B11.2 Date, time, and location of blast

7B11.3 Hole sizes, spacing, depths, layout, and volume of rock in blast

7B11.4 Delay type, interval, total number of delays, and holes per delay

7B11.5 Explosive type, specific gravity, energy release, weight of explosive per delay, and total weight of explosive per shot

7B11.6 Powder factor

7B11.7 Copies of any seismographic data

7C Evaluation of Close-In Blasts

The following additional limitations apply for blasting at distances of less than 25 feet from the pipeline. These criteria were extrapolated from a 1970 US Bureau of Mines Study on cratering in granite and refined based on a 2004 failure investigation.

7C1 Blasting on Pipeline Right-of-Way

Blasting should not be allowed on the pipeline right-of-way except when conducted for the benefit of the Company and under the supervision of a Company representative or qualified Blasting Inspector familiar with the Company's blasting requirements.

7C2 Minimum Offset From Blast Holes to Pipeline

7C2.1 No blast holes should be loaded at an offset of less than 25 feet from the centerline of an in-service pipeline except in cases where precise measurements are taken to ensure that the pipeline will have at least one foot of Clearance (C) from the theoretical area surrounding the blast hole in which the ground could be permanently deformed by the blast under worst case conditions.

7C2.2 This theoretical area is a conical shape originating at the bottom of the blast hole and extending out at an angle up to the ground surface as depicted in Figure BLAST1 below.

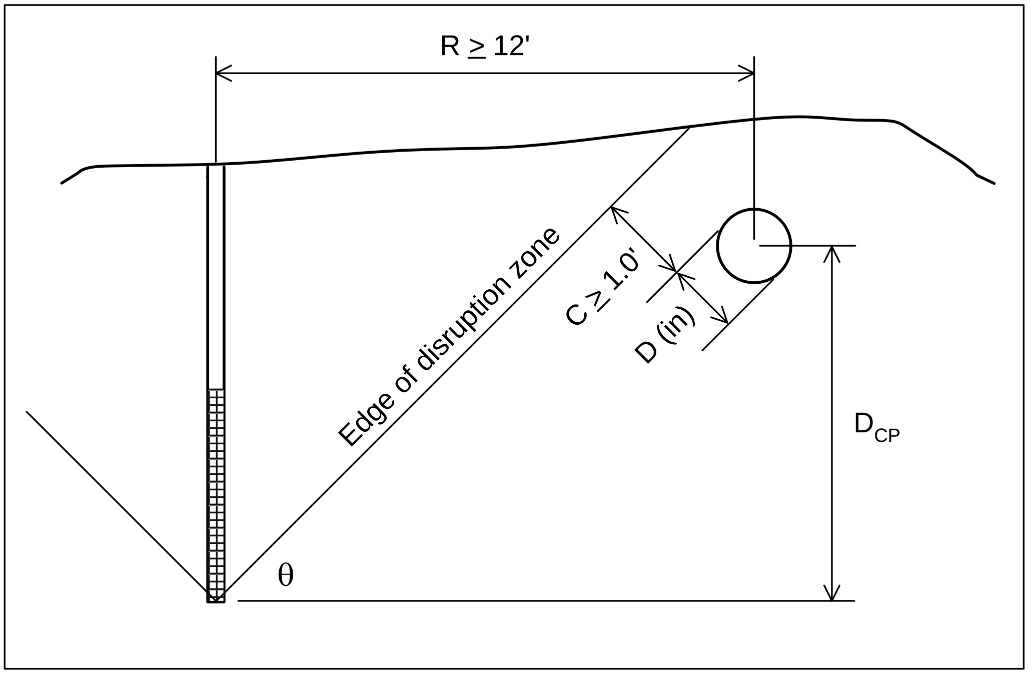

FIGURE BLAST1 – SEPARATION FROM BLAST HOLE

7C2.3 The clearance C can be calculated by:

$$C = R \times \sin\theta - D_{CP} \times \cos\theta - \frac{D}{24}$$

with D in inches and the other dimensions in feet, and where θ is the angle from the horizontal of the theoretical zone of permanent disruption.

7C2.4 The disruption zone angle θ shall be taken to be 32°, except when both of the following special circumstances hold. If both of these conditions hold, the disruption zone angle θ may be taken to be 45°.

7C2.4.1 Charge weight per delay does not exceed 0.9 times the ordinary maximum allowable charge weight <u>and</u>

7C2.4.2 Charge weight per delay in pounds must not be greater than effective hole depth in feet, divided by 2.5 lb/ft (Example: for 15-ft hole depth, maximum charge no greater than 15 ft / 2.5 lb/ft = 6 lb).

7C2.5 If the calculated clearance C would be less than 1 foot, the minimum offset distance must be increased accordingly. The minimum offset R to achieve 1 foot clearance is:

$$R = \frac{1\,ft}{\sin\theta} + \frac{D}{24 \times \sin\theta} + \frac{D_{cp}}{\tan\theta}$$, or:

- θ = 32°: $R = 1.887\,ft + \frac{D}{12.718} + 1.6 \times D_{cp}$
- θ = 45°: $R = 1.414\,ft + \frac{D}{16.971} + D_{cp}$

7C2.6 When blast holes are angled from the vertical, this can have the effect of directing the disruption from the blast in one direction (the surface acts as a free face, allowing movement in that direction). For this reason, blast holes within 25 feet of an existing pipeline must be drilled vertically or angled away from the pipeline as the hole gets deeper.

7C2.7 In all cases, the absolute minimum offset R is 12 feet.

7D Mechanical Rock Removal

7D1 Mechanical rock removal shall occur between the hours of 7:00 am and 7:00 pm, unless otherwise specified by the Company.

7D2 The Contractor shall achieve a fragmentation rate of at least 75% of the trench rock to less than 6 in (150 mm) in diameter.

APPENDIX E-3

NGT PROJECT DRAIN TILE MITIGATION PLAN

NEXUS Gas Transmission Proposed Pipeline Project

DRAFT

Drain Tile Mitigation Plan

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LIST OF ACRONYMS

DSWR	Division of Soil and Water Resources
DTE	DTE Gas Company
DTMP	Drain Tile Mitigation Plan
HDPE	High-density polyethylene
NEXUS	NEXUS Gas Transmission, LLC
NRCS	Natural Resource Conservation Service
ODNR	Ohio Department of Natural Resources
PE	Polyethylene
PVC	Polyvinyl chloride
ROW	Right-of-Way
USDA	United States Department of Agriculture

1 INTRODUCTION

NEXUS Gas Transmission, LLC (NEXUS) is proposing construction of approximately 255 miles of new, 36-inch diameter natural gas transmission pipeline through Ohio and Michigan, known as the NEXUS Gas Transmission Project (Project or NEXUS Project). The mainline route originates in Columbiana County, Ohio and extends through Ohio and Michigan, connecting with facilities of DTE Gas Company (DTE) in Ypsilanti Township, Michigan. The proposed mainline route includes approximately 208 miles of new pipeline in Columbiana, Stark, Summit, Wayne, Medina, Lorain, Huron, Erie, Sandusky, Wood, Lucas, Henry, and Fulton Counties, Ohio; and approximately 47 miles of new pipeline in Lenawee, Monroe, Washtenaw and Wayne Counties, Michigan.

The proposed Project will cross agricultural fields that contain a widespread network of subsurface drainage systems, commonly known as drain tile systems. NEXUS is committed to working with Stakeholders and landowners to minimize the potential for impacts to drain tile systems and has developed this draft Drain Tile Mitigation Plan (DTMP) for use during planning, construction, and restoration of the proposed Project in order to manage, mitigate and repair drainage systems impacted by construction activities.

As outlined below, parcels crossed by the proposed Project will be individually reviewed and analyzed to determine the potential for drain tile impacts. Appropriate advance planning and mitigation work will be undertaken as practicable. This will be accomplished through communication with Stakeholders, landowners and subject matter experts. NEXUS will be responsible for the costs associated with mitigating and repairing drain tile impacts from construction-related activities so that drainage systems are at least equivalent to their pre-construction condition. This draft DTMP will be revised and expanded as appropriate as the proposed Project moves forward and additional site-specific information is obtained.

2 DEFINITIONS

A. Agricultural Land – Land which is presently under cultivation; land which has been previously cultivated and not subsequently developed for non-agriculture use; and cleared land which is capable of being cultivated. It includes land used for cropland, improved pasture, truck gardens, vineyards and orchards (ODNR).

B. Agricultural Inspector – A person qualified by education and experience for the purpose of evaluating pipeline construction in relation to soil removal and replacement, drainage repairs, and corridor restoration associated with agricultural land and cropland.

C. Cropland – A land use category that includes areas used for the production of crops for harvest, both cultivated and non-cultivated. Cultivated crops include row crops, close grown crops, vegetables and hay and pasture in rotation with the crops. Non-cultivated crops include lands used in conservation grassland programs, berries, horticultural plants and long stand vegetables.

D. Drain Tile – Any artificial sub-surface system designed to intercept, collect, and convey excess soil moisture to a suitable outlet. This may include systems constructed using clay, concrete, polyvinyl chloride (PVC), polyethylene (PE) materials, and high-density polyethylene (HDPE) plastic.

E. Drain Tile Inspector – A person qualified by experience for the purpose of evaluating pipeline construction in relation to drain tile removal and replacement, repairs and system restoration.

F. Drain Tile Contractor – A person qualified by experience for the purpose of drain tile installation, drainage repairs and drainage system restoration.

G. Landowner – Person(s) holding legal title to property on the pipeline route from whom NEXUS is seeking or has obtained a temporary or permanent easement, or any person(s) legally authorized by a landowner to make decisions regarding the mitigation or restoration of agricultural impacts to such landowner's property. This includes tenant farmers on the public or private properties

H. Stakeholders – Federal, state and local agencies, landowners and local citizens impacted by the proposed project activities.

I. Pipeline – The mainline pipeline and its related appurtenances (ODNR).

J. Right-of-Way (ROW) – The permanent and temporary easements that NEXUS acquires for the purpose of constructing and operating the pipeline.

K. Right-of-Way (ROW) Agent – A person to negotiate the buying and selling of private lands or land use rights (such as easements) between two or more parties.

L. Surface Drains – Any surface drainage system such as shallow surface field drains, grassed waterways, open ditches, or any other conveyance of surface water (ODNR).

M. Tenant – A person or persons lawfully residing on, or in operational control of the land.

N. Topsoil – The upper-most part of the soil commonly referred to as the plow layer, the A layer, or the A horizon, or its equivalent in uncultivated soils. It is the surface layer of the soil that has the darkest color or the highest content of organic matter (as Identified in the United States Department of Agriculture (USDA) County Soil Survey and verified with right-of-way samples) (ODNR).

3 GENERAL OVERVIEW OF DRAINAGE SYSTEMS

Drain tile is used in agricultural areas to improve drainage in soils with high groundwater or poor internal drainage. Drain tile typically removes excess water from the top 3 to 4 feet of soil and improves the potential for crop productivity. Pipeline construction activities, particularly trenching and heavy equipment traffic, can damage existing drain tile.

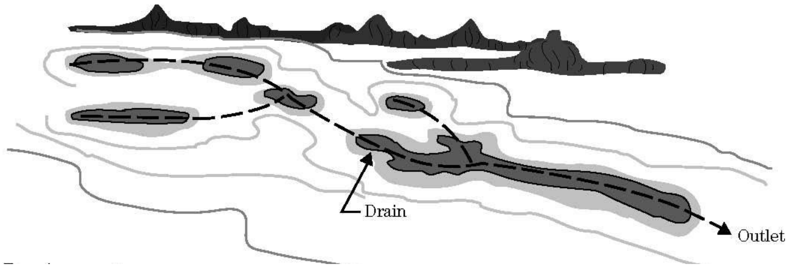
Conduits support the overall makeup of drain tile systems and are intended to facilitate water drainage. Laterals are smaller drain tile – typically 4” in diameter – aligned as much as possible with field contours in order to intercept or capture water as it flows down slope.

Mains and sub-mains are larger drain tile – typically 6” to 18” in diameter – positioned on steeper grades or in swales in order to facilitate the placement of laterals and to convey water to an outlet.

Historically, the most common materials used to manufacture drain tile have been clay, concrete, PVC, and PE. Practically all agricultural drain tile installed today is made from HDPE plastic. Drain tile made from HDPE plastic comes in various wall profiles (e.g. corrugated and smooth), diameters (e.g. 4” – 24” and larger), wall thicknesses (e.g. single and dual wall), and wall perforations (e.g. slotted and non-perforated).

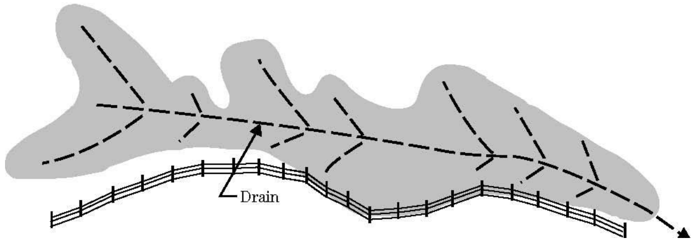
Because sub-surface drainage is used primarily to lower the water table or remove excess water percolating through the soil, drain tile is typically laid out in a pattern that best fits the soil and topography of the area. There are two basic ways to lay out drain tile: random and systematic. It is expected that the proposed NEXUS Project will encounter both layouts along the pipeline corridor.

The random system pattern is suitable for undulating or rolling land that contains isolated wet areas. The main drain is usually placed in the swales rather than in deep cuts through ridges. The laterals in this pattern are arranged according to the size of the isolated wet areas. Thus, the laterals may be arranged in a parallel or herringbone pattern or may be a single drain connected to a sub main or the main drain (NRCS).



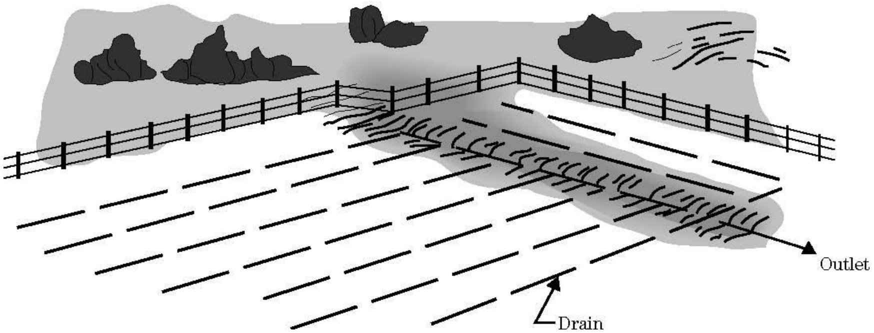
Random System (USDA)

The types of systematic systems expected to be encountered include the herringbone, parallel and double main system. The herringbone system consists of parallel laterals that enter the main at an angle, usually from both sides (USDA). The main is located on the major slope of the land, and the laterals are angled upstream on a grade. This pattern is often combined with other patterns to drain small or irregular areas. Its disadvantage is that it may cause double drainage (since two field laterals intercept the main at the same point). The herringbone pattern can provide the extra drainage needed for the less permeable soils that are found in narrow depressions.



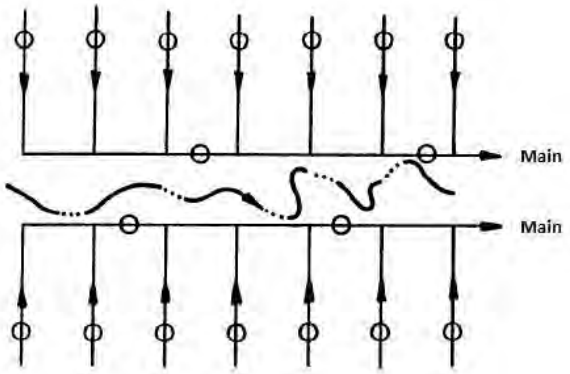
Herringbone System (USDA)

The parallel system consists of parallel lateral drains located perpendicular to the main drain. The laterals in the pattern may be spaced at any interval consistent with site conditions. This pattern is used on flat, regularly shaped fields and on uniform soil. Variations of this pattern are often combined with others (NRCS).



Parallel System (USDA)

The double main system is a modification of the parallel and herringbone patterns. It is applicable where a depression, frequently a grass waterway, divides the field in which drains are to be installed. This pattern is used where a depression area is wet because of seepage from higher ground. Placing a main on each side of the depression serves two purposes, it intercepts the seepage water, and it provides an outlet for the laterals. If the depression is deep and unusually wide, and if there is only one main in the center, a change in the grade line of each lateral may be required before it reaches the main. Locating a main on each side of depressions keeps the grade line of the laterals more uniform.



Double Main (NRCS)

Drain tile can be installed with a backhoe, tile plow, and chain machine or wheel trencher. Drain tile laterals are generally installed at a depth of three-to-five feet, and outlet tile is often installed five-to-six feet deep or deeper in some areas. Installation depths can vary dramatically based on the need to maintain grade through a hill slope and reach a desired outlet location and depth. The drain tile must be installed deep enough to effectively drain subsurface water from the property, minimizing the need to repair or install additional drain tile in the future.

4 PROPOSED NEXUS PROJECT AREA

The presence of drain tile along the proposed NEXUS pipeline route generally increases as the route traverses east to west. Beginning in Columbiana County and through Stark, Summit, Wayne, Medina and Lorain Counties in Ohio, the proposed pipeline route crosses agricultural land with minimal drain tile consisting mostly of random, with occasional systematic, layouts. Once into Erie County and continuing through Sandusky, Wood, Lucas, Henry and Fulton Counties in Ohio, drain tile becomes more prevalent and consists of mostly systematic layouts. As the proposed pipeline route crosses into Michigan, systematic drain tile layouts continue to be prevalent in Lenawee County. The presence of drain tile is less in Monroe and Washtenaw Counties, Michigan. There are no known drain tile systems along the proposed NEXUS pipeline route in Wayne County, Michigan.

As the frequency of systematic layouts increases, the drain tile spacing typically becomes tighter or “closer”, increasing the intensity of drainage in that area. The counties in Ohio expected to have the greatest density of drain tile include Erie, Sandusky and Wood. In Michigan, Lenawee County is expected to have the greatest density of drain tile.

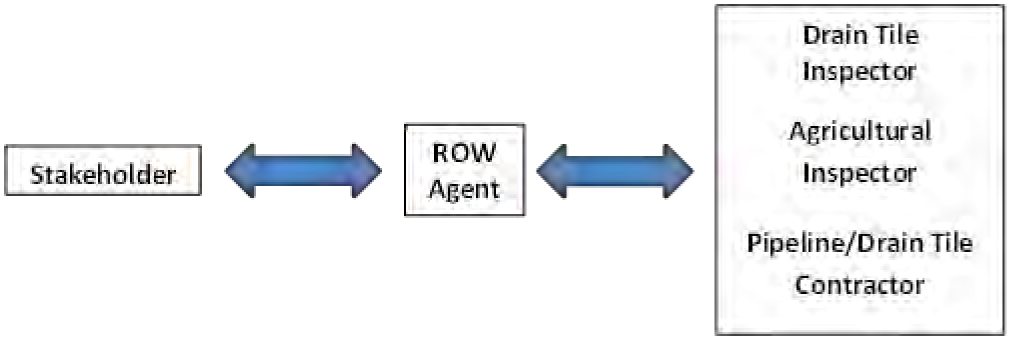
It is anticipated that many of the drainage systems in the proposed Project area are designed like a spider web: drain tile and surface drains funnel water to a main tile or area on or off the property, and the water is moved to a ditch, creek, or other waterbody.

5 PRE-CONSTRUCTION PHASE

5.1. Communication Protocol

NEXUS landowners will be enabled to easily communicate drain tile concerns before, during and following the construction process and for the life of the pipeline. The affected landowner’s primary point of contact will be a NEXUS ROW Agent, who in turn will coordinate with appropriate Drain Tile Inspectors and Contractors to develop responses and solutions to landowner concerns. Landowner communication can also be facilitated through the use of NEXUS’s toll-free telephone number (1-844-589-3655).

Flow Diagram for Communications



5.2. Preliminary Drain Tile Assessment

NEXUS ROW Agents will communicate with affected landowners in advance of construction activities to gain an understanding and knowledge of existing and planned drainage systems traversed by the proposed Project. NEXUS will use a structured landowner questionnaire (see Appendix 9.1) to collect information pertaining to drain tile layout, location, material, size, and depth of cover, etc. NEXUS will also gather information from the following additional sources, as needed and practicable:

- Interviews with various public agencies and entities (local Soil and Water Conservation Districts, County Engineers, Conservancy Districts and County Drain Commissioners, and Farm Bureaus)
- Interviews with local Drain Tile Contractors

- Review of existing drain tile plans, maps and as-built drawings
- Analysis of high resolution aerial imagery
- Field investigations

Where landowners have communicated plans to install future drain tile systems, NEXUS will endeavor to accommodate plans for future drain tile systems as provided by the landowner. NEXUS will construct the pipeline at a depth of approximately 6 to 12-inches below the planned drain tile to accommodate planned installation of drain tile systems. The location of planned drain tile systems will also be identified on the Project as-built alignment sheets.

5.3. Mitigation Planning and Process

If drain tile is determined to be present on a property, a meeting with a Drain Tile Contractor will be scheduled on-site to gather additional details to develop a drain tile mitigation plan in coordination with affected landowners. NEXUS will utilize the information gathered to identify mitigation options, taking into consideration drain tile size requirements and materials, if the drain tile is to be cut and capped, and/or if drain tile is to be removed and replaced.

NEXUS recognizes the amount of drain tile information from each landowner will vary. It is anticipated the information will range from detailed drain tile locations to unknown conditions. At the very least, drain tile information will be tabulated per property tract and utilized for construction planning. In the event detailed drain tile locations are known (i.e. existing maps, GPS data, imagery, etc.), the details will be illustrated on property drawings. The drawings will be utilized for pipeline construction planning and may be requested by the landowner before the construction process begins on their property. Appendix 9.2 provides a flow chart of this process.

The following mitigation measures will be implemented:

- NEXUS will be responsible for repairing drain tile damages that result from construction-related activities so that they are at least equivalent to their pre-construction condition. If the construction schedule impacts the landowner’s ability to grow crops during that season, appropriate compensation will be provided.

- If available during the time of construction, NEXUS will endeavor to use qualified local Drain Tile Contractors with experience in Ohio and Michigan to conduct drain tile repairs/replacements.

- The Drain Tile Contractor will work under the direction of, and with the direct involvement of, the pipeline construction contractor and the NEXUS construction management team.

- Repair materials will be equivalent to those currently in place for repairing the damaged drain tile and will be joined to existing drain tile by means of adapters or couplers manufactured for that purpose.

- During construction, damaged drain tile will be staked with lath using colored flagging in such a manner that they will remain visible to the construction crews until permanent repairs are completed. Damaged, unused, or discarded pieces of drain tile will be removed and disposed of promptly and properly.

- To the extent practicable, NEXUS will replace drain tile to the same location, depth, alignment, grade, and spacing as the pre-construction drain tile.

- GPS technology capable of 3-D survey grade accuracy, or other similarly accurate technology, will be used to document drain tile location, alignment and grade.

- The landowner will be given the opportunity to observe temporary and permanent repairs on their property. For safety concerns, the landowner shall request access with the ROW Agent to be properly escorted onto the construction ROW.

- The Agricultural Inspector and Drain Tile Inspector will inspect and approve the drain tile repairs prior to the commencement of final restoration.

- Permanent repairs to drain tile will be completed as soon as possible, based on, for example weather and soil conditions.

- NEXUS will collect as-built data of the restored and replaced drain tile. This will include the linear extent of the drain tile repairs and the location of adapter connections.

6 CONSTRUCTION PHASE

The following sets forth anticipated measures and techniques to be employed during mitigation activities (these may be subject to change depending on field conditions and other variables). NEXUS will have Agricultural Inspectors and Drain Tile Inspectors present during construction, to monitor the execution of the following measures and, as noted above, the landowner will be given the opportunity to observe temporary and permanent repairs on their property.

6.1 Drain Tile Identification

Using the information gathered during the drain tile assessment phase, known locations of existing drain tile will be staked with lath using colored flagging, after stripping the topsoil from the construction ROW. NEXUS will stake both sides of the trench, once the drain tile has been exposed. These locations will be surveyed to define the linear extent of each drain tile within the construction ROW.

In some cases, drain tile information may be limited or locations not known. Once the drain tile has been exposed during construction, NEXUS will communicate with the landowner based on field conditions as to how the drain tile will be repaired. If the drain tile location is not known, the drain tile will be staked with lath using colored flagging on both sides of the trench once it has been exposed during pipeline construction.

6.2 Drain Tile Repair

During construction, drain tile will be temporarily repaired in the trench until the pipe is lowered into the trench and permanent repairs are completed.

The following describes the typical pipeline construction process for drain tile repairs:

A. Pipeline Trench - Temporary Repair

As trenching equipment traverses across the landowner's property, temporary repairs will be completed at each drain tile location as it is being exposed. Drain tile that will be impacted by trenching will be:

- Cut and temporarily capped or screened, if water is not flowing in the drain tile.
- Cut and temporarily repaired, if water is flowing in the drain tile.

For temporary repairs, a rigid support or pipe will be laid across the full extent of the trench with a 1-foot minimum into undisturbed ground on both sides of the trench. Drain tile will be laid on the support and connected with adapters to the existing drain tile. This process will be utilized throughout the trenching phase to maintain drainage, where necessary.

The temporary drain tile will be disconnected as the pipe is lowered into the trench to approximately 6 to 12-inches below the drain tile. The drain tile connections will be re-established as quickly as possible to reduce the amount of water flowing into the trench.

B. Pipeline Trench - Permanent Repair

After the pipe is lowered into the trench but before the trench is backfilled, the drain tile will be permanently repaired:

- Where drain tile was temporarily capped or screened, the drain tile will be laid onto a rigid beam, high strength composite material, rigid outer casing pipe or other rigid support material that will keep the repaired drain tile supported the full length of the trench and approximately 3-feet into undisturbed ground on both sides of the trench. The rigid support will be stabilized and adapters or couplers will connect the repaired tile to existing drain tile on both sides of the trench.

- Where drain tile was temporarily repaired in the trench, the drain tile will be fortified based on the above mentioned requirements. The rigid support will be stabilized.

NEXUS will utilize sandbags in the trench to structurally support and prevent settling of the permanent repaired drain tile during or after the backfill process (see Appendix 9.3).

C. ROW - Permanent Repair

Before completing permanent drain tile repairs in the trench, the tile will be internally probed or examined by other suitable means on both sides of the trench for the entire width of the ROW. If damage has occurred, the drain tile will be repaired.

If Project construction activities damage drain tile outside the pipeline construction ROW, NEXUS will address the issue with the landowner on a case-by-case basis.

7 POST-CONSTRUCTION PHASE

After the replacement of topsoil in the ROW, drain tile repaired and replaced by NEXUS within the ROW will be monitored for three years, or until restoration is considered successful. Conditions to be monitored during this period include drain tile settling, crop production, and drainage. The monitoring period is intended to allow for effects of weather changes such as frost action, precipitation, settling and changes in growing seasons, from which various monitoring determinations can be made.

During and after the post-construction monitoring phase, the NEXUS ROW Agent will remain the landowner's point of contact and will coordinate with appropriate Drain Tile Inspectors and Contractors to develop responses and solutions to landowner concerns. Landowner communication can also be facilitated through the use of NEXUS's toll-free telephone number (**1-844-589-3655)**

8 SUMMARY

NEXUS appreciates the importance of agricultural drainage systems in the proposed Project area and is committed to minimizing the potential for impacts to drainage systems as a result of construction-related activities. NEXUS will work with landowners to identify the locations of existing drain tile and plans for developing drainage systems, and devise mitigation and repair strategies as necessary. NEXUS will be responsible for the costs associated with mitigating and repairing impacts from construction-related activities. Unless otherwise negotiated with the landowner, drain tile systems directly damaged by NEXUS will be repaired to at least equivalent to their pre-construction condition or replaced by NEXUS. If available during the time of construction, NEXUS will endeavor to use qualified local Drain Tile Contractors with experience in Ohio and Michigan to conduct and/or consult during drain tile repairs/replacements. Repairs and restoration to drain tile systems conducted by NEXUS will be monitored for three years, or until restoration is considered successful, to ensure the system functions properly.

This draft DTMP will be revised and expanded as the Project develops and additional site-specific information is obtained.

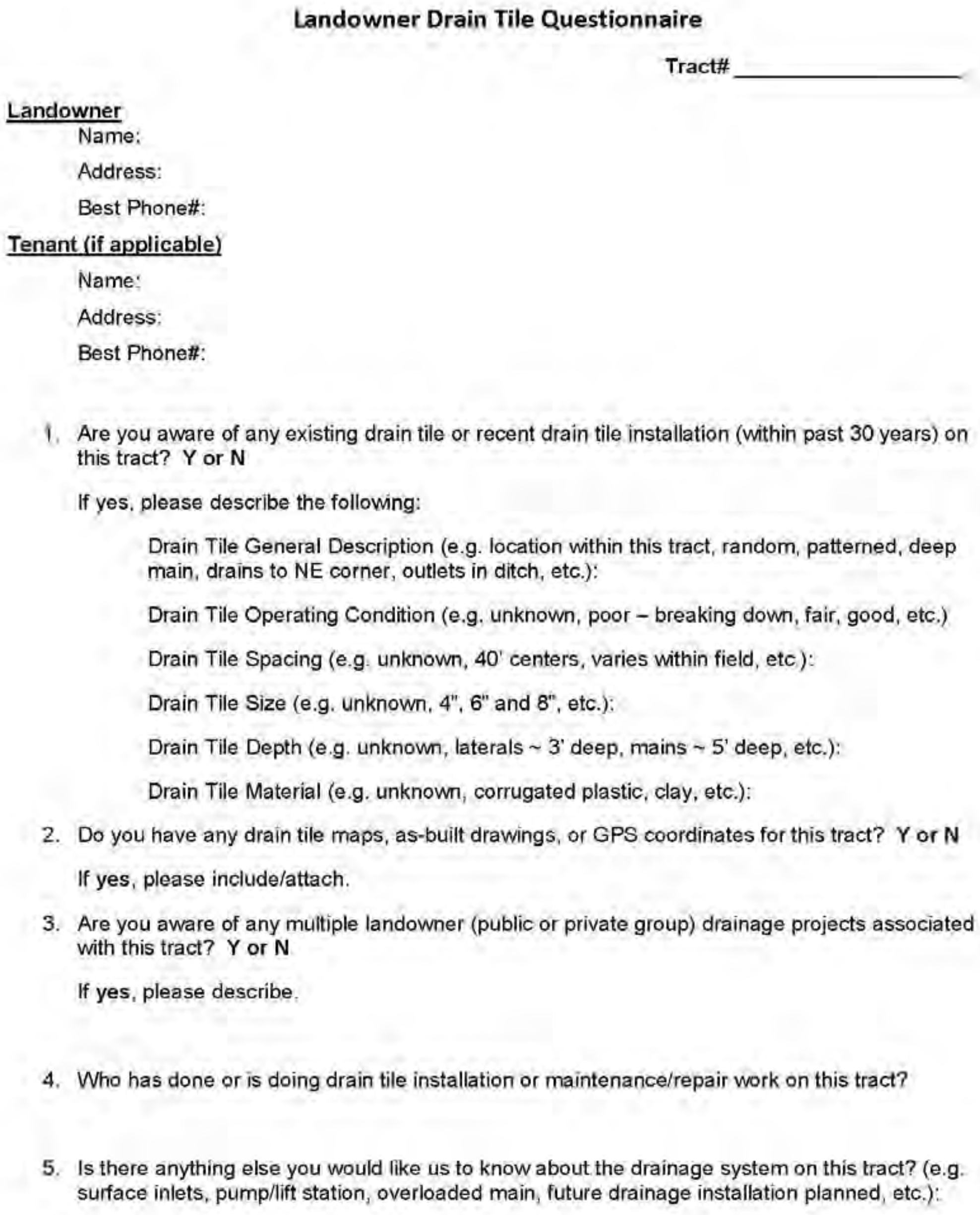
9 REFERENCES AND APPENDICES

ODNR - DSWR Pipeline Standard, December 3, 2013.

USDA NRCS Water Management Guide - Chapter 3 Subsurface Drainage, July 2007.

NRCS National Engineering Handbook - H_210_NEH_16, May 2008.

9.1. Drain Tile Questionnaire



Landowner Drain Tile Questionnaire

Tract# ____________________

Landowner
Name:
Address:
Best Phone#:

Tenant (if applicable)
Name:
Address:
Best Phone#:

1. Are you aware of any existing drain tile or recent drain tile installation (within past 30 years) on this tract? **Y or N**

   If yes, please describe the following:

   Drain Tile General Description (e.g. location within this tract, random, patterned, deep main, drains to NE corner, outlets in ditch, etc.):

   Drain Tile Operating Condition (e.g. unknown, poor – breaking down, fair, good, etc.)

   Drain Tile Spacing (e.g. unknown, 40' centers, varies within field, etc.):

   Drain Tile Size (e.g. unknown, 4", 6" and 8", etc.):

   Drain Tile Depth (e.g. unknown, laterals ~ 3' deep, mains ~ 5' deep, etc.):

   Drain Tile Material (e.g. unknown, corrugated plastic, clay, etc.):

2. Do you have any drain tile maps, as-built drawings, or GPS coordinates for this tract? **Y or N**

   If yes, please include/attach.

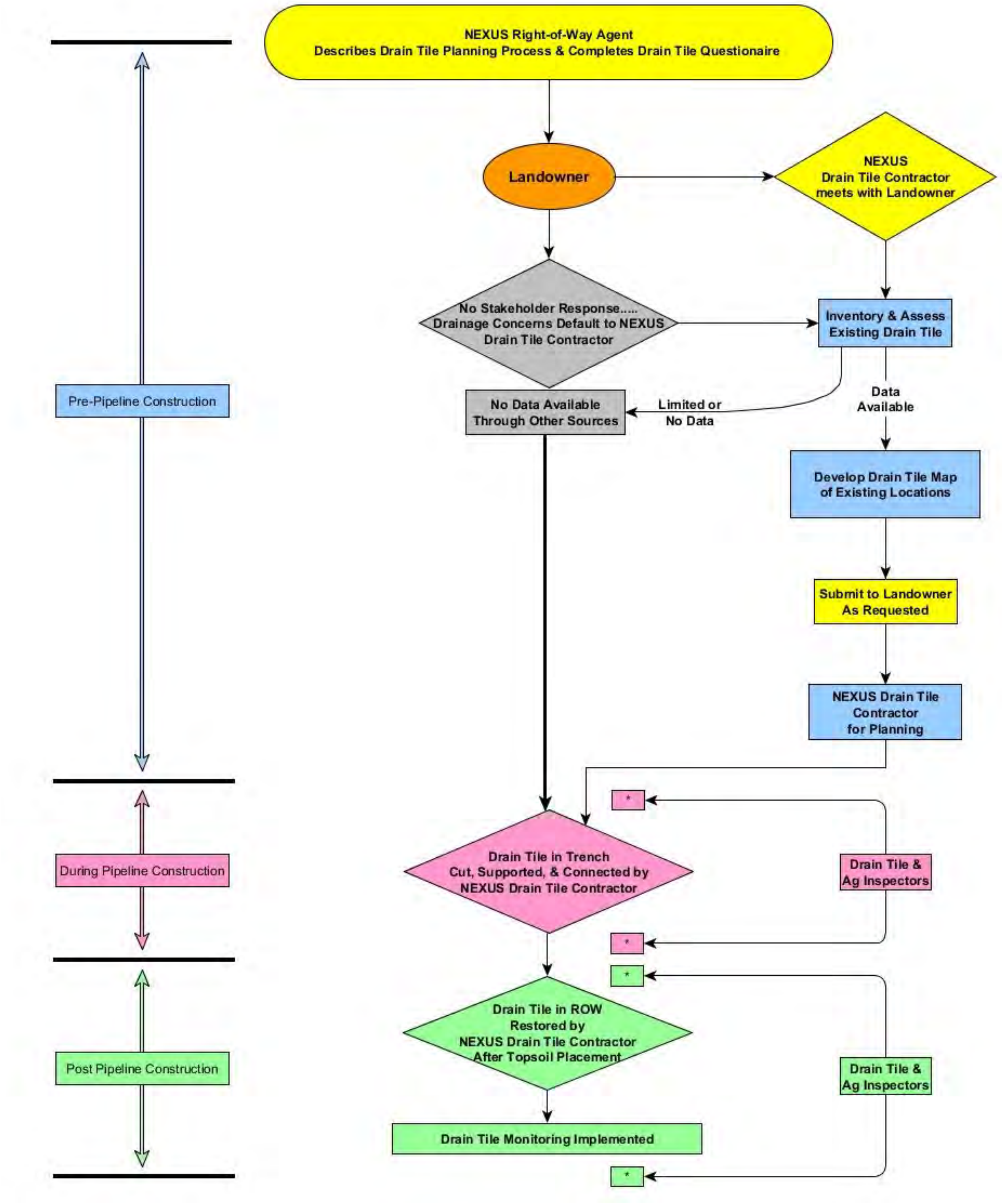
3. Are you aware of any multiple landowner (public or private group) drainage projects associated with this tract? **Y or N**

   If yes, please describe.

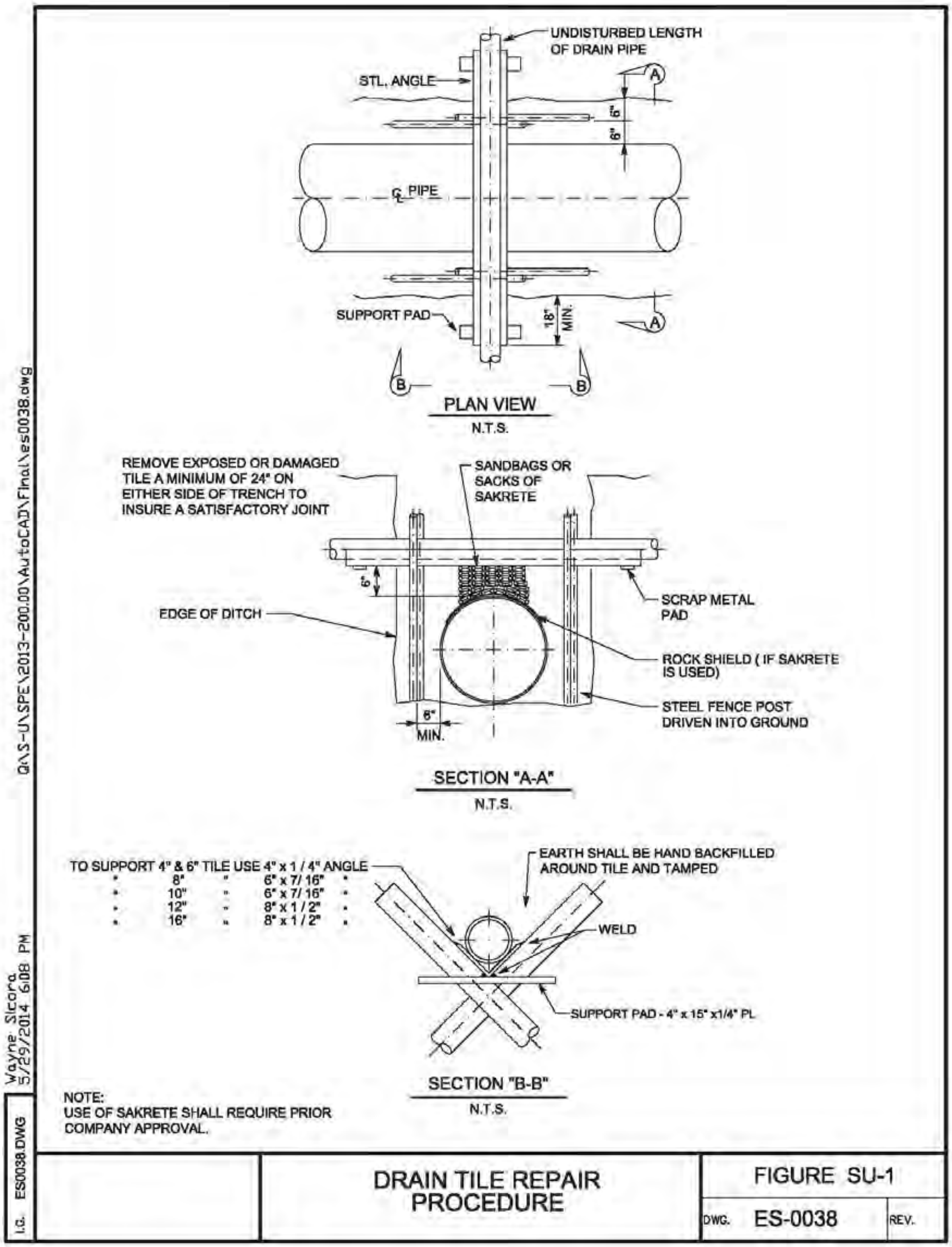
4. Who has done or is doing drain tile installation or maintenance/repair work on this tract?

5. Is there anything else you would like us to know about the drainage system on this tract? (e.g. surface inlets, pump/lift station, overloaded main, future drainage installation planned, etc.):

9.2. Mitigation Planning and Process



9.3. Typical Permanent Drain Tile Repair Procedures



APPENDIX E-4

HDD DESIGN REPORT AND HDD MONITORING AND INADVERTENT RETURN CONTINGENCY PLAN

HDD Design Report, Revision 2
Nexus Pipeline Project

March 2016

Prepared for:

FLUOR

FLUOR ENTERPRISES, INC.
1 Fluor Daniel Drive
Sugarland, Texas 77478

Prepared by

J.D. Hair & Associates, Inc.
2424 E 21st St, Suite 510
Tulsa, Oklahoma 74114-1723

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March 17, 2016

Fluor Enterprises, Inc.
1 Fluor Daniel Drive
Sugarland, TX 77478

Attention: Mr. Rollins Brown, P.E.

SUBJECT: HDD Design Report, Revision 2
Nexus Pipeline Project

Dear Mr. Brown:

J. D. Hair & Associates, Inc. (JDH&A) is pleased to submit the following report titled *HDD Design Report, Revision 2, Nexus Pipeline Project*. The report presents site-specific feasibility evaluations, design considerations, supporting calculations, and other details relative to obstacle crossings on the proposed Nexus Pipeline Project to be installed using horizontal directional drilling (HDD).

We appreciate your confidence in JDH&A. If you have any questions or need additional information, please do not hesitate to contact us.

Sincerely,

J. D. HAIR & ASSOCIATES, INC.

Jeffrey M Scholl

Jeffrey M. Scholl, P.E.
Engineering Manager

STATE OF MICHIGAN
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TABLE OF CONTENTS

1. INTRODUCTION

This report provides a summary of design considerations and engineering calculations associated with horizontal directionally drilled (HDD) crossings on the 36-inch pipeline for the Nexus Gas Transmission Project. J. D. Hair & Associates, Inc. (JDH&A) has undertaken this report as part of the scope outlined in Fluor Enterprises, Inc. (FLUOR) Purchase Order No: GS15-337208.

The report is divided into two primary sections. The first section provides a general overview of the HDD construction method including a description of the HDD process, feasibility considerations, and details with respect to calculation methods used during the design process. The second section of the report contains site-specific crossing evaluations that include the following topics:

- General Site Descriptions
- Subsurface Conditions
- Design Geometry and Layout
- Assessment of Feasibility
- Risk Identification and Assessment
- Installation Loading Analysis
- Hydraulic Fracture Evaluation
- Estimated Construction Duration

HDD crossings proposed for the Nexus Project that served as the focus of this report are included in Table 1.

Table 1: Proposed HDD Crossings on the Nexus Project

Mile Post	Location	Crossing Name	Horizontal Length
7.9R	Columbiana County, Ohio	Wetland	2,931 feet
41.0R	Summit County, Ohio	Nimisila Reservoir	1,776 feet
47.8R	Summit County, Ohio	Tuscarawas River	3,263 feet
71.1	Median County, Ohio	Wetland	1,784 feet
86.9	Lorain County, Ohio	East Branch Black River	1,809 feet
92.5	Lorain County, Ohio	West Branch Black River	1,676 feet
104.1	Huron County, Ohio	Vermilion River	3,184 feet
110.3	Erie County, Ohio	Interstate 80	1,432 feet
116.8	Erie County, Ohio	Huron River	2,423 feet
146.3R	Sandusky County, Ohio	Sandusky River	2,586 feet
162.6R	Sandusky County, Ohio	Portage River	1,790 feet
180.1R	Wood County, Ohio	Findlay Road	1,522 feet
181.2	Wood and Lucas Counties, Ohio	Maumee River	3,999 feet
215.0	Lenawee County, Michigan	River Raisin	1,479 feet
237.4	Washtenaw County, Michigan	Saline River	1,315 feet
250.7	Washtenaw County, Michigan	Hydro Park	2,300 feet
251.5	Washtenaw County, Michigan	Interstate 94	1,359 feet
254.4R	Washtenaw County, Michigan	US-12	1,739 feet

2. HDD PROCESS DESCRIPTION

Installation of a pipeline by HDD is accomplished in three stages as illustrated in Figure 1. The first stage consists of directionally drilling a small diameter pilot hole along a designed directional path. The second stage involves enlarging this pilot hole to a diameter suitable for installation of the pipeline. The third stage consists of pulling the pipeline back into the enlarged hole.

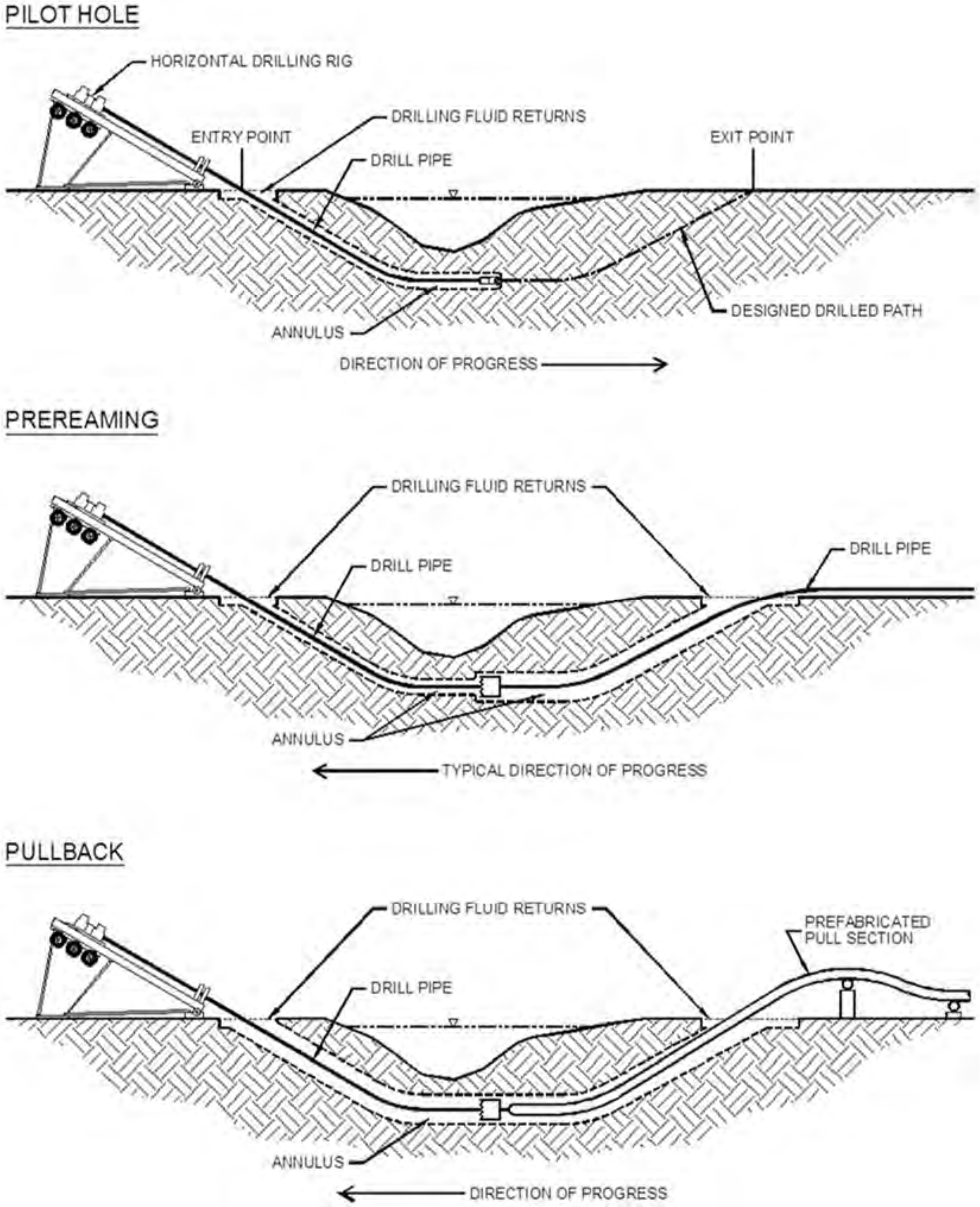

Figure 1: The HDD Process

2.1. Pilot Hole Directional Drilling

2.1.1. Pilot Hole

Pilot hole directional control is achieved by using a non-rotating drill string with an asymmetrical leading edge. The asymmetry of the leading edge creates a steering bias while the non-rotating aspect of the drill string allows the steering bias to be held in a specific position while drilling. If a change in direction is required, the drill string is rolled so that the direction of bias is the same as the desired change in direction. Leading edge asymmetry is typically accomplished with either a bent sub or a bent motor housing located behind the bit.

In loose soils, drilling progress may achieved by hydraulic cutting with a jet nozzle. If hard zones are encountered, the drill string may be rotated to drill without directional control until the hard zone has been penetrated. Mechanical cutting action required for harder soils and rock is provided by a mud motor, which converts hydraulic energy from drilling fluid to mechanical energy at the drill bit. This allows for bit rotation without drill string rotation.

The path of the pilot hole is monitored during drilling using a steering tool positioned near the bit. The steering tool provides continuous readings of the inclination and azimuth at the leading edge of the drill string. These readings, in conjunction with measurements of the distance drilled, are used to calculate the horizontal and vertical coordinates of the steering tool relative to the initial entry point on the surface. The path of the pilot hole can also be determined with a surface monitoring system that induces an artificial magnetic field using a wire placed on the surface. Measurements of this magnetic field's properties by instruments in the steering tool allow the position of the steering tool to be determined using triangulation. This provides data that can be used to correct downhole survey inaccuracy that results from inconsistencies in the earth's magnetic field.

2.1.2. Prereaming

Enlarging the pilot hole is accomplished using prereaming passes prior to pipe installation. Reaming tools generally consist of a circular array of cutters and drilling fluid jets and are often custom made by contractors for a particular hole size or type of soil. These tools are attached to the drill string and rotated and drawn along the pilot hole. Drill pipe is added behind the tools as they progress along the drilled path to ensure that a string of pipe always extends between the entry and exit points.

2.1.3. Pullback

Pipe installation is accomplished by attaching a pipeline pull section behind a reaming assembly at the exit point, then pulling the reaming assembly and pull section back to the drilling rig. This is undertaken after completion of prereaming or, for smaller diameter lines in loose soils, directly after completion of the pilot hole. A swivel is utilized to connect the pull section to the reaming assembly to minimize torsion transmitted to the pipe. The pull section is supported using some combination of roller stands and pipe handling equipment to minimize tension and prevent damage to the pipe.

3. TECHNICAL FEASIBILITY CONSIDERATIONS

For a pipeline to be installed by HDD, either an open hole must be cut into the subsurface material so that installation of a pipeline by the pullback method is possible, or the properties of the subsurface material must be modified so that the soil behaves in a fluid manner allowing a pipeline to pass through it.

In the open hole condition, a cylindrical hole is drilled through the subsurface. Drilling fluid flows to the surface in the annulus between the pipe and the wall of the hole. Drilled spoil is transported in the drilling fluid to the surface. This is generally applicable to rock and cohesive soils. It may also apply to some sandy or silty soils depending on the density of the material, the specific makeup of the coarse fraction, and the binding or structural capacity of the fine fraction.

The open hole condition is difficult to achieve in loose cohesionless soils over a long horizontally drilled length. Nevertheless, pipelines are routinely installed by HDD in loose soils. The mechanical agitation of the reaming tool coupled with the injection of drilling fluid will cause the soil to experience a decrease in shear strength. If the resulting shear strength is low enough, the soil will behave in a fluid manner allowing a pipe to be pulled through it.

3.1. Pilot Hole Limitations

A pilot hole must be drilled in compression. That is, weight on bit must be achieved by thrusting the drill pipe away from the drilling rig. Drill pipe buckling becomes a problem, depending on soil conditions, and the combination of pipe bending and rotation can lead to failure through low cycle fatigue. Pilot hole length is limited by the capacity of the drill pipe to withstand the combination of compressive, bending, and torsional loads.

Pilot holes are directionally drilled by orienting the asymmetry of the bottom hole assembly by rotating the drill string at the drilling rig. As pilot hole distances increase, the orientation of the bottom hole assembly becomes more difficult to control. Actions taken at the drilling rig several thousand feet behind the bottom hole assembly may not translate clearly to reactions at the leading edge. Pilot hole length is limited by the ability to accurately steer.

A pilot hole must achieve either an open hole or fluidized condition in the soil to allow penetration. Depending on the characteristics of the soil, these two conditions may be difficult to achieve over long horizontal lengths. Suspension of cuttings is difficult to maintain over long horizontal distances. Cuttings may accumulate around the pipe causing it to get stuck. Experience has shown that the fluidized condition degrades over time if the soil is not agitated and exposed to bentonite drilling fluid flow. Drill pipe, and pipelines, have become stuck during HDD operations and have been abandoned in place. Pilot hole length is limited by the ability to maintain a hole in the subsurface.

Despite the above limitations, experience in the HDD industry indicates that pilot holes up to approximately 7,000 feet are feasible when drilling with a single rig in one direction, and significantly longer lengths are possible through the use of the drilled intersect technique. A drilled intersect involves drilling a pilot hole with two rigs from opposite ends of a drilled segment. The pilot holes are essentially drilled into one another. The intersect technique theoretically doubles the maximum feasible length of a pilot hole from 7,000 feet to 14,000 feet.

The practical limits of the intersect technique may be closer to 12,500 feet to allow for some overlap as one pilot hole is sought out by another.

HDD crossings under consideration on the Nexus Project have proposed lengths ranging from 1,320 feet to 4,018 feet, easily within the lengths attainable using a single HDD rig. Therefore, utilization of the intersect technique is not envisioned.

3.2. Prereaming and Pullback Limitations

Since drill pipe is usually rotated in tension during prereaming and pullback, the length limitations associated with drill pipe compression and low cycle fatigue experienced in pilot hole drilling do not come into play. Concerns with steering are also not applicable. Horizontal length during prereaming and pullback is limited by the ability to maintain an open hole or fluid condition to such an extent that drill pipe, reaming tools, and product pipe can be moved along the drilled path without exceeding the capacity of the pipe or drilling rig.

Pipeline diameter is limited by the capacity of drill pipe for the transmission of torque to reaming tools. Commercially available drill pipe is limited to 7-5/8 inches in diameter. This limitation notwithstanding, experience in the HDD industry has demonstrated that installation of 56-inch diameter steel pipe is feasible in amenable subsurface conditions. HDD installation of 36-inch diameter steel pipe, once again in amenable subsurface conditions, is relatively common.

3.3. Subsurface Material

While length, diameter, and subsurface material work in combination to limit the technical feasibility of a HDD installation, technical feasibility is primarily limited by subsurface material. The problematic subsurface condition most often encountered in evaluating the feasibility of a HDD installation is large grain content in the form of gravel, cobbles, and boulders. Other subsurface conditions that can affect the feasibility of a HDD installation include excessive rock strength and abrasivity, poor rock quality, solution cavities, and artesian conditions.

3.3.1. Large Grained Formations

Soils consisting principally of coarse-grained material present a serious restriction on the feasibility of HDD. Coarse gravel, cobbles, and boulders, cannot be readily fluidized by the drilling fluid, nor are they stable enough to be cut and removed in a drilling fluid stream as is the case with a crossing installed in competent rock. A boulder or cluster of cobbles will remain in the drilled path and present an obstruction to a bit, reamer, or pipeline. Such obstructions must be mechanically displaced by drilling tools. If the characteristics of the coarse grained materials are such that mechanical displacement with HDD tools is not possible, HDD installation may not be technically feasible.

Fortunately, problematic coarse grained soils are normally encountered in limited quantities. Coarse overburden may overlay bedrock or a finer grained formation amenable to penetration by HDD. If the overburden is not too deep, it can be removed by excavation or penetrated with a surface casing. HDD can then proceed through the amenable formation.

3.3.2. Excessive Rock Strength and Abrasivity

Exceptionally strong and abrasive rock can hamper all phases of a HDD project. Slow penetration rates and frequent stoppages to replace worn bits and reamers can result in extended construction durations and unacceptable increases in construction cost. Excessive rock strength and abrasivity can also lead to tool or drill pipe failures downhole as a result of premature wear and excessive torque. Experience has shown that competent rock with unconfined compressive strengths as high as 50,000 psi can be negotiated with today's technology. However, entry of such materials at depth can be problematic, as the drill string may tend to deflect rather than penetrate.

3.3.3. Poor Rock Quality

A HDD installation through poor quality (extensively fractured or jointed) rock can present the same problems as coarse-grained deposits. Cutting a hole through such materials may cause the overlying rock to collapse, creating obstructions during subsequent passes.

3.3.4. Solution Cavities

Solution cavities present in karst formations can have a substantial impact on the feasibility of a HDD installation. While the wall of a competent rock hole serves to limit the deflection of the drill string, penetration of a void leaves the drill string unconstrained potentially allowing it to deflect laterally. Continued rotation of a drill string subjected to such a deflection can result in failure of the drill pipe due to low-cycle fatigue.

3.3.5. Artesian Conditions

Penetration of an artesian aquifer during drilling or reaming operations can result in a sustained flow of groundwater and fine soils into the drilled hole. This can cause several serious problems including degradation of drilling fluid, deterioration of the hole, drilling fluid storage and disposal issues, and stuck pipe or downhole tools.

4. DRILLING FLUIDS

4.1. Introduction

The primary impact of HDD on the environment revolves around the use of drilling fluids. Where regulatory problems are experienced, the majority of concerns and misunderstandings are associated with drilling fluids. An awareness of the function and composition of HDD drilling fluids is imperative in producing a permittable and constructible HDD design.

Drilling fluid is used in all phases of the HDD process. Figure 2 shows the relationship of the elements typically associated with a HDD drilling fluid system.

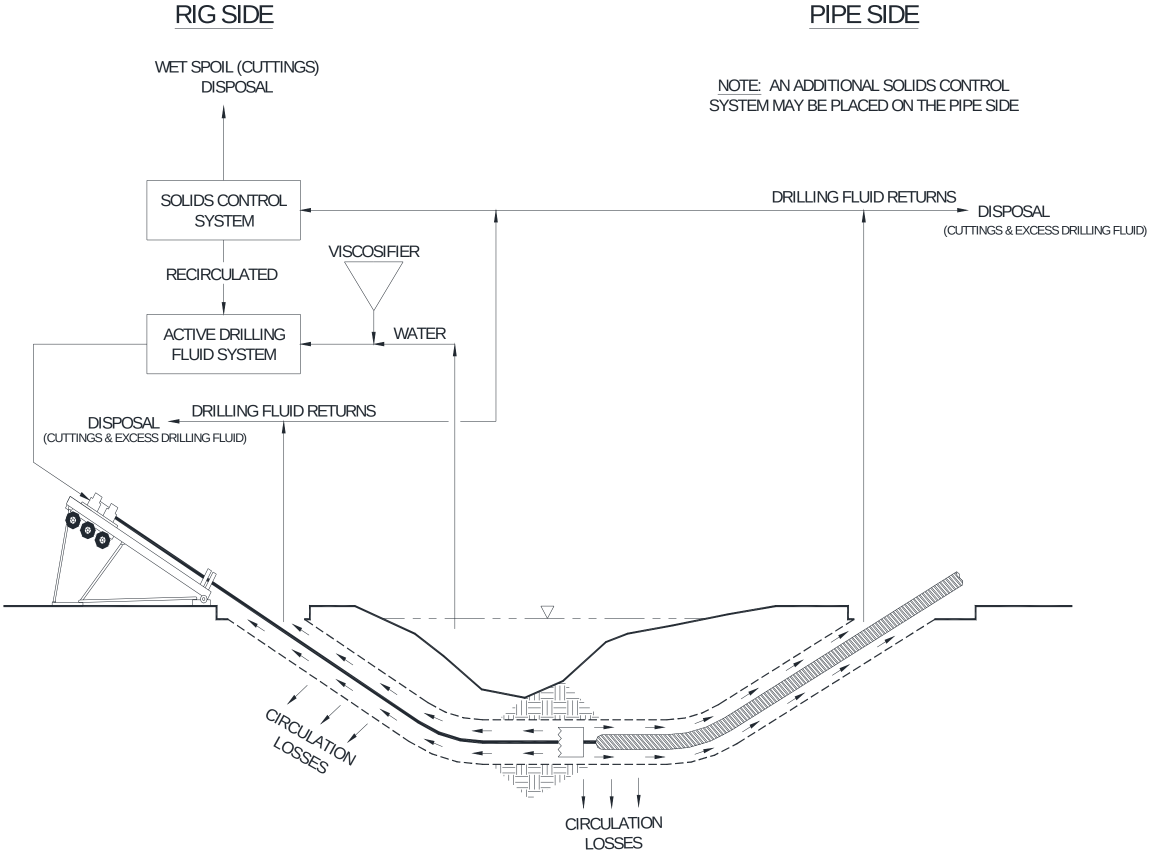

Figure 2: HDD Drilling Fluid Flow Schematic

4.2. Functions of Drilling Fluid

The principal functions of drilling fluid in HDD pipeline installation are as listed below:

- **Transportation of Spoil –** Drilled spoil, consisting of excavated soil or rock cuttings, is suspended in the fluid and carried to the surface by the fluid stream flowing in the annulus between the wall of the hole and the pipe.
- **Cooling and Cleaning of Cutters** – High velocity fluid streams directed at the cutters remove drilled spoil build-up on bit or reamer cutters. The fluid also cools the cutters.
- **Reduction of Friction** – Friction between the pipe and the wall of the hole is reduced by the lubricating properties of the drilling fluid.
- **Hole Stabilization** – The drilling fluid stabilizes the drilled or reamed hole. This is critical in HDD pipeline installation as holes are often in loose soil formations and are uncased. Stabilization is accomplished by the drilling fluid building up a wall cake and exerting a positive pressure on the hole wall. Ideally, the wall cake will seal pores and produce a bridging mechanism to hold soil particles in place.

- **Transmission of Hydraulic Power** – Power required to turn a bit and mechanically drill a hole is transmitted to a downhole motor by the drilling fluid.
- **Hydraulic Excavation –** Soil is excavated by erosion from high velocity fluid streams directed from jet nozzles on bits or reaming tools.
- **Soil Modification –** Mixing of the drilling fluid with the soil along the drilled path facilitates installation of a pipeline by reducing the shear strength of the soil to a near fluid condition. The resulting soil mixture can then be displaced as a pipeline is pulled into it.

4.3. Composition of Drilling Fluid

The major component of drilling fluid used in HDD pipeline installation is fresh water obtained at the crossing location. In order for water to perform the functions listed above, it is generally necessary to modify its properties by adding a viscosifier. The viscosifier used almost exclusively in HDD drilling fluids is naturally occurring clay in the form of bentonite mixed with small amounts of extending polymers to increase its yield (high yield bentonite).

Increasing the yield of bentonite allows more drilling fluid to be produced with less viscosifier (dry bentonite). For example, Wyoming bentonite yields in excess of 85 barrels of drilling fluid per US ton of dry viscosifier. Addition of polymers to produce high yield bentonite can increase the yield to more than 200 barrels of fluid per ton of viscosifier. Typical HDD drilling fluids are composed of less than 2% high yield bentonite by volume with the remaining components being water and drilled spoil. Solids control equipment should be utilized to remove drilled spoil from the fluid to the extent practical, maintaining total solids (high yield bentonite and drilled spoil) at around 6% by volume.

4.4. Inadvertent Returns

HDD involves the subsurface discharge of drilling fluids. Once discharged downhole, drilling fluid is uncontrolled and will flow in the path of least resistance. The annulus of the drilled hole is intended to provide a controlled path of least resistance. However, in some cases the drilling fluid will disperse into the surrounding soils or discharge to the surface at some random location, which may not be a critical problem in an undeveloped location. However, in an urban environment or a high profile recreational area, inadvertent returns can be a major problem. In addition to the obvious public nuisance, drilling fluid flow can buckle streets or wash out embankments.

Drilling parameters may be adjusted to maximize drilling fluid circulation and minimize the risk of inadvertent returns. However, the possibility of lost circulation and inadvertent returns cannot be eliminated. Contingency plans addressing possible remedial action should be made in advance of construction and regulatory bodies should be informed.

Inadvertent returns are more likely to occur in less permeable soils with existing flow paths. Examples are slickensided clay or fractured rock structures. Coarse grained, permeable soils exhibit a tendency to absorb circulation losses. Manmade features, such as exploratory boreholes or piles, may also serve as conduits to the surface for drilling fluids. Inadvertent drilling fluid returns in a waterway are shown in Figure 3 and drilling fluid returns surfacing through cracks in pavement along a roadway in Figure 4.

Research projects have been conducted in an attempt to identify the mechanisms that cause inadvertent returns and develop analytical methods for use in predicting their occurrence. Efforts have centered on predicting the point at which hydraulic fracture of the native soils will occur. These programs have met with limited success in providing a reliable prediction method. Engineering judgment and experience must be applied in utilizing hydraulic fracture models to predict the occurrence, or nonoccurrence, of inadvertent returns. Additional information relative to evaluating the potential for hydraulic fracture is presented in Section 5.

Figure 3: Inadvertent drilling fluid return in waterway

Figure 4: Inadvertent drilling fluid return surfacing through cracks in pavement

5. HYDRAULIC FRACTURE EVALUATION

As mentioned briefly above, hydraulic fracture, also known as hydrofracture, is a phenomenon that occurs when drilling fluid pressure in the annular space of the drilled hole exceeds the strength of the surrounding soil mass, resulting in deformation, cracking, and fracturing. The fractures may then serve as flow conduits for drilling fluid allowing the fluid to escape into the formation and possibly up to the ground surface. Drilling fluid that makes its way to the ground surface is known as an inadvertent drilling fluid return or, more commonly, a “frac-out.”

Although hydrofracture may be one mechanism by which frac-outs occur, it is not the only one. In fact, it is thought that frac-outs due to true hydrofracture occur in only a small percentage of cases. Drilling fluid flows in the path of least resistance. Ideally, the path of least resistance is through the annulus of the drilled hole and back to the fluid containment pits at the entry or exit points. However, the path of least resistance may also be through naturally occurring subsurface features such as fissures in the soil, shrinkage cracks, or porous deposits of gravel. Drilling fluid may also flow to the surface alongside piers, piles, utility poles, or other structures.

The risk of hydrofracture can be determined by comparing the formation limit pressure (confining capacity) of the subsurface soils to the estimated annular pressure necessary to conduct HDD operations. If the drilling fluid pressure in the annulus exceeds the confining capacity of the overlying soils, there is risk that inadvertent drilling fluid returns due to hydrofracture will occur. A discussion of the methods used to predict the formation limit pressure and the minimum required annular pressure on the Nexus Project is provided in the sections below.

5.1. Formation Limit Pressure

For HDD crossings on the Nexus Project that involve passing through uncemented soil (i.e. silt, sand, clay), the formation limit pressure was calculated using the "Delft Method." The Delft Method is described in Appendix A of an Army Corps of Engineers publication (CPAR-GL-98) titled *Recommended Guidelines for Installation of Pipelines beneath Levees using Horizontal Directional Drilling.*[1]

The Delft Method assumes uniform soil conditions in the soil column above the point along the drilled path that is being analyzed and requires engineering judgment with respect to the selection of geotechnical parameters that are used in the Delft equations. With respect to the Nexus Project, subsurface parameters were estimated based on site-specific standard penetration test (SPT) data presented in the geotechnical reports prepared by Fugro Consultants, Inc. Since the Delft Method assumes uniform soil conditions, weighted averages of the various material properties of the overburden soils were used in assessing the confining capacity.

5.2. Estimated Annular Pressure

The estimated minimum annular pressure necessary for HDD pilot hole operations was calculated using the Bingham Plastic Model. The Bingham Plastic Model is described in Chapter 4 of Society of Petroleum Engineer's *Applied Drilling Engineering*.[2] Variables with respect to drilling fluid rheology and tooling used in the annular pressure calculations are provided in Table 2.

Table 2: Drilling Fluid Parameters

Drilling Fluid Parameter	Value
Effective Pilot Hole Diameter	14 inches
Drill Pipe Diameter	6.625 inches
Drilling Fluid Weight	11 pounds per gallon
Pump Flow Rate	210 gallons per minute
Yield Point	29 pounds per 100 ft^2
Plastic Viscosity	15 centipoise

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[1] *Recommended Guidelines for Installation of Pipelines beneath Levees using Horizontal Directional Drilling*, prepared for U.S. Army Corps of Engineers, Kimberlie Staheli [et al], April 1998

[2] *Applied Drilling Engineering,* Society of Petroleum Engineers, Richardson, Texas, A. T. Bourgoyne, Jr. [et al], 1991

5.3. Hydrofracture Risk Assessment

The results of the hydrofracture risk assessments for applicable crossings on the Nexus Project are included in the site-specific reports.

6. DESIGN CRITERIA

6.1. HDD Path Centerline

An HDD profile design is defined by the following six parameters:

- Entry Point
- Exit Point
- Entry Angle
- Exit Angle
- P.I. Elevation
- Radius Of Curvature

The relationship of these parameters to each other is illustrated in Figure 5.

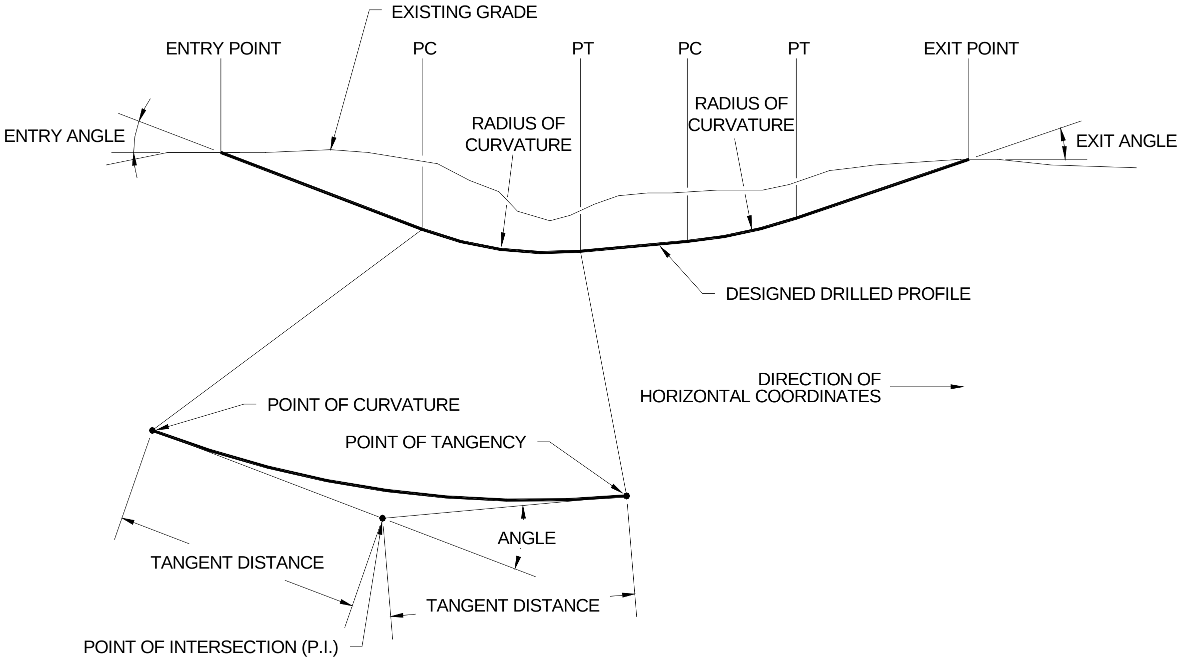

Figure 3: Horizontal Directional Drilling Terminology

6.2. Entry and Exit Points

The entry and exit points are the endpoints of the designed drilled segment on the ground surface. The drilling rig is positioned at the entry point and the pipeline is pulled into the drilled hole through the exit point. The relative locations of the entry and exit points, and consequently the direction of pilot hole drilling and pullback, should be established by the site's geotechnical and topographical conditions.

The following criteria were used as the basis for selecting entry and exit points on the Nexus Project: 1) steering precision and drilling effectiveness are greater near the drilling rig; 2) drilling fluid returns to the rig are enhanced if the entry point is lower than the exit point; 3) pullback operations are enhanced if there is sufficient work space in line with the drilled path to allow the pull section to be fabricated in one continuous string. It is also important to recognize that the position of the drilling rig may be changed during construction to facilitate operations and a dual rig scenario may be employed during prereaming. In a dual rig scenario rigs are positioned at both ends of the drilled segment and work in tandem.

6.3. Entry and Exit Angles

Ideal or target entry angles are between 8-degrees and 12-degrees, which accommodate most HDD drilling rigs. Target exit angles are between 8-degrees and 10-degrees to facilitate breakover support during pullback. These are consistent with HDD industry design standards.[3] In some cases, where topographic considerations or other site-specific conditions dictated, angles greater than the target values have been used.

6.4. P.I. Elevation

The P.I. elevation defines the depth of cover that the HDD installation will provide under the obstacle. Although experience and judgement with respect to depth of cover must be used on a crossing specific basis, it is generally thought that areas along the HDD alignment with less than 40 feet of cover have a greater susceptibility to inadvertent drilling fluid returns.[4] Standard practice with respect to design depth has slowly evolved over the years, primarily based on field experience and observations as opposed to theoretical methods. Therefore, in order to reduce the risk of drilling fluid impacts (heaving, settlement, and inadvertent returns) the majority of the HDD crossings on the Nexus Project were designed with 40 feet of cover at the target obstacle. However, in some cases, designs may involve less cover if adverse subsurface conditions or other site-specific constraints dictated otherwise.

6.5. Radius of Curvature

The design radius of curvature for HDD segments was set at 3,600 feet. This is consistent with the HDD industry standard design radius of 1,200 times the nominal outside diameter.[5] This relationship has been developed over a period of years in the HDD industry and is based on experience with constructability as opposed to any theoretical analysis.

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[3] *Manual of Practice No. 108, Pipeline Design for Installation by Horizontal Directional Drilling* (Reston, VA: American Society of Civil Engineers, 2005), 15.

[4] *Manual of Practice No. 108*, 50.

[5] *Manual of Practice No. 108*, 16.

7. INSTALLATION LOADS AND STRESSES

During HDD installation, a pipeline segment is subjected to tension, bending, and external pressure as it is pulled through a prereamed hole. The stresses in the pipe and its potential for failure are a result of the interaction of these loads.[6,7] In order to determine if a given pipe specification is adequate, HDD installation loads must first be estimated so that the stresses resulting from these loads can be calculated. A thorough design process requires examination of the stresses that result from each individual installation loading condition as well as an examination of the combined stresses that result from the interaction of these loads.

7.1. HDD Installation Stress Analysis

Calculation of the approximate tensile load required to install a pipeline by HDD is relatively complicated due to the fact that the geometry of the drilled path must be considered along with the properties of the pipe being installed and the subsurface conditions. Assumptions and simplifications are required. A method to accomplish this is presented in *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, published by the Pipeline Research Council International (PRCI).[8]

The PRCI Method involves modeling the drilled path as a series of segments to define its shape and properties during installation. The individual loads acting on each segment are then resolved to determine a resultant tensile load for each segment. The estimated force required to install the entire pull section in the reamed hole is equal to the sum of the tensile loads acting on all of the defined segments. When utilizing the PRCI Method, pulling loads are affected by numerous variables, many of which are dependent upon site-specific conditions and individual contractor practices. These include prereaming diameter, hole stability, removal of cuttings, soil and rock properties, drilling fluid properties, and the effectiveness of buoyancy control measures.[9]

It is important to keep in mind that the PRCI Method considers pulling tension, pipe bending, and external pressure. It does not consider point loads that may result from subsurface conditions such as a rock ledge or boulder. Indeed, we know of no way to analyze potential point loads that may develop due to subsurface conditions. Although this type of damage is relatively rare, several cases have been observed over the last ten years where pipelines suffered damage in the form of dents or pipe deformation due to point loads encountered during HDD installation.

Pulling load calculations for the Nexus Project were completed under two separate installation scenarios. The first is based on the exact design geometry shown on the preliminary plan and profile drawings. The second is based on an assumed worse case installation model in which the pilot hole is drilled 25 feet deeper and 50 feet longer than the designed path with a radius of curvature equal to 50 percent of the design radius (1,800 feet).

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[6] Fowler, J.R. and C.G. Langner. "Performance Limits for Deepwater Pipelines." Presentation, OTC 6757, 23rd Annual Offshore Technology Conference, Houston, TX, May 6-9, 1991.

[7] Loh, J.T. "A Unified Design Procedure for Tubular Members." Presentation, OTC 6310, 22nd Annual Offshore Technology Conference, Houston, TX, May 7-10, 1990.

[8] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide* (Arlington, VA: Pipeline Research Council International, Inc., 2008), 26-36.

[9] *Manual of Practice No. 108*, 42.

The installation stress calculations are based on several assumptions with respect to pipe/soil interaction, conditions of the hole, and drilling fluid properties. One variable, which plays a significant role in the calculated pulling load is the fluid drag coefficient. For pulling load calculations on the Nexus Project, a fluid drag coefficient of 0.025 was assumed. This value is based on research conducted by Jeffrey Puckett[10] and is referenced in the 2008 edition of the PRCI's *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide.* Another variable that has substantial impact on the calculated pulling load is the soil friction coefficient. In this case, a value of 0.30 was assumed, which is generally considered a conservative, upper bound, but reasonable value for pipe and soil interaction in a drilling fluid filled hole. For drilling fluid density, it was assumed the reamed hole would contain a heavy 12 pounds per gallon mixture of drilling fluid and soil cuttings during pullback. For conservative results, it was assumed the pipe will be installed empty, without ballast during pullback.

Anticipated pulling loads as well as the results of the pipe stress calculations can be found in the site-specific reports.

7.2. Operating Stress Analysis

As with a pipeline installed by conventional methods, a pipeline installed by HDD will be subjected to internal pressure, thermal expansion, and external pressure during normal operation. A welded pipeline installed by HDD will also be subjected to elastic bending. The operating loads imposed on a pipeline installed by either of these methods are addressed in Chapter 5 of *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide.*

With one exception, the operating stresses in a pipeline installed by HDD are not materially different from those experienced by pipelines installed by cut and cover techniques. As a result, past procedures for calculating and limiting stresses can be applied. However, unlike a cut and cover installation in which the pipe is bent to conform to the ditch, a pipeline installed by HDD will contain elastic bends.

Flexural stresses associated with elastic bends were analyzed in combination with longitudinal and hoop stresses that develop during hydrostatic testing and subsequent operation of the pipeline to verify that stresses conform to applicable limits specified in ASME B31.8 (2010).

Three scenarios were investigated for the Nexus Project. In the first two scenarios, it was assumed the pipeline would be fully restrained underground, with an initial restraint temperature of 55 °F and an operating temperature of 120 °F. The first scenario involved an elastic radius of 3,600 feet under an operating pressure 1,440 psig. The second scenario involved the same operating pressure but reduces the radius to 1,800 feet. The third scenario assumed that temperatures would be constant under a hydrostatic test pressure of 2,160 psig and a bending radius of 1,800 feet. A summary of the assumptions used in each loading scenario is provided in Table 3.

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[10] Puckett, Jeffrey S. "Analysis of Theoretical Versus Actual HDD Pulling Loads." *Volume Two, New Pipeline Technologies, Security and Safety*, 1352. Presentation, Proceedings of the ASCE International Conference on Pipeline Engineering and Construction from The Technical Committee on Trenchless Installation of Pipelines (TIPS) of the Pipeline Division of ASCE, Baltimore, Maryland, July 13-16, 2003.

Table 3: Operational & Hydrotesting Parameters

Scenario	Radius (ft.)	Max. Pressure (psig)	Installation Temperature (ºF)	Max Operating Temperature (ºF)
Number 1 (Operation)	3,600 (Design)	1,440	55	120
Number 2 (Operation)	1,800 50% of Design	1,440	55	120
Number 3 (Hydrotesting)	1,800 50% of Design	2,160	50	50

In summary, pipe stress resulting from each of the loading scenarios is within acceptable limits as defined by B31.8 (2010). A summary of the results is provided in Table 4.

7.3. Minimum Radius

As mentioned previously in this report, the HDD design radius is 3,600 feet. However, since the pilot hole generally deviates from the exact design during construction, a minimum allowable radius has been specified as part of the allowable pilot hole tolerances called out on the drawings. The radius is typically analyzed over a distance of approximately 90 feet (three joints of range 2 drill pipe) during pilot hole drilling and compared against the allowable minimum. In order to facilitate pilot hole drilling and allow the contractor flexibility in the event that steering issues result due to subsurface conditions, JDH&A recommends setting the minimum radius to 50 percent of the design radius (1,800 feet). Operational stress calculations demonstrating the acceptability of the recommended minimum radius are provided in Table 4. Installation loading stresses associated with the minimum radius are provided with the site-specific reports included in the Appendix.

Table 4: Operational Stress Summary

Pipe Properties			
	Scenario 1	Scenario 2	Scenario 3
Pipe Outside Diameter =	36.000 in	36.000 in	36.000 in
Wall Thickness =	0.741 in	0.741 in	0.741 in
Specified Minimum Yield Strength =	70,000 psi	70,000 psi	70,000 psi
Young's Modulus =	2.9E+07 psi	2.9E+07 psi	2.9E+07 psi
Moment of Inertia =	12755.22 in^4	12755.22 in^4	12755.22 in^4
Pipe Face Surface Area =	82.08 in^2	82.08 in^2	82.08 in^2
Diameter to Wall Thickness Ratio, D/t =	49	49	49
Poisson's Ratio =	0.3	0.3	0.3
Coefficient of Thermal Expansion =	6.5E-06 in/in/°F	6.5E-06 in/in/°F	6.5E-06 in/in/°F
Pipe Weight in Air =	279.04 lb/ft	279.04 lb/ft	279.04 lb/ft
Pipe Interior Volume =	6.50 ft^3/ft	6.50 ft^3/ft	6.50 ft^3/ft
Pipe Exterior Volume =	7.07 ft^3/ft	7.07 ft^3/ft	7.07 ft^3/ft
Operating Parameters			
Maximum Allowable Operating Pressure =	1,440 psig	1,440 psig	2,160 psig
Radius of Curvature =	3,600 ft	1,800 ft	1,800 ft
Restraint Temperature =	55 °F	55 °F	55 °F
Operating Temperature =	120 °F	120 °F	55 °F
Groundwater Table Head =	0 ft	0 ft	0 ft
Operating Stress Check	Scenario 1	Scenario 2	Scenario 3
Hoop Stress =	34,980 psi	34,980 psi	52,470 psi
% SMYS =	50%	50%	75%
Longitudinal Stress from Internal Pressure =	10,494 psi	10,494 psi	15,741 psi
% SMYS =	15%	15%	22%
Longitudinal Stress from Temperature Change =	-12,253 psi	-12,253 psi	0 psi
% SMYS =	18%	18%	0%
Longitudinal Stress from Bending =	12,083 psi	24,167 psi	24,167 psi
% SMYS =	17%	35%	35%
Net Longitudinal Stress (taking bending in tension) =	10,325 psi	22,408 psi	39,908 psi
Limited to 90% of SMYS by ASME B31.8 (2010) B31.4 (2012) =	15% ok	32% ok	57%
Net Longitudinal Stress (taking bending in compression) =	-13,842 psi	-25,925 psi	-8,426 psi
Limited to 90% of SMYS by ASME B31.8 (2010) B31.4 (2012) =	20% ok	37% ok	12%
Combined Stress (NLS w/bending in tension) - Max Shear Stress Theory =	24,655 psi	12,572 psi	12,562 psi
Limited to 90% of SMYS by ASME B31.8 (2010) B31.4 (2012) =	35% ok	18% ok	18%
Combined Stress (NLS w/bending in compression) - Max Shear Stress Theory =	48,822 psi	60,905 psi	60,895 psi
Limited to 90% of SMYS by ASME B31.8 (2010) B31.4 (2012) =	70% ok	87% ok	87%
Combined Stress (NLS w/bending in tension) - Max. Distortion Energy Theory =	31,129 psi	30,690 psi	47,453 psi
Limited to 90% of SMYS by ASME B31.8 (2010) B31.4 (2012) =	44% ok	44% ok	68%
Combined Stress (NLS w/bending in compress.) - Max. Distortion Energy Theory =	43,582 psi	52,939 psi	57,150 psi
Limited to 90% of SMYS by ASME B31.8 (2010) B31.4 (2012) =	62% ok	76% ok	82%

8. CONSTRUCTION DURATION

Estimates of the duration of HDD activities at each crossing site have been prepared based on assumed production rates for the various phases of HDD operations taking into account the crossing lengths, the product line diameter, and subsurface conditions. The duration estimates cover drilling services only (pilot hole through pullback) and do not include installation of surface casings that may be installed at the contractor’s option or support operations that are typically provided by a prime contractor (i.e. site preparation & restoration, pull section fabrication, hydrostatic testing). Additionally, the duration estimates do not include contingency to account for operational problems that may occur during construction. Bearing in mind that unanticipated operational problems are relatively common on HDD installations, actual construction durations can be expected to exceed the estimated durations by some amount. In some extreme cases, the duration may be increased by 50 to 100 percent.

Estimated durations for each crossing are presented in Table 5. Details with respect to the individual crossing estimates are provided in the site-specific reports.

Table 5: Estimated HDD Construction Durations

Mile Post	Crossing Name	True Length (feet)	Construction Duration (days)
7.9R	Wetland	2,959	73
41.0R	Nimisila Reservoir	1,785	16*
47.8R	Tuscarawas River	3,309	88
71.1	Wetland	1,792	14
86.9	East Branch Black River	1,822	46
92.5	West Branch Black River	1,686	39*
104.1	Vermilion River	3,205	78
110.3	Interstate 80	1,439	38
116.8	Huron River	2,437	60
146.3R	Sandusky River	2,600	65
162.6R	Portage River	1,801	46
180.1R	Findlay Road	1,528	13
181.2	Maumee River	4,018	81
215.0	River Raisin	1,485	13
237.4	Saline River	1,320	12
250.7	Hydro Park	2,311	26
251.5	Interstate 94	1,366	12
254.4R	US-12	1,750	14*

*Based on assumed subsurface conditions

9. RISK ASSESSMENT

The relative risk associated with installation by HDD at each crossing location has been categorized as Low, Average, or High. This categorization is presented in the site specific reports under the sections titled Risk Identification and Assessment.

For the purposes of this report, risk is defined as the possibility of experiencing serious operational problems that result in significant delays or cost overruns. For example, an HDD pull section may become stuck during pull back requiring either remedial action to recover the partially installed pipeline or abandonment of the pipeline in place. The latter instance would require a new pilot hole to be drilled and reamed with a probable doubling of drilling duration and cost. This would be a significant delay and cost overrun.

Additional discussions relative to site-specific operational problems that may occur during HDD construction on the Nexus Project are in the site-specific reports included in the Appendix.

Further discussion concerning HDD operational problems and contingency planning is included in the project-specific document titled “Nexus Gas Transmission Project, HDD Monitoring and Contingency Plan.”

APPENDIX

Crossing Specific Reports

MP 7.9R Wetland

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- A combination of LiDAR and traditional survey data covering the proposed crossing location
- A geotechnical data report prepared by Fugro Consultants, In`c. titled “Geotechnical Data Report, Wetland No. 7 HDD Crossing, Nexus Gas Transmission Project, Columbiana County, Ohio” and dated September 11, 2015
- A reconnaissance of the proposed crossing location conducted in July of 2015 by a representative of JDH&A

General Site Description

The proposed 36-inch wetland crossing at pipeline Mile Post 7.9R is located near the intersection of Knox School Road and New Garden Avenue, about 5 miles northeast of Minerva, Ohio. The crossing involves passing beneath the wetland and Knox School Road. The wetland is approximately 450 feet wide and is located in a topographically low-lying area bound to the east by Knox School Road and open farm fields to the west. The east side of the crossing involves a mixture of wooded plots surrounding a commercial orchard. The west side of the crossing is primarily open farm fields. The topography in the area is gently rolling with steep slopes down to the wetland. The relief from the top of the slopes to the bottom of the valley where the wetland is located is about 150 feet. Figure 1 provides a general overview of the vicinity of the crossing.

Figure 1: Overview of the Wetland Crossing at M.P. 7.9R

Subsurface Conditions

Four geotechnical exploratory borings were taken as part of the site investigation conducted by Fugro Consultants, Inc. Borings WL7-01 and WL7-02 were taken on the east side of the wetland and borings WL7-03 and WL7-04 were taken on the west side of the wetland. Each of the borings encountered approximately 15 to 30 feet of overburden soil (sand, silty sand, clayey sand and some gravel) overlying sedimentary bedrock in the form of sandstone, siltstone, claystone, shale, and occasional coal beds. Unconfined compressive strength of the bedrock generally fell in the range of 2,000 psi to 6,000 psi. Rock quality designation (RQD) indicates good quality, competent bedrock overall.

Refer to the geotechnical data report prepared by Fugro Consultants, Inc. titled "Geotechnical Data Report, Wetland No. 7 HDD Crossing, Nexus Gas Transmission Project, Columbiana County, Ohio" and dated September 11, 2015 for detailed information relative to the subsurface layers.

Design Geometry & Layout

The proposed wetland crossing involves a horizontal length of 2,931 feet. It utilizes a 12-degree entry angle, an 8-degree exit angle, and a radius of curvature of 3,600 feet. The crossing design is based on obtaining a minimum of 40 feet of cover beneath the wetland and Knox School Road.

The exit point is located on the west side of the crossing to take advantage of available workspace for pull section fabrication, which will allow the pull section to be fabricated in a single segment, thus avoiding the potential risk of getting stuck during downtime associated with a tie-in weld during pullback. The entry point is located in an open field behind a commercial orchard.

The proposed HDD design, as well as available workspace for HDD operations, is shown on the preliminary HDD plan and profile drawing included at the end of this site-specific report.

Assessment of Feasibility

Based on a review of available geotechnical and other site-specific mapping, the proposed 36-inch wetland crossing is feasible. Although large diameter rock crossings do involve higher risk of HDD operational problems, given the proposed length and the fact that the crossing involves passing through relatively soft sedimentary rock formations, it is our opinion that with the right downhole tool selections and sound planning, skilled and experienced HDD contractors will not have significant difficulties.

Risk Identification and Assessment

Potential construction impacts resulting from installation by HDD include damage to Knox School Road in the form of heaving or settlement, as well as drilling fluid surfacing within the wetland. In this case, due to the topographic relief and relative depth of the crossing compared to the entry point (177 feet), annular pressure will be high due to the height of the drilling fluid column. Since the crossing will be installed through bedrock, drilling fluid may flow through existing fractures or joints and make its way to the ground surface. Therefore, the risk of inadvertent drilling fluid returns within the wetland is increased at this location. There is also increased risk of the development of sinkholes or surface settlement along the HDD alignment on the west end of the crossing during reaming operations. This is due to the 16 foot elevation differential between the entry and exit points. The risk of sinkholes is greatest within 115 feet of the exit point.

HDD construction and operational risks associated with the crossing include failure of large diameter rock reaming tools downhole, hole misalignment at the soil/rock interface which can lead to downhole tools or the pull section getting lodged, and loss of drilling fluid circulation through existing fractures which could negatively impact cuttings removal. In addition, sink holes (hole collapse) on the west side resulting from the elevation differential may increase the difficulty of reaming and cuttings removal.

The overall risk level associated with the proposed 36-inch wetland crossing is considered average.

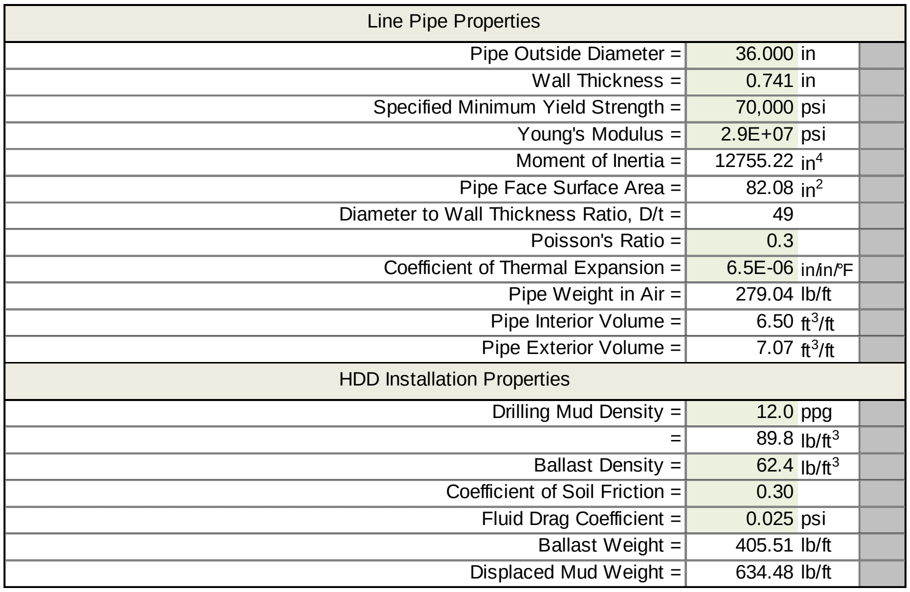
Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse-case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the loading scenarios described above, the estimated pulling load for the crossing, without ballast, is 492,725 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 521,640 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 2. Detailed calculations for each loading scenario are summarized in Figures 3 and 4.



Line Pipe Properties		
Pipe Outside Diameter =	36.000	in
Wall Thickness =	0.741	in
Specified Minimum Yield Strength =	70,000	psi
Young's Modulus =	2.9E+07	psi
Moment of Inertia =	12755.22	in^4
Pipe Face Surface Area =	82.08	in^2
Diameter to Wall Thickness Ratio, D/t =	49	
Poisson's Ratio =	0.3	
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F
Pipe Weight in Air =	279.04	lb/ft
Pipe Interior Volume =	6.50	ft^3/ft
Pipe Exterior Volume =	7.07	ft^3/ft
HDD Installation Properties		
Drilling Mud Density =	12.0	ppg
=	89.8	lb/ft^3
Ballast Density =	62.4	lb/ft^3
Coefficient of Soil Friction =	0.30	
Fluid Drag Coefficient =	0.025	psi
Ballast Weight =	405.51	lb/ft
Displaced Mud Weight =	634.48	lb/ft

Figure 2: Pipe and Installation Properties

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 1131.7 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 119,497 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 38,396 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 55,981 lb
Pulling Load on Exit Tangent = 213,875 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 270,090 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 8.77 ft
$j = [(E\ I) / T]^{1/2}$ = 1,170
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 3.4E+06
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 929.55
$U = (12\ L) / j$ = 5.15
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 138,187 lb
Bending Frictional Drag = $2\ \mu\ N$ = 82,912 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 17,055 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 12,463 lb
Pulling Load on Exit Sag Bend = 112,430 lb
Total Pulling Load = 326,305 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 100.0 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 10,664 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 3,393 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 0 lb
Pulling Load on Bottom Tangent = 14,057 lb
Total Pulling Load = 340,362 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 754.0 ft
Segment Angle with Horizontal, θ = 12.0 °
Deflection Angle, α = 6.0 °
Average Tension, T = 401,395 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 19.72 ft
$j = [(E\ I) / T]^{1/2}$ = 960
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 9.3E+06
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 1782.04
$U = (12\ L) / j$ = 9.43
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 207,497 lb
Bending Frictional Drag = $2\ \mu\ N$ = 124,498 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 25,582 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -28,013 lb
Negative value indicates axial weight applied in direction of installation
Pulling Load on Entry Sag Bend = 122,067 lb
Total Pulling Load = 462,429 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 470.9 ft
Entry Angle, θ = 12.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 49,120 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 15,979 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -34,802 lb
Negative value indicates axial weight applied in direction of installation
Pulling Load on Entry Tangent = 30,296 lb
Total Pulling Load = 492,725 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	6,003	ok	0	ok	0	ok	0.10	ok	0.01	ok
	5,634	ok	0	ok	1483	ok	0.09	ok	0.06	ok
PC										
	5,634	ok	12,083	ok	1483	ok	0.35	ok	0.17	ok
	4,147	ok	12,083	ok	2674	ok	0.33	ok	0.27	ok
PT										
	4,147	ok	0	ok	2674	ok	0.07	ok	0.15	ok
	3,975	ok	0	ok	2674	ok	0.06	ok	0.15	ok
PC										
	3,975	ok	12,083	ok	2674	ok	0.33	ok	0.27	ok
	2,606	ok	12,083	ok	2143	ok	0.31	ok	0.19	ok
PT										
	2,606	ok	0	ok	2143	ok	0.04	ok	0.09	ok
Exit Point	0	ok	0	ok	-242	ok	0.00	ok	0.00	ok

Figure 3: Installation Loading and Stress Analysis (As-Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 1437.2 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 151,756 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 48,762 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = 71,093 lb

Pulling Load on Exit Tangent = 271,612 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 313,529 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 4.38 ft
$j = [(E\ I) / T]^{1/2}$ = 1,086

$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 5.1E+05
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 274.54

$U = (12\ L) / j$ = 2.78
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 115,128 lb

Bending Frictional Drag = $2\ \mu\ N$ = 69,077 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 8,527 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = 6,231 lb

Pulling Load on Exit Sag Bend = 83,836 lb
Total Pulling Load = 355,447 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 169.6 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 18,081 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 5,753 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 23,834 lb
Total Pulling Load = 379,281 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 377.0 ft
Segment Angle with Horizontal, θ = 12.0 °
Deflection Angle, α = 6.0 °
Average Tension, T = 425,360 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 9.86 ft
$j = [(E\ I) / T]^{1/2}$ = 933

$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 1.8E+06
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 671.94

$U = (12\ L) / j$ = 4.85
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 155,622 lb

Bending Frictional Drag = $2\ \mu\ N$ = 93,373 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 12,791 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = -14,007 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 92,158 lb
Total Pulling Load = 471,439 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 780.4 ft
Entry Angle, θ = 12.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 81,394 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 26,477 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = -57,669 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 50,202 lb
Total Pulling Load = 521,640 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	6,355	ok	0	ok	0	ok	0.10	ok	0.01	ok
	5,744	ok	0	ok	2457	ok	0.09	ok	0.14	ok
PC										
	5,744	ok	24,167	ok	2457	ok	0.62	ok	0.48	ok
	4,621	ok	24,167	ok	3052	ok	0.60	ok	0.54	ok
PT										
	4,621	ok	0	ok	3052	ok	0.07	ok	0.20	ok
	4,330	ok	0	ok	3052	ok	0.07	ok	0.19	ok
PC										
	4,330	ok	24,167	ok	3052	ok	0.60	ok	0.53	ok
	3,309	ok	24,167	ok	2787	ok	0.58	ok	0.47	ok
PT										
	3,309	ok	0	ok	2787	ok	0.05	ok	0.16	ok
Exit Point	0	ok	0	ok	-242	ok	0.00	ok	0.00	ok

Figure 4: Installation Loading and Stress Analysis (Worse-Case)

Hydrofracture Evaluation

The proposed wetland crossing will be installed almost entirely through sedimentary bedrock. Since the Delft Method (discussed previously in Section 5) is only applicable to uncemented subsurface material, a hydrofracture evaluation was not completed. In general, inadvertent drilling fluid returns due to hydrofracture do not typically occur on rock crossings, but instead occur by flowing through existing fractures, joints, or solution cavities.

Construction Duration

The estimated duration of construction is 73 days. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated based on information contained within the Pipeline Research Council International's "*Installation of Pipelines by Horizontal Directional Drilling*"[1], as well as JDH&A's past experience in similar subsurface conditions. Refer to Figure 5 for details relative to the estimate.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.

General Data		Comments
Work Schedule, hours/shift =	12.0	36" Wetland Crossing (MP 7.9R)
days/week =	7.0	
Drilled Length, feet =	2,959	
Pilot Hole		
Production Rate, feet/hour =	20	
shifts/day =	1	
Drilling Duration, hours =	148.0	
shifts =	12.3	
Trips to change tools, shifts =	1.0	
Pilot Hole Duration, days =	13.3	

Ream and Pull Back								
Pass Description =	24-inch	36-inch	48-inch			Swab	Pull Back	Total
Travel Speed, feet/minute =	0.3	0.3	0.3			8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0	15.0			15.0	15.0	
shifts/day =	1	1	1			1	1	
Reaming Duration, hours =	200.4	200.4	200.4			9.3	11.4	622.1
shifts =	16.7	16.7	16.7			0.8	1.0	51.8
Rig up, shifts =	0.5	0.5	0.5			0.5	0.5	2.5
Trips to change tools, shifts =	1.0	1.0	1.0			0.0		3.0
Pass Duration, days =	18.2	18.2	18.2			1.3	1.5	57.3

Summary				
HDD Duration at Site, days =	72.7			
Site Establishment	Move in	Rig Up	Rig Down	Move Out
shifts/day =	1	1	1	1
shifts =	0.5	1.0	1.0	0.5
days =	0.5	1.0	1.0	0.5

Figure 5: Estimated Construction Duration

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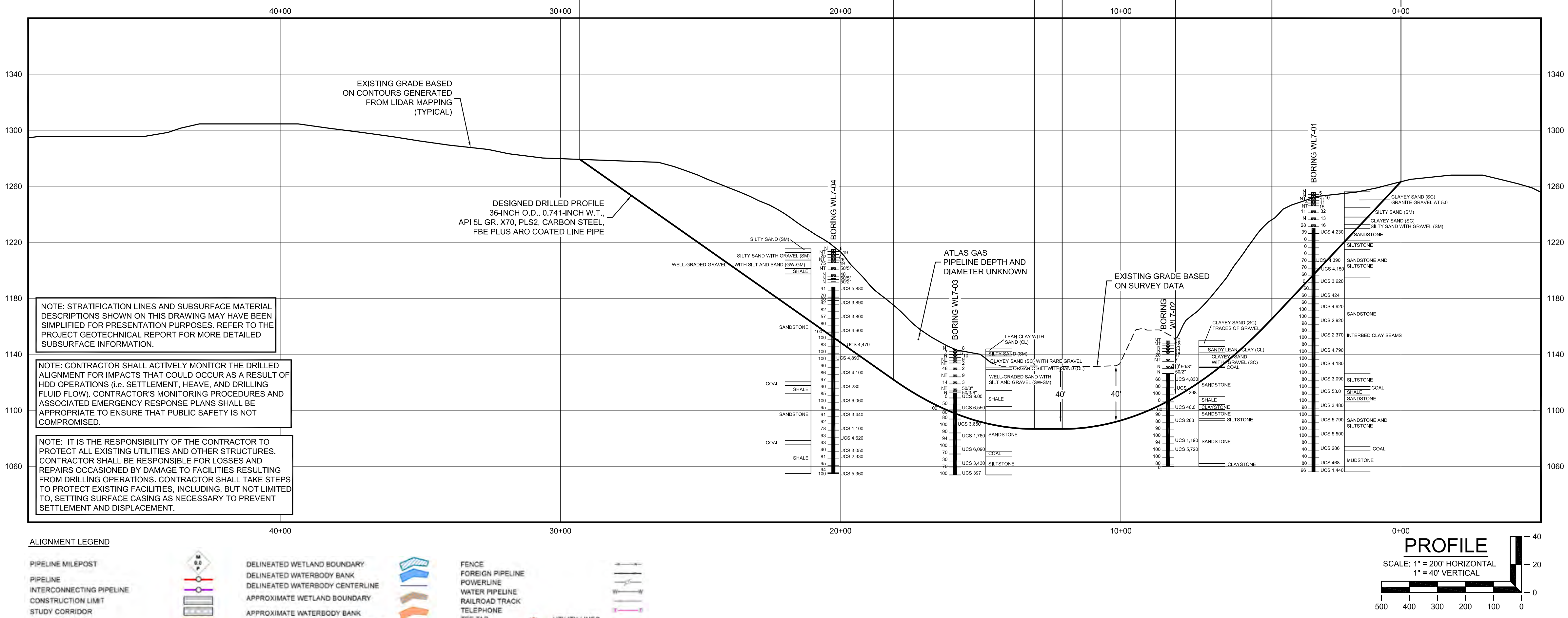
[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.

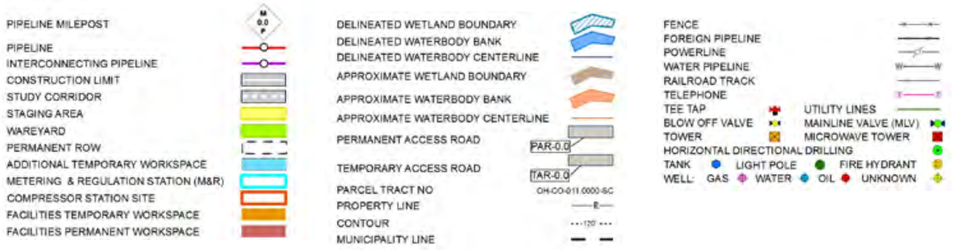


NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING MAY HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

ALIGNMENT LEGEND



GENERAL LEGEND

⊕ DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR, SURVEY, AND HYDROGRAPHIC DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

GEOTECHNICAL LEGEND

Ⓑ BORING LOCATION

SPLIT SPOON SAMPLE

53 ⊠ 23 ← PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

PUSH SAMPLE

CORE BARREL SAMPLE

UCS 6,250 ← UNCONFINED COMPRESSIVE STRENGTH (PSI)
TSS 1,350 ← TENSILE SPLITTING STRENGTH (PSI)
53 6 ← MOHS HARDNESS
ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY FUGRO CONSULTANTS, INC, BATON ROUGE, LOUISIANA. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED SEPTEMBER 11, 2015 FOR ADDITIONAL INFORMATION.

2. THE LETTER "N" TO THE LEFT OF A SPLIT SPOON SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TESTS WERE PERFORMED.

3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGEMENT IN INTERPRETING THIS DATA.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		3	LKB	JMS	RE-ISSUED FOR FERC
		2	DLB	JMS	ADD DEPTH CRITERIA/CENTERLINE AND REVISE ENTRY POINT LOCATION
HANO-A-1010	ALIGNMENT SHEET M.P. 7.97 TO M.P. 8.91	1	LKB	JMS	ISSUED FOR BID
HANO-A-1009	ALIGNMENT SHEET M.P. 7.02 TO M.P. 7.97	0	LKB	ACM	ISSUED FOR FERC

John D. Hair, P.E.
Consulting Engineer
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS

TITLE	PRELIMINARY SIGNATURE	PRELIMINARY DATE	CONSTRUCTION SIGNATURE	CONSTRUCTION DATE
DRAWN BY:	ACM	08/07		
PROJECT MANAGER	JMS	08/07		
DESIGN ENGINEER	ACM	08/07		
DESIGN CHECKER	DLB	08/07		

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH WETLAND CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

COLUMBIANA COUNTY, OHIO

NEXUS GAS TRANSMISSION

M.P. 7.9R | W.O. | SCALE: AS SHOWN | DWG. HANO-H-1001 | REV. 3

MP 41.0R Nimisila Reservoir

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- A combination of LiDAR, hydrographic, and traditional survey data covering the proposed crossing location
- A reconnaissance of the proposed crossing location conducted in July of 2015 by a representative of JDH&A

General Site Description

The 36-inch Nimisila Reservoir Crossing is located near the intersection of East Comet Road and Christman Road, just south of Akron, Ohio. The primary obstacles that will be crossed are Christman Road, an existing overhead powerline right of way, and the Nimisila Reservoir. The reservoir is approximately 700 feet wide, and based on hydrographic survey points, roughly 5 feet deep. The proposed HDD alignment crosses an existing overhead power corridor at an approximate 45-degree angle. Both ends of the crossing are within agricultural land. Residential homes exist directly to the north and southeast of the exit point with the nearest home being roughly 370 feet away. The topography in the area is gently rolling with a mixture of farm land and mature timber. Refer to Figure 1 for a general overview of the vicinity of the crossing.

Figure 1: Overview of the Nimisila Reservoir Crossing

Subsurface Conditions

At the time of this writing, site-specific subsurface information is not yet available.

Design Geometry & Layout

The proposed Nimisila Reservoir HDD design involves a horizontal length of 1,776 feet. It utilizes a 10-degree entry angle, an 8-degree exit angle, and a radius of curvature of 3,600 feet. The crossing design maintains 20 feet of cover beneath the slope on the west side of the reservoir, 53 feet of cover beneath Christman Road, 53 feet beneath the Reservoir, and 40 feet beneath the edge of wetland on the east side of the crossing.

The entry point is located on the east side of Christman Road in an open farm field. The exit point is located on the west side of the crossing, also within an open but slightly smaller farm field. An elevation difference of roughly 17 feet exists between the entry and exit points with the entry site existing at the lower elevation.

The proposed HDD design, as well as available workspace for HDD operations, is shown on the preliminary HDD plan and profile drawing included in this site-specific report.

Assessment of Feasibility

Overall, given the length and diameter of the proposed installation, it is within the range of what has been successfully completed using HDD in the past. However, the feasibility will need to be confirmed when site-specific geotechnical data is available.

Risk Identification and Assessment

Potential construction impact resulting from HDD operations include damage to Christman Road in the form of heaving or settlement, drilling fluid surfacing within the reservoir, or drilling fluid surfacing near the entry or exit point due to shallow cover within loose agricultural soil.

Based on the length of the proposed Nimisila Reservoir crossing, it is considered to have a low level of risk. However, risk should be re-evaluated after site-specific geotechnical information is available.

Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse-case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the loading scenarios described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 311,607 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 338,943 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 2. Detailed calculations for each loading scenario are summarized in Figures 3 and 4.

Line Pipe Properties		
Pipe Outside Diameter =	36.000	in
Wall Thickness =	0.741	in
Specified Minimum Yield Strength =	70,000	psi
Young's Modulus =	2.9E+07	psi
Moment of Inertia =	12755.22	in^4
Pipe Face Surface Area =	82.08	in^2
Diameter to Wall Thickness Ratio, D/t =	49	
Poisson's Ratio =	0.3	
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F
Pipe Weight in Air =	279.04	lb/ft
Pipe Interior Volume =	6.50	ft^3/ft
Pipe Exterior Volume =	7.07	ft^3/ft
HDD Installation Properties		
Drilling Mud Density =	12.0	ppg
=	89.8	lb/ft^3
Ballast Density =	62.4	lb/ft^3
Coefficient of Soil Friction =	0.30	
Fluid Drag Coefficient =	0.025	psi
Ballast Weight =	405.51	lb/ft
Displaced Mud Weight =	634.48	lb/ft

Figure 2: Pipe and Installation Properties

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
PIpe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 323.4 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\, L\, \mu \cos\theta$ = 34,154 lb
Fluidic Drag = $12\, \pi\, D\, L\, C_d$ = 10,974 lb
Axial Segment Weight = $W_e\, L \sin\theta$ = 16,000 lb

Pulling Load on Exit Tangent = 61,129 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 114,139 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\,[1 - \cos(\alpha/2)]$ = 8.77 ft
$j = [(E\, I) / T]^{1/2}$ = 1,800
$Y = [18\, (L)^2] - [(j)^2\, (1 - \cosh(U/2)^{-1}]$ = 2.5E+06
$X = (3\, L) - [\, (j / 2) \tanh(U/2)\,]$ = 668.84
$U = (12\, L) / j$ = 3.35
$N = [(T\, h) - W_e \cos\theta\, (Y/144)] / (X / 12)$ = 127,506 lb
Bending Frictional Drag = $2\, \mu\, N$ = 76,504 lb
Fluidic Drag = $12\, \pi\, D\, L\, C_d$ = 17,055 lb
Axial Segment Weight = $W_e\, L \sin\theta$ = 12,463 lb

Pulling Load on Exit Sag Bend = 106,021 lb
Total Pulling Load = 167,150 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 280.3 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\, L\, \mu$ = 29,890 lb
Fluidic Drag = $12\, \pi\, D\, L\, C_d$ = 9,511 lb
Axial Segment Weight = $W_e\, L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 39,401 lb
Total Pulling Load = 206,551 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 628.3 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 257,147 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\,[1 - \cos(\alpha/2)]$ = 13.70 ft
$j = [(E\, I) / T]^{1/2}$ = 1,199
$Y = [18\, (L)^2] - [(j)^2\, (1 - \cosh(U/2)^{-1}]$ = 5.8E+06
$X = (3\, L) - [\, (j / 2) \tanh(U/2)\,]$ = 1287.50
$U = (12\, L) / j$ = 6.29
$N = [(T\, h) - W_e \cos\theta\, (Y/144)] / (X / 12)$ = 165,565 lb
Bending Frictional Drag = $2\, \mu\, N$ = 99,339 lb
Fluidic Drag = $12\, \pi\, D\, L\, C_d$ = 21,318 lb
Axial Segment Weight = $W_e\, L \sin\theta$ = -19,464 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 101,193 lb
Total Pulling Load = 307,744 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 50.0 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\, L\, \mu \cos\theta$ = 5,254 lb
Fluidic Drag = $12\, \pi\, D\, L\, C_d$ = 1,698 lb
Axial Segment Weight = $W_e\, L \sin\theta$ = -3,088 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 3,863 lb
Total Pulling Load = 311,607 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	3,796	ok	0	ok	0	ok	0.06	ok	0.00	ok
	3,749	ok	0	ok	132	ok	0.06	ok	0.01	ok
PC										
	3,749	ok	12,083	ok	132	ok	0.32	ok	0.08	ok
	2,516	ok	12,083	ok	960	ok	0.30	ok	0.10	ok
PT										
	2,516	ok	0	ok	960	ok	0.04	ok	0.02	ok
	2,036	ok	0	ok	960	ok	0.03	ok	0.02	ok
PC										
	2,036	ok	12,083	ok	960	ok	0.30	ok	0.10	ok
	745	ok	12,083	ok	429	ok	0.28	ok	0.06	ok
PT										
	745	ok	0	ok	429	ok	0.01	ok	0.00	ok
Exit Point	0	ok	0	ok	-252	ok	0.00	ok	0.00	ok

Figure 3: Installation Loading and Stress Analysis (As-Designed Scenario)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
PIpe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30

Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 628.9 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 66,413 lb

Fluidic Drag = 12 π D L C_d = 21,340 lb

Axial Segment Weight = W_e L sinθ = 31,113 lb

Pulling Load on Exit Tangent = 118,866 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °

Average Tension, T = 156,994 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 4.38 ft
j = [(E I) / T]$^{1/2}$ = 1,535

Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 3.3E+05
X = (3 L) - [(j / 2) tanh(U/2)] = 175.22

U = (12 L) / j = 1.96
N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 102,498 lb

Bending Frictional Drag = 2 μ N = 61,499 lb

Fluidic Drag = 12 π D L C_d = 8,527 lb

Axial Segment Weight = W_e L sinθ = 6,231 lb

Pulling Load on Exit Sag Bend = 76,258 lb
Total Pulling Load = 195,123 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 294.0 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ = 31,351 lb

Fluidic Drag = 12 π D L C_d = 9,976 lb

Axial Segment Weight = W_e L sinθ = 0 lb

Pulling Load on Bottom Tangent = 41,327 lb
Total Pulling Load = 236,450 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 314.2 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °

Average Tension, T = 274,126 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 6.85 ft
j = [(E I) / T]$^{1/2}$ = 1,162

Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 9.4E+05
X = (3 L) - [(j / 2) tanh(U/2)] = 405.22

U = (12 L) / j = 3.25
N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 124,041 lb

Bending Frictional Drag = 2 μ N = 74,424 lb

Fluidic Drag = 12 π D L C_d = 10,659 lb

Axial Segment Weight = W_e L sinθ = -9,732 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 75,351 lb
Total Pulling Load = 311,802 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 351.5 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 36,910 lb

Fluidic Drag = 12 π D L C_d = 11,925 lb

Axial Segment Weight = W_e L sinθ = -21,694 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 27,141 lb
Total Pulling Load = 338,943 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	4,129	ok	0	ok	0	ok	0.07	ok	0.01	ok
	3,799	ok	0	ok	924	ok	0.06	ok	0.02	ok
PC										
	3,799	ok	24,167	ok	924	ok	0.59	ok	0.30	ok
	2,881	ok	24,167	ok	1338	ok	0.58	ok	0.31	ok
PT										
	2,881	ok	0	ok	1338	ok	0.05	ok	0.04	ok
	2,377	ok	0	ok	1338	ok	0.04	ok	0.04	ok
PC										
	2,377	ok	24,167	ok	1338	ok	0.57	ok	0.30	ok
	1,448	ok	24,167	ok	1073	ok	0.55	ok	0.26	ok
PT										
	1,448	ok	0	ok	1073	ok	0.02	ok	0.02	ok
Exit Point	0	ok	0	ok	-252	ok	0.00	ok	0.00	ok

Figure 4: Installation Loading and Stress Analysis (Worse-Case)

Hydrofracture Evaluation

At the time of this writing, site-specific geotechnical data is not available. Therefore, a hydrofracture evaluation could not be completed.

Construction Duration

The estimated duration of construction is 16 days based on assumed subsurface conditions consisting of silt, sand, and clay. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated based on information contained within the Pipeline Research Council International's "*Installation of Pipelines by Horizontal Directional Drilling*"[1], as well as JDH&A's past experience in similar subsurface conditions. Refer to Figure 5 for details relative to the estimate.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.

General Data		Comments
Work Schedule, hours/shift =	12.0	36" Nimisila Reservoir Crossing. Subsurface assumed to consist of silt/sand/clay.
days/week =	7.0	
Drilled Length, feet =	1,785	
Pilot Hole		
Production Rate, feet/hour =	50	
shifts/day =	1	
Drilling Duration, hours =	35.7	
shifts =	3.0	
Trips to change tools, shifts =	0.5	
Pilot Hole Duration, days =	3.5	

Ream and Pull Back								
Pass Description =	36-inch	48-inch				Swab	Pull Back	Total
Travel Speed, feet/minute =	1.0	1.0				8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0				15.0	15.0	
shifts/day =	1	1				1	1	
Reaming Duration, hours =	31.7	31.7				5.6	6.9	75.9
shifts =	2.6	2.6				0.5	0.6	6.3
Rig up, shifts =	0.5	0.5				0.5	0.5	2.0
Trips to change tools, shifts =	1.0	1.0				0.0		2.0
Pass Duration, days =	4.1	4.1				1.0	1.1	10.3

Summary				
HDD Duration at Site, days =	15.8			
Site Establishment	Move in	Rig Up	Rig Down	Move Out
shifts/day =	1	1	1	1
shifts =	0.5	1.0	1.0	0.5
days =	0.5	1.0	1.0	0.5

Figure 5: Estimated Construction Duration

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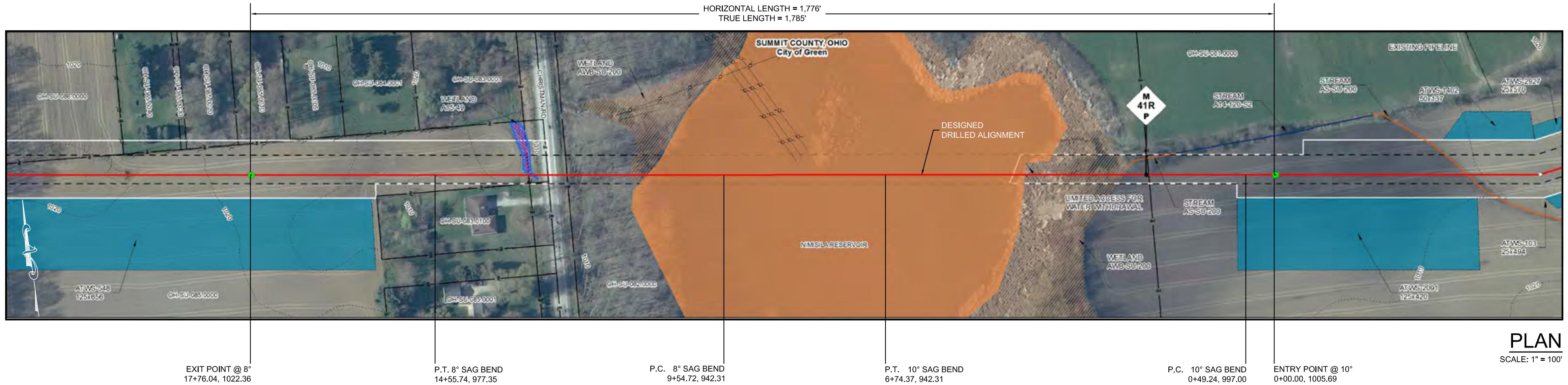
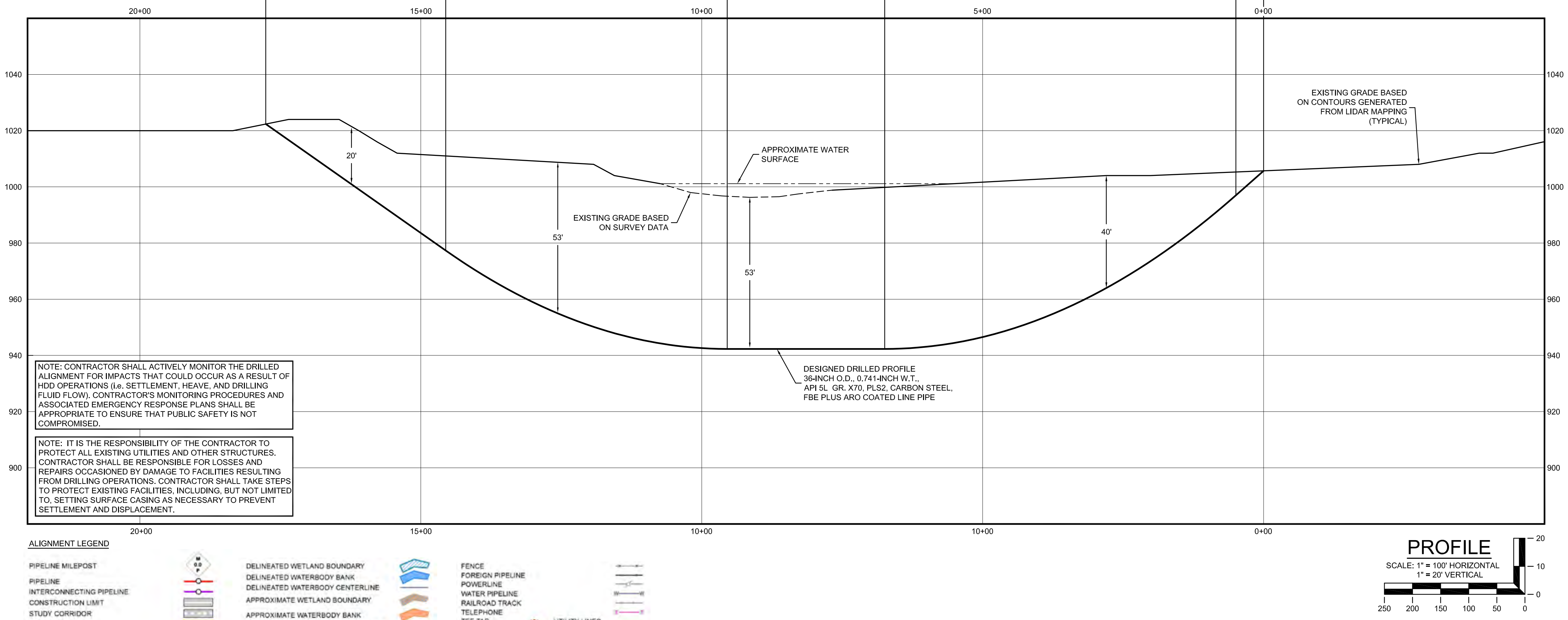
[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.



PLAN

SCALE: 1" = 100'



NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

PROFILE

SCALE: 1" = 100' HORIZONTAL
1" = 20' VERTICAL

ALIGNMENT LEGEND

PIPELINE MILEPOST
PIPELINE
INTERCONNECTING PIPELINE
CONSTRUCTION LIMIT
STUDY CORRIDOR
STAGING AREA
WAREYARD
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
METERING & REGULATION STATION (M&R)
COMPRESSOR STATION SITE
FACILITIES TEMPORARY WORKSPACE
FACILITIES PERMANENT WORKSPACE

DELINEATED WETLAND BOUNDARY
DELINEATED WATERBODY BANK
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY BANK
APPROXIMATE WATERBODY CENTERLINE
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
PARCEL TRACT NO OH-CO-011.0000-SC
PROPERTY LINE
CONTOUR ---120'---
MUNICIPALITY LINE

FENCE
FOREIGN PIPELINE
POWERLINE
WATER PIPELINE
RAILROAD TRACK
TELEPHONE
TEE TAP
BLOW OFF VALVE
TOWER
UTILITY LINES
MAINLINE VALVE (MLV)
MICROWAVE TOWER
HORIZONTAL DIRECTIONAL DRILLING
TANK ● LIGHT POLE ● FIRE HYDRANT ●
WELL: GAS ● WATER ● OIL ● UNKNOWN ●

GENERAL LEGEND

⊕ DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR, SURVEY, AND HYDROGRAPHIC DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE.

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

		3	LKB	JMS	RE-ISSUED FOR FERC
		2	DLB	JMS	ADD DEPTH CRITERIA AND UPDATE WORKSPACE/CENTERLINE
		1	LKB	JMS	ISSUED FOR BID
HANO-A-1048	ALIGNMENT SHEET M.P. 40.41 TO M.P. 41.36	0	LKB	ACM	ISSUED FOR FERC
DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION

IG.#

John D. Hair, P.E.
Consulting Engineer

2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS				
	PRELIMINARY		CONSTRUCTION	
DRAWN BY:	LKB	01/11		
PROJECT MANAGER	JMS	08/07		
DESIGN ENGINEER	LKB	01/11		
DESIGN CHECKER	JMS	01/12		
TITLE	SIGNATURE	DATE	SIGNATURE	DATE

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH NIMISILA RESERVOIR CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

SUMMIT COUNTY, OHIO

NEXUS℠
GAS TRANSMISSION

M.P. 41.0R | W.O. | SCALE: AS SHOWN | DWG. HANO-H-1002 | REV. 3

MP 47.8R Tuscarawas River

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- A combination of LiDAR, hydrographic, and traditional survey data covering the proposed crossing location
- A geotechnical data report prepared by Fugro Consultants, Inc. titled "Geotechnical and Geophysical Data Report, Tuscarawas River HDD Crossing, Nexus Gas Transmission Project, Summit County, Ohio" and dated October 30, 2015
- A reconnaissance of the proposed crossing location conducted in July of 2015 by a representative of JDH&A

General Site Description

The 36-inch Tuscarawas River Crossing is located near pipeline Mile Post 48, south of Barberton, Ohio. It involves passing beneath the Tuscarawas River, a railroad, and Van Buren Road. The Tuscarawas River is approximately 80 feet from bank to bank at the crossing location, and less than 2 feet deep at the deepest point. The proposed HDD alignment runs parallel to an existing power line corridor. The topography on each side of the crossing slopes moderately steeply toward the river. The elevation change east of Van Buren Road is approximately 155 feet. The land on each side of the river consists of a mixture of wooded patches and agricultural land. An overview of the proposed crossing location is provided in Figure 1 through Figure 3.

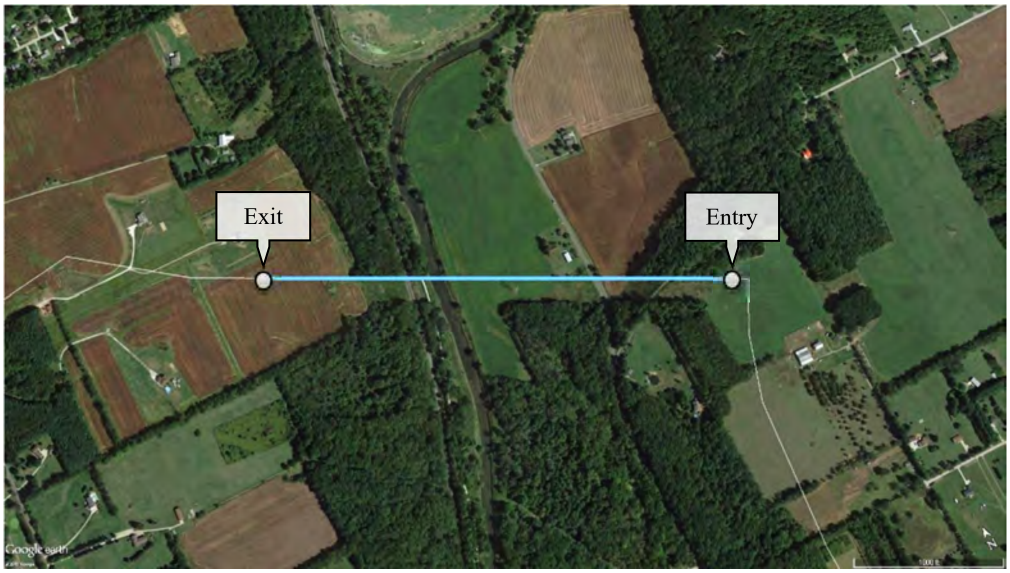


Figure 1: Overview of the Tuscarawas River Crossing

Figure 2: View west along proposed HDD alignment from Van Buren Road

Figure 3: View east from Van Buren Road. Topography extends upwards toward the proposed entry point

Subsurface Conditions

Three geotechnical borings were taken on the east side of the river as part of the geotechnical exploration program conducted by Fugro Consultants, Inc. Two of the borings, TUS-01 and TUS-02, were taken between Van Buren Road and the east edge of Tuscarawas River, and one of the borings, TUS-06, was taken near the proposed HDD entry point approximately 1,000 feet east of Van Buren Road. TUS-01 encountered mixtures of sand with silt, lean clay, and sandy lean clay, sand, and occasional gravel to the termination depth of 76 feet below grade. The second boring, TUS-02, taken near the bank of the river, encountered relatively sandy lean clay, sand, and silt until 20 feet below ground surface, followed by sandstone and siltstone bedrock to the termination of 100 feet. Rock quality designation (RQD) index values indicate good to excellent quality bedrock overall. Results for unconfined compressive strength (UCS) average 8,189 psi. Boring TUS-06 encountered clayey sand to a depth of 14 feet, followed by residual shale to a depth of 34 feet, interbedded siltstone, sandstone, and shale to a depth of 52 feet, and sandstone to the boring termination depth of 101 feet. RQD index values ranged from 23 to 95, with an average of 65 indicating fair quality bedrock. UCS test values ranged from 1,150 psi to 7,990 psi.

Geophysical methods were used in an attempt to characterize the bedrock surface between borings TUS-1 and TUS-2. Results of the seismic refraction study indicate the bedrock surface may dip to the east from boring TUS-2, falling from elevation 930 feet to 855 feet over a horizontal distance of 450 feet. From that point, the bedrock surface looks to be trending upwards toward boring TUS-1. The bedrock is estimated to fall somewhere in the range of elevation 860 feet and elevation 875 feet at the location of boring TUS-1.

Refer to the geotechnical data report prepared by Fugro Consultants, Inc. titled "Geotechnical and Geophysical Data Report, Tuscarawas River HDD Crossing, Nexus Gas Transmission Project, Summit County, Ohio" and dated October 30, 2015 for detailed information relative to the subsurface conditions.

Design Geometry & Layout

The proposed Tuscarawas River HDD design has a horizontal length of 3,263 feet. It utilizes a 16-degree entry angle, an 8-degree exit angle, and a design radius of curvature of 3,600 feet. The design maintains a minimum of 40 feet of cover at the west edge of the Tuscarawas River, 46 feet of cover beneath the railroad tracks, 66 feet beneath Van Buren Road, and approximately 42 feet of cover beneath the bottom of the hillside on the east side of the river. Due to a pipeline alignment point of intersection (P.I.) on the east side of the crossing, the entry point location was limited in how far east it could be located. Therefore, in order to maintain suitable cover along the hillside, a 16-degree entry angle was necessary.

An alternate entry point located at the bottom of the slope just east of Van Buren road was investigated during the initial design stages. However, the location was seen an unfavorable due to the inability to gain sufficient cover beneath Van Buren Road (less than 20 feet), as well as the large elevation differential between the entry and exit points (107 feet). A large elevation differential would result in drilling fluid flowing to the low side, leaving much of the reamed hole on the west side unsupported with drilling fluid, increasing the risk of sinkholes and HDD operational problems

Due to workspace considerations, the exit point is located on the west side of the crossing, which provides the better option for pull section fabrication across relatively open fields. The entry point on the east side is approximately 48 feet higher topographically. Some HDD contractors may elect to drill the pilot hole and ream from the exit (low) side since there are benefits with respect to drilling fluid flow and fluid handling, and then move the HDD rig spread over to west side for pullback.

A copy of the HDD design plan and profile drawing for crossing the Tuscarawas River is attached to this report for reference.

Assessment of Feasibility

Although the feasibility of the proposed crossing of the Tuscarawas cannot be ruled out, uncertainties with respect to subsurface conditions make it difficult to assess with any certainty. Based on the three site-specific geotechnical borings as well as geophysical studies, the bedrock surface is variable along the HDD alignment. Boring TUS-02, taken closes to the river, encountered bedrock at only 20 feet below the surface, whereas the other boring, TUS-01, taken roughly 800 feet to the east of TUS-02, was drilled to 77 feet and did not encounter bedrock. Boring TUS-06, taken approximately 1,200 feet east of TUS-01 near the proposed entry point, encountered bedrock at a depth of 14 feet.

Ideally, since borings TUS-02 and TUS-06 encountered bedrock at shallow depths, thus making it impossible to avoid bedrock, the HDD crossing should be designed to stay within bedrock over the majority of the length of the crossing. This minimizes the risk of HDD operational problems associated with passing in and out of bedrock, or skimming across the top of the bedrock surface. The current HDD design may present a challenging installation since because the bedrock surface is highly variable, it may involve drilling out of bedrock and into overburden, and then back into bedrock. This may result in downhole tooling or the product pipe getting lodged as it moves through the soil/bedrock interface.

Risk Identification and Assessment

Potential construction impacts resulting from installation by HDD are damage to Van Buren Road and the railroad due to heaving or settlement, as well as drilling fluid surfacing within the river channel. The risk of inadvertent drilling fluid returns is increased due to the topographic nature of the site and the relative pressure head associated with the depth of the HDD segment in relation to its entry and exit points.

The overall risk associated with installation by HDD is questionable due to uncertainties with respect to the bedrock surface. At a minimum, there is risk of briefly drilling out of bedrock and then, after a few hundred feet, drilling back into bedrock. Moving in and out of bedrock can result in numerous HDD operational problems.

Additional geotechnical data is necessary to better define the location of the bedrock surface so that the HDD design can be optimized and the level of risk better assessed.

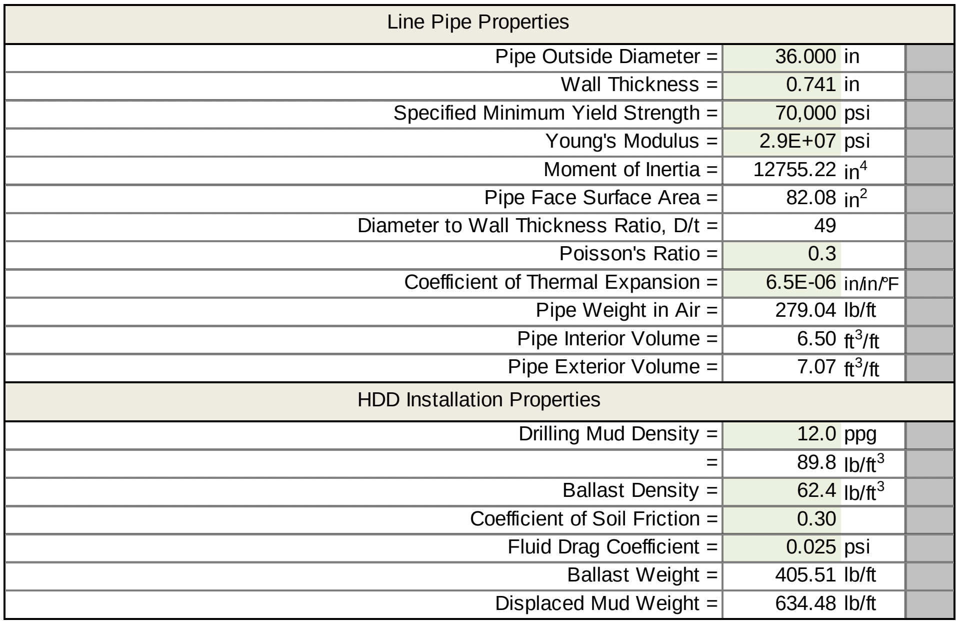
Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse-case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the scenarios described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 530,744 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 560,400 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 3. Detailed calculations for each scenario are summarized in Figures 4 and 5.



Line Pipe Properties			
Pipe Outside Diameter =	36.000	in	
Wall Thickness =	0.741	in	
Specified Minimum Yield Strength =	70,000	psi	
Young's Modulus =	2.9E+07	psi	
Moment of Inertia =	12755.22	in^4	
Pipe Face Surface Area =	82.08	in^2	
Diameter to Wall Thickness Ratio, D/t =	49		
Poisson's Ratio =	0.3		
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F	
Pipe Weight in Air =	279.04	lb/ft	
Pipe Interior Volume =	6.50	ft^3/ft	
Pipe Exterior Volume =	7.07	ft^3/ft	
HDD Installation Properties			
Drilling Mud Density =	12.0	ppg	
=	89.8	lb/ft^3	
Ballast Density =	62.4	lb/ft^3	
Coefficient of Soil Friction =	0.30		
Fluid Drag Coefficient =	0.025	psi	
Ballast Weight =	405.51	lb/ft	
Displaced Mud Weight =	634.48	lb/ft	

Figure 4: Pipe and Installation Properties

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 1330.8 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 140,520 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 45,151 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 65,829 lb
Pulling Load on Exit Tangent = 251,501 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 308,517 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 8.77 ft
$j = [(E\ I) / T]^{1/2}$ = 1,095
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 3.5E+06
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 964.90
$U = (12\ L) / j$ = 5.51
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 140,857 lb

Bending Frictional Drag = $2\ \mu\ N$ = 84,514 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 17,055 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 12,463 lb
Pulling Load on Exit Sag Bend = 114,032 lb
Total Pulling Load = 365,533 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 0.1 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 6 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 2 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 0 lb
Pulling Load on Bottom Tangent = 8 lb
Total Pulling Load = 365,541 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 1005.3 ft
Segment Angle with Horizontal, θ = 16.0 °
Deflection Angle, α = 8.0 °
Average Tension, T = 439,102 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 35.03 ft
$j = [(E\ I) / T]^{1/2}$ = 918
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 1.7E+07
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 2557.02
$U = (12\ L) / j$ = 13.14
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 271,238 lb

Bending Frictional Drag = $2\ \mu\ N$ = 162,743 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 34,109 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -49,730 lb
Negative value indicates axial weight applied in direction of installation
Pulling Load on Entry Sag Bend = 147,122 lb
Total Pulling Load = 512,663 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 470.2 ft
Entry Angle, θ = 16.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 48,191 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 15,952 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -46,062 lb
Negative value indicates axial weight applied in direction of installation
Pulling Load on Entry Tangent = 18,081 lb
Total Pulling Load = 530,744 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	6,466	ok	0	ok	0	ok	0.10	ok	0.01	ok
	6,246	ok	0	ok	1223	ok	0.10	ok	0.05	ok
PC										
	6,246	ok	12,083	ok	1223	ok	0.36	ok	0.16	ok
	4,453	ok	12,083	ok	3335	ok	0.34	ok	0.36	ok
PT										
	4,453	ok	0	ok	3335	ok	0.07	ok	0.23	ok
	4,453	ok	0	ok	3335	ok	0.07	ok	0.23	ok
PC										
	4,453	ok	12,083	ok	3335	ok	0.34	ok	0.36	ok
	3,064	ok	12,083	ok	2804	ok	0.31	ok	0.27	ok
PT										
	3,064	ok	0	ok	2804	ok	0.05	ok	0.16	ok
Exit Point	0	ok	0	ok	0	ok	0.00	ok	0.00	ok

Figure 5: Installation Loading and Stress Analysis (As Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
PIpe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30

Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 1636.3 ft
Exit Angle, θ = 8.0 °

Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 172,779 lb

Fluidic Drag = 12 π D L C_d = 55,517 lb

Axial Segment Weight = W_e L sinθ = 80,942 lb

Pulling Load on Exit Tangent = 309,238 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °

Average Tension, T = 352,086 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 4.38 ft

j = [(E I) / T]$^{1/2}$ = 1,025

Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 5.4E+05

X = (3 L) - [(j / 2) tanh(U/2)] = 292.84

U = (12 L) / j = 2.94

N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 118,228 lb

Bending Frictional Drag = 2 μ N = 70,937 lb

Fluidic Drag = 12 π D L C_d = 8,527 lb

Axial Segment Weight = W_e L sinθ = 6,231 lb

Pulling Load on Exit Sag Bend = 85,696 lb
Total Pulling Load = 394,934 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 163.8 ft

Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ = 17,470 lb

Fluidic Drag = 12 π D L C_d = 5,559 lb

Axial Segment Weight = W_e L sinθ = 0 lb

Pulling Load on Bottom Tangent = 23,028 lb
Total Pulling Load = 417,962 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = 16.0 °
Deflection Angle, α = 8.0 °

Average Tension, T = 473,532 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 17.52 ft

j = [(E I) / T]$^{1/2}$ = 884

Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 3.8E+06

X = (3 L) - [(j / 2) tanh(U/2)] = 1067.01

U = (12 L) / j = 6.82

N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 198,251 lb

Bending Frictional Drag = 2 μ N = 118,951 lb

Fluidic Drag = 12 π D L C_d = 17,055 lb

Axial Segment Weight = W_e L sinθ = -24,865 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 111,140 lb
Total Pulling Load = 529,102 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 813.8 ft
Entry Angle, θ = 16.0 °

Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 83,418 lb

Fluidic Drag = 12 π D L C_d = 27,612 lb

Axial Segment Weight = W_e L sinθ = -79,733 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 31,298 lb
Total Pulling Load = 560,400 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	6,827	ok	0	ok	0	ok	0.11	ok	0.01	ok
	6,446	ok	0	ok	2658	ok	0.10	ok	0.16	ok
PC										
	6,446	ok	24,167	ok	2658	ok	0.63	ok	0.53	ok
	5,092	ok	24,167	ok	3713	ok	0.61	ok	0.66	ok
PT										
	5,092	ok	0	ok	3713	ok	0.08	ok	0.29	ok
	4,812	ok	0	ok	3713	ok	0.08	ok	0.28	ok
PC										
	4,812	ok	24,167	ok	3713	ok	0.61	ok	0.65	ok
	3,768	ok	24,167	ok	3448	ok	0.59	ok	0.58	ok
PT										
	3,768	ok	0	ok	3448	ok	0.06	ok	0.24	ok
Exit Point	0	ok	0	ok	0	ok	0.00	ok	0.00	ok

Figure 6: Installation Loading and Stress Analysis (Worse-Case)

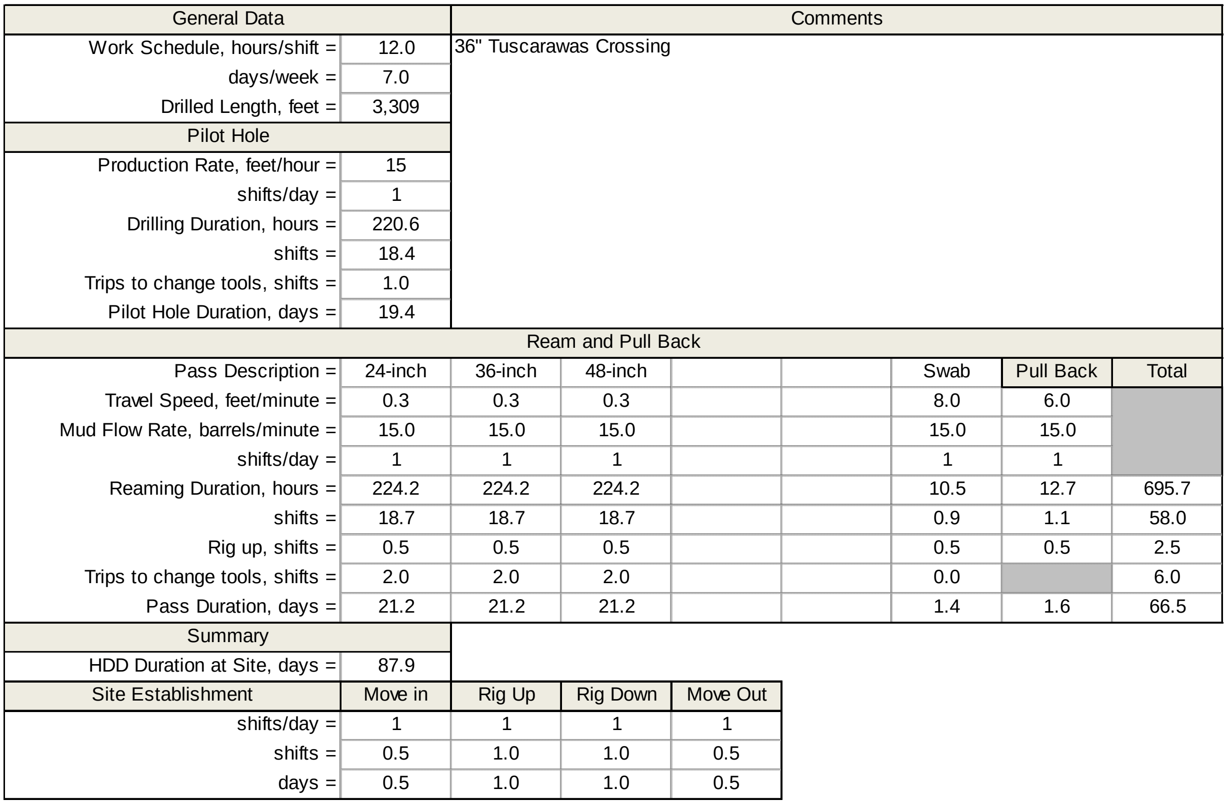
Hydrofracture Evaluation

Based on subsurface information available to date, the Tuscarawas River crossing will likely involve passing through bedrock over the portion of the crossing beneath the river that is of interest. Since the Delft Equation (Discussed previously in Section 5 of this report) is only applicable to uncemented subsurface material, a hydrofracture evaluation was not completed. In general, inadvertent drilling fluid returns due to hydrofracture do not typically occur on rock crossings, but instead occur by flowing through existing fractures, joints, or solution cavities.

Construction Duration

The estimated duration of construction for the Tuscarawas River Crossing, assuming it is installed entirely through bedrock, is 88 days. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated by JDH&A based on information contained within the Pipeline Research Council International's "*Installation of Pipelines by Horizontal Directional Drilling*"[1], as well as past experience in similar subsurface conditions. Refer to Figure 7 for details relative to the estimate.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.



General Data		Comments
Work Schedule, hours/shift =	12.0	36" Tuscarawas Crossing
days/week =	7.0	
Drilled Length, feet =	3,309	
Pilot Hole		
Production Rate, feet/hour =	15	
shifts/day =	1	
Drilling Duration, hours =	220.6	
shifts =	18.4	
Trips to change tools, shifts =	1.0	
Pilot Hole Duration, days =	19.4	

Ream and Pull Back								
Pass Description =	24-inch	36-inch	48-inch			Swab	Pull Back	Total
Travel Speed, feet/minute =	0.3	0.3	0.3			8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0	15.0			15.0	15.0	
shifts/day =	1	1	1			1	1	
Reaming Duration, hours =	224.2	224.2	224.2			10.5	12.7	695.7
shifts =	18.7	18.7	18.7			0.9	1.1	58.0
Rig up, shifts =	0.5	0.5	0.5			0.5	0.5	2.5
Trips to change tools, shifts =	2.0	2.0	2.0			0.0		6.0
Pass Duration, days =	21.2	21.2	21.2			1.4	1.6	66.5

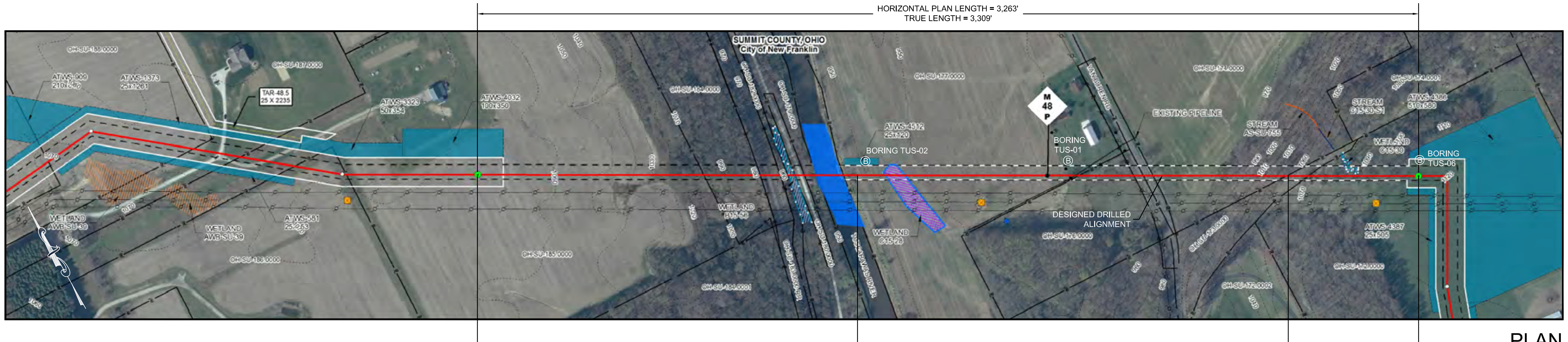
Summary	
HDD Duration at Site, days =	87.9

Site Establishment	Move in	Rig Up	Rig Down	Move Out
shifts/day =	1	1	1	1
shifts =	0.5	1.0	1.0	0.5
days =	0.5	1.0	1.0	0.5

Figure 7: Estimated Construction Duration

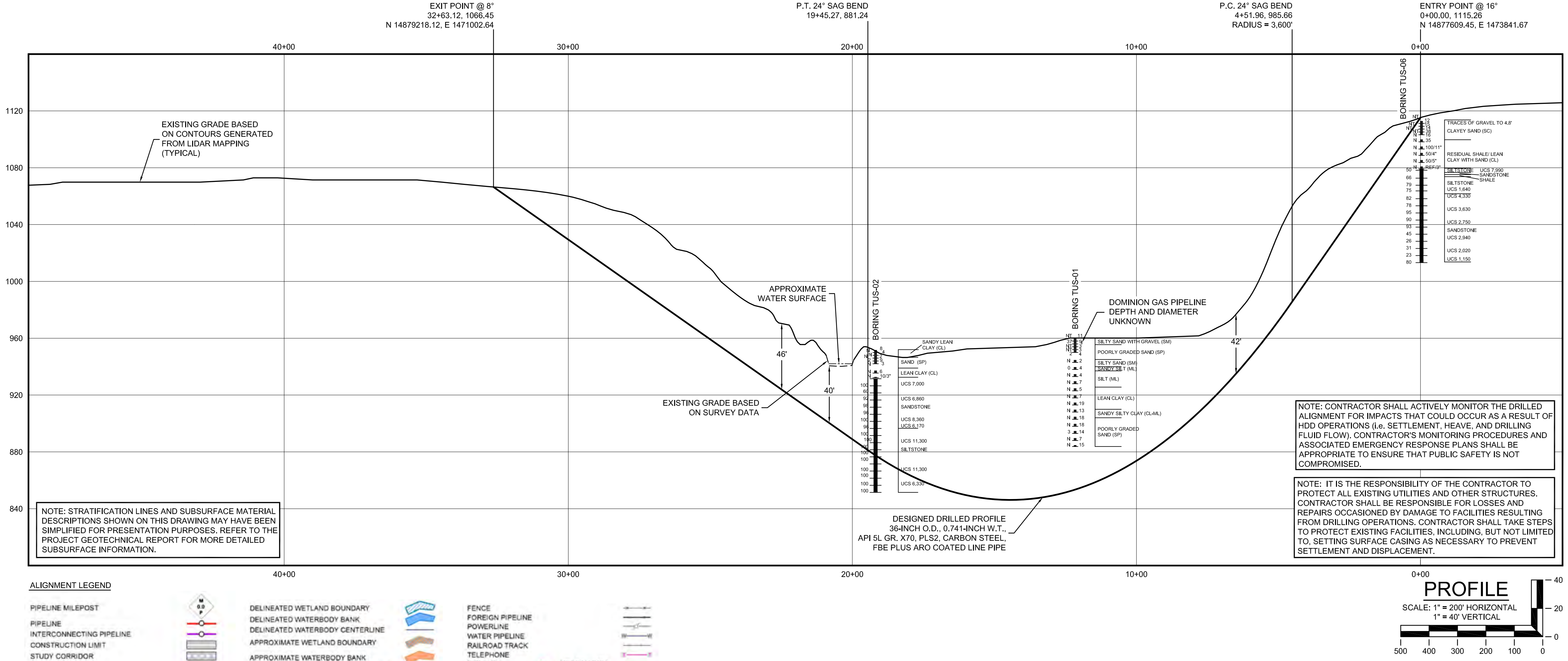
---

[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.



PLAN

SCALE: 1" = 200'



NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING MAY HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

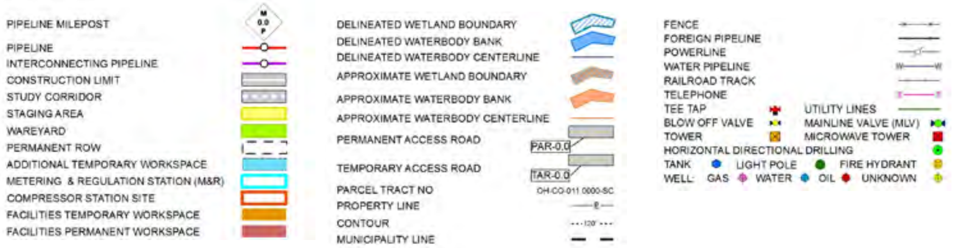
NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

PROFILE

SCALE: 1" = 200' HORIZONTAL
1" = 40' VERTICAL

ALIGNMENT LEGEND



GENERAL LEGEND

⊕ DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR, SURVEY, AND HYDROGRAPHIC DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

GEOTECHNICAL LEGEND

Ⓑ BORING LOCATION

SPLIT SPOON SAMPLE

53 ☒ 23 ← PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

PUSH SAMPLE

CORE BARREL SAMPLE

UCS 6,250 ← UNCONFINED COMPRESSIVE STRENGTH (PSI)
53 6 ← MOHS HARDNESS
ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY FUGRO CONSULTANTS, INC, BATON ROUGE, LOUISIANA. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED OCTOBER 30, 2015 FOR ADDITIONAL INFORMATION.

2. THE LETTER "N" TO THE LEFT OF A SPLIT SPOON SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TESTS WERE PERFORMED.

3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGEMENT IN INTERPRETING THIS DATA.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE.

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		3	LKB	JMS	RE-ISSUED FOR FERC
		2	DLB	JMS	ADD DEPTH CRITERIA AND UPDATE CENTERLINE
HANO-A-1056	ALIGNMENT SHEET M.P. 47.99 TO M.P. 48.93	1	LKB	JMS	ISSUED FOR BID
HANO-A-1055	ALIGNMENT SHEET M.P. 47.04 TO M.P. 47.99	0	LKB	AM	ISSUED FOR FERC

John D. Hair, P.E.
Consulting Engineer
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS	PRELIMINARY		CONSTRUCTION	
TITLE	SIGNATURE	DATE	SIGNATURE	DATE
DRAWN BY:	KMN	08/07		
PROJECT MANAGER	JMS	08/07		
DESIGN ENGINEER	KMN	08/07		
DESIGN CHECKER	DLB	08/07		

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH TUSCARAWAS RIVER CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

SUMMIT COUNTY, OHIO

NEXUS GAS TRANSMISSION

M.P. 47.8R	W.O.	SCALE: AS SHOWN	DWG. HANO-H-1003	REV. 3

MP 71.1 Wetland

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- A combination of LiDAR and traditional survey data covering the proposed crossing location
- A geotechnical data report prepared by Fugro Consultants, Inc. titled "Geotechnical Data Report, Wetland No. 68 HDD Crossing, Nexus Gas Transmission Project, Medina County, Ohio" and dated September 11, 2015
- A reconnaissance of the proposed crossing location conducted in July of 2015 by a representative of JDH&A

General Site Description

The proposed 36-inch category 3 wetland crossing at approximate pipeline Mile Post 71.1 is located about 4 miles south of Medina, Ohio near the intersection of Wedgewood Road and Lafayette Road. The crossing involves passing beneath a wooded wetland that is approximately 900 feet wide. Both sides of the crossing are open farm fields. The south side of the crossing is bound to the south by Wedgewood Road and to the north by Chippewa Inlet Trail. The topography in the area is flat. Figure 1 provides a general overview of the vicinity of the crossing. Figures 2 and 3 provide site photos showing the general vicinity of the entry and exit locations.

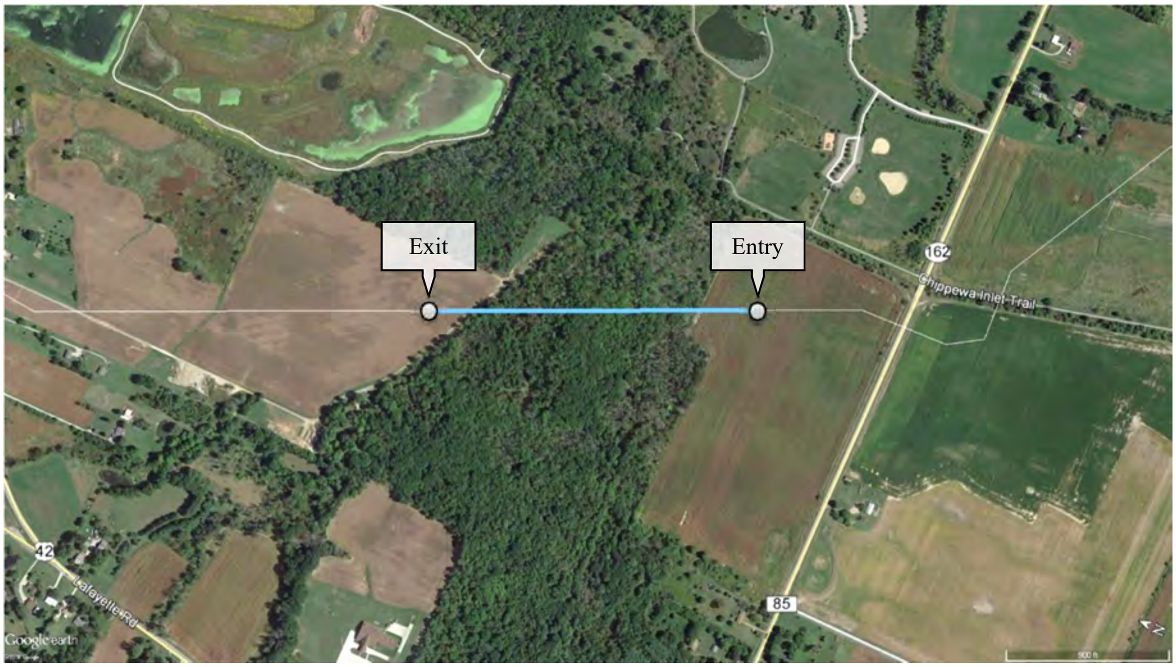


Figure 1: Overview of the Wetland Crossing at MP 71.1

Figure 2: View looking toward exit location

Figure 3: View toward entry location from Wedgewood Road

Subsurface Conditions

Two site-specific geotechnical borings were taken as part of the site investigation conducted by Fugro Consultants, Inc. One boring (WL68-02) was taken on the north side of the crossing near the tree line and the second (WL68-01) was taken on the south side of the crossing near the tree line. Both terminated at a depth of 100 feet below the ground surface. Boring WL68-02 encountered primarily sand and lean clay, with occasional gravel. Where encountered, gravel content ranged from 32% to 36% at depths of approximately 44 feet and 94 feet in boring WL68-01. Boring WL68-02 encountered similar soils. Where encountered, gravel content ranged from 3% to 18%.

Refer to the geotechnical data report prepared by Fugro Consultants, Inc. titled "Geotechnical Data Report, Wetland No. 68 HDD Crossing, Nexus Gas Transmission Project, Medina County, Ohio" and dated September 11, 2015 for additional information.

Design Geometry & Layout

The proposed wetland crossing involves a horizontal length of 1,784 feet. It utilizes a 10-degree entry angle, an 8-degree exit angle, and a radius of curvature of 3,600 feet. The crossing design maintains 40 feet of cover at the south edge of the wetland, 56 feet of cover at the north edge of the wetland, and just under 30 feet of cover beneath the small drainage ditch on the north side of the wetland.

The exit point is located on the north side of the crossing to take advantage of available workspace for pull section fabrication, which will allow the pull section to be fabricated in a single segment, and thus avoid the risk of getting stuck during downtime associated with a tie-in weld. The entry point is located in an open field south of Wedgewood Road.

The proposed HDD design, as well as available workspace, is shown on the preliminary plan and profile drawing included at the end of this site-specific report.

Assessment of Feasibility

Given the relatively short length of the crossing, as well as the anticipated subsurface conditions consisting of mixtures of sand and lean clay with minor gravel, the proposed wetland crossing is feasible and should be a straightforward installation.

Risk Identification and Assessment

Potential construction impacts that may result from installation by HDD include inadvertent drilling fluid returns surfacing within the wetland. Provided subsurface conditions across the site are consistent with those encountered in the site-specific geotechnical borings, the overall risk of HDD operational problems is considered low.

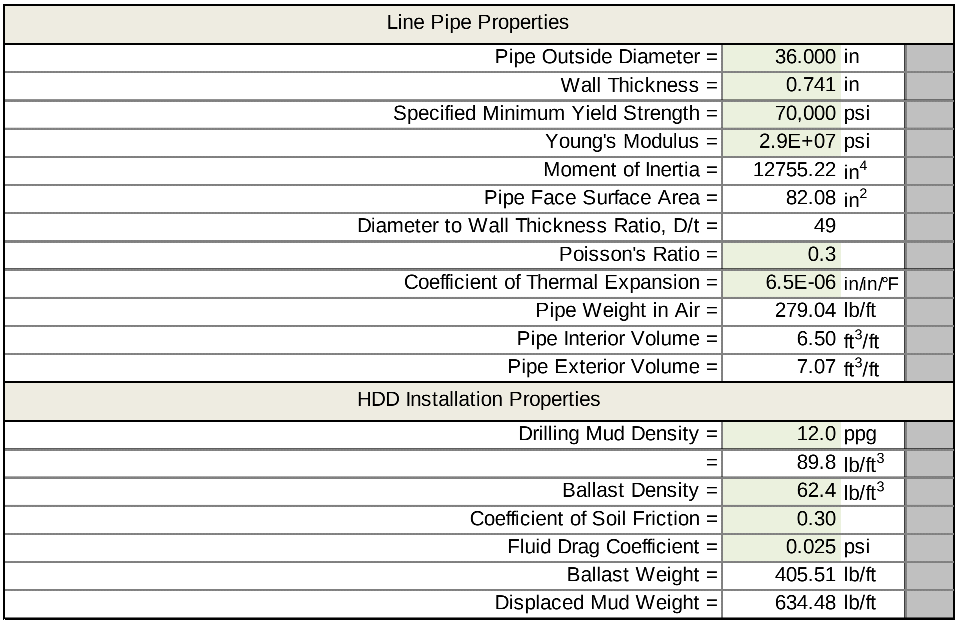
Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse-case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the loading scenarios described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 308,072 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 335,211 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 4. Detailed calculations for each loading scenario are summarized in Figures 5 and 6.



Line Pipe Properties			
Pipe Outside Diameter =	36.000	in	
Wall Thickness =	0.741	in	
Specified Minimum Yield Strength =	70,000	psi	
Young's Modulus =	2.9E+07	psi	
Moment of Inertia =	12755.22	in^4	
Pipe Face Surface Area =	82.08	in^2	
Diameter to Wall Thickness Ratio, D/t =	49		
Poisson's Ratio =	0.3		
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F	
Pipe Weight in Air =	279.04	lb/ft	
Pipe Interior Volume =	6.50	ft^3/ft	
Pipe Exterior Volume =	7.07	ft^3/ft	
HDD Installation Properties			
Drilling Mud Density =	12.0	ppg	
=	89.8	lb/ft^3	
Ballast Density =	62.4	lb/ft^3	
Coefficient of Soil Friction =	0.30		
Fluid Drag Coefficient =	0.025	psi	
Ballast Weight =	405.51	lb/ft	
Displaced Mud Weight =	634.48	lb/ft	

Figure 4: Pipe and Installation Properties

Pipe and Installation Properties

Pipe Diameter, D =	36.000	in	Fluid Drag Coefficient, C_d =	0.025	psi	
Pipe Weight, W =	279.0	lb/ft	Ballast Weight / ft Pipe, W_b =	405.5	lb	(If Ballasted)
Coefficient of Soil Friction, μ =	0.30		Drilling Mud Displaced / ft Pipe, W_m =	634.5	lb	(If Submerged)
			Above Ground Load =	0	lb	

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 222.4 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 23,489 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 7,547 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 11,004 lb

Pulling Load on Exit Tangent = 42,041 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 94,657 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 8.77 ft
$j = [(E\ I) / T]^{1/2}$ = 1,977
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 2.3E+06
$X = (3\ L) - [\ (j\ /\ 2) \tanh(U/2)\ ]$ = 608.83
$U = (12\ L) / j$ = 3.05
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 126,193 lb
Bending Frictional Drag = $2\ \mu\ N$ = 75,716 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 17,055 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 12,463 lb

Pulling Load on Exit Sag Bend = 105,234 lb
Total Pulling Load = 147,274 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 408.2 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 43,532 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 13,851 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 57,384 lb
Total Pulling Load = 204,658 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 628.3 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 255,207 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 13.70 ft
$j = [(E\ I) / T]^{1/2}$ = 1,204
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 5.8E+06
$X = (3\ L) - [\ (j\ /\ 2) \tanh(U/2)\ ]$ = 1285.29
$U = (12\ L) / j$ = 6.26
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 165,406 lb
Bending Frictional Drag = $2\ \mu\ N$ = 99,244 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 21,318 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -19,464 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 101,098 lb
Total Pulling Load = 305,755 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 30.0 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 3,150 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 1,018 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -1,852 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 2,317 lb
Total Pulling Load = 308,072 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	3,753	ok	0	ok	0	ok	0.06	ok	0.00	ok
	3,725	ok	0	ok	79	ok	0.06	ok	0.00	ok
PC										
	3,725	ok	12,083	ok	79	ok	0.32	ok	0.08	ok
	2,493	ok	12,083	ok	907	ok	0.30	ok	0.10	ok
PT										
	2,493	ok	0	ok	907	ok	0.04	ok	0.02	ok
	1,794	ok	0	ok	907	ok	0.03	ok	0.02	ok
PC										
	1,794	ok	12,083	ok	907	ok	0.29	ok	0.09	ok
	512	ok	12,083	ok	376	ok	0.27	ok	0.06	ok
PT										
	512	ok	0	ok	376	ok	0.01	ok	0.00	ok
Exit Point	0	ok	0	ok	-92	ok	0.00	ok	0.00	ok

Figure 5: Installation Loading and Stress Analysis (As-Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 527.9 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu\ \cos\theta$ = 55,748 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 17,913 lb
Axial Segment Weight = $W_e\ L\ \sin\theta$ = 26,116 lb

Pulling Load on Exit Tangent = 99,777 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 137,431 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 4.39 ft
$j = [(E\ I) / T]^{1/2}$ = 1,641
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 3.0E+05
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 158.87
$U = (12\ L) / j$ = 1.84
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 100,915 lb
Bending Frictional Drag = $2\ \mu\ N$ = 60,549 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 8,528 lb
Axial Segment Weight = $W_e\ L\ \sin\theta$ = 6,231 lb

Pulling Load on Exit Sag Bend = 75,308 lb
Total Pulling Load = 175,085 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 421.9 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 44,993 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 14,316 lb
Axial Segment Weight = $W_e\ L\ \sin\theta$ = -1 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Bottom Tangent = 59,309 lb
Total Pulling Load = 234,394 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 314.2 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 272,006 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 6.85 ft
$j = [(E\ I) / T]^{1/2}$ = 1,166
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 9.4E+05
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 403.64
$U = (12\ L) / j$ = 3.23
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 123,829 lb
Bending Frictional Drag = $2\ \mu\ N$ = 74,298 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 10,659 lb
Axial Segment Weight = $W_e\ L\ \sin\theta$ = -9,732 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 75,224 lb
Total Pulling Load = 309,618 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 331.4 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu\ \cos\theta$ = 34,804 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 11,245 lb
Axial Segment Weight = $W_e\ L\ \sin\theta$ = -20,457 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 25,593 lb
Total Pulling Load = 335,211 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	4,084	ok	0	ok	0	ok	0.06	ok	0.01	ok
	3,772	ok	0	ok	871	ok	0.06	ok	0.02	ok
PC										
	3,772	ok	24,167	ok	871	ok	0.59	ok	0.29	ok
	2,856	ok	24,167	ok	1285	ok	0.57	ok	0.30	ok
PT										
	2,856	ok	0	ok	1285	ok	0.05	ok	0.04	ok
	2,133	ok	0	ok	1285	ok	0.03	ok	0.04	ok
PC										
	2,133	ok	24,167	ok	1285	ok	0.56	ok	0.29	ok
	1,216	ok	24,167	ok	1020	ok	0.55	ok	0.26	ok
PT										
	1,216	ok	0	ok	1020	ok	0.02	ok	0.02	ok
Exit Point	0	ok	0	ok	-92	ok	0.00	ok	0.00	ok

Figure 6: Installation Loading and Stress Analysis (Worse-Case)

Hydrofracture Evaluation

The risk of inadvertent drilling fluid returns due to hydrofracture was evaluated using the Delft Method. In summary, under normal drilling operations, the risk of inadvertent drilling fluid returns due to hydrofracture is low over the majority of the length of the crossing. The factor of safety remains above 2.0, with an estimated low risk of hydrofracture until the last 315 feet of the crossing. It is only as the bit begins making its way to the surface when depth of cover drops to 20 feet or less that the risk of hydrofracture is pronounced. Beginning at approximately station 14+70, the estimated annular pressure matches or exceeds the formation limit pressure, indicating a high risk of inadvertent drilling fluid returns. Refer to Figure 7 for results presented in graphical format.

It is important to keep in mind that inadvertent drilling fluid returns may occur due to mechanisms unrelated to hydrofracture. It remains possible that inadvertent drilling fluid returns will occur by flowing to the ground surface through preexisting fractures or porous seams in the soil mass.

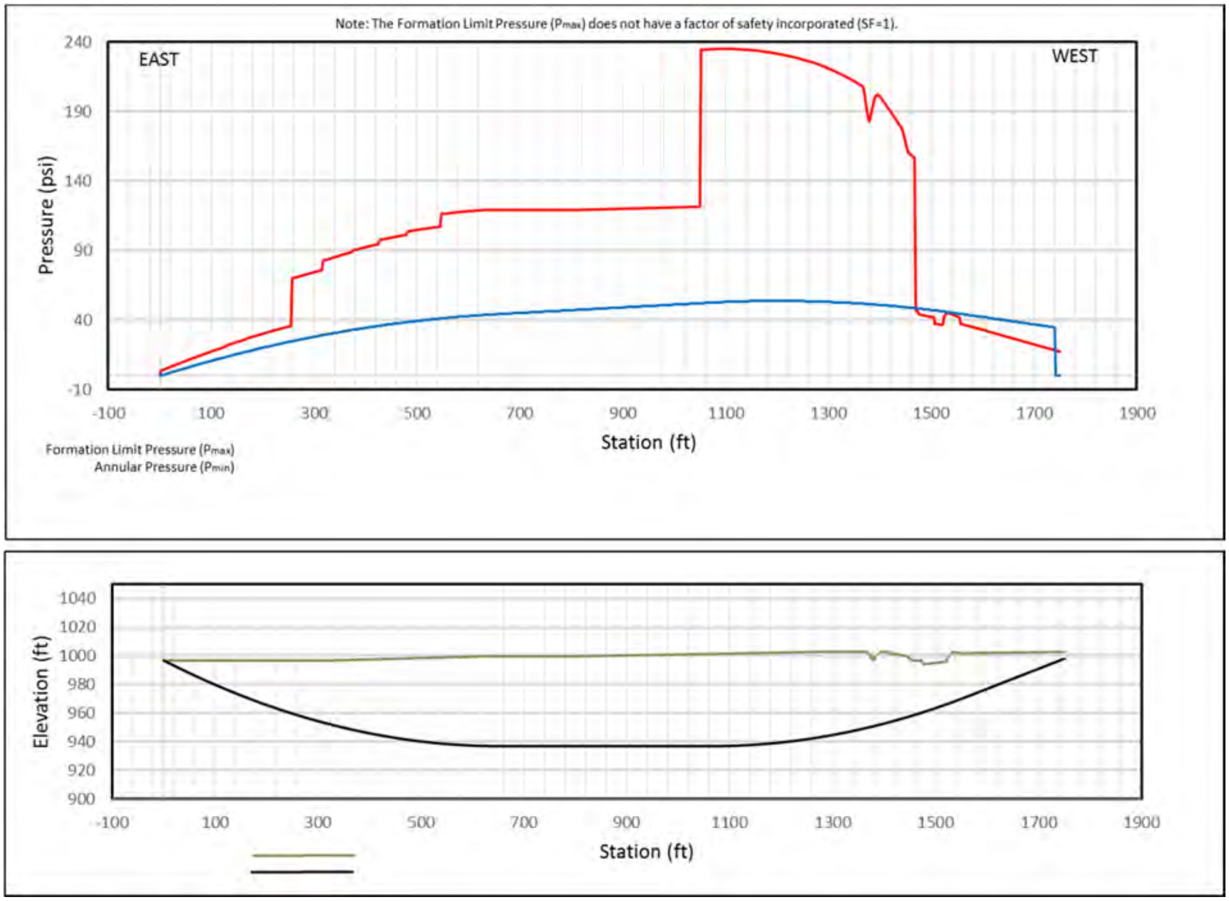


Figure 7: Hydrofracture Evaluation (Formation Limit Pressure -vs-Annular Pressure)

Construction Duration

The estimated duration of construction is 14 days. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated by JDH&A based on information contained within the Pipeline Research Council International's "*Installation of Pipelines by Horizontal Directional Drilling*"[1], as well as past experience in similar subsurface conditions. Refer to Figure 8 for details relative to the estimate.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.

General Data		Comments
Work Schedule, hours/shift =	12.0	36" Wetland Crossing (MP 71.1)
days/week =	7.0	
Drilled Length, feet =	1,792	
Pilot Hole		
Production Rate, feet/hour =	50	
shifts/day =	1	
Drilling Duration, hours =	35.8	
shifts =	3.0	
Trips to change tools, shifts =	0.5	
Pilot Hole Duration, days =	3.5	

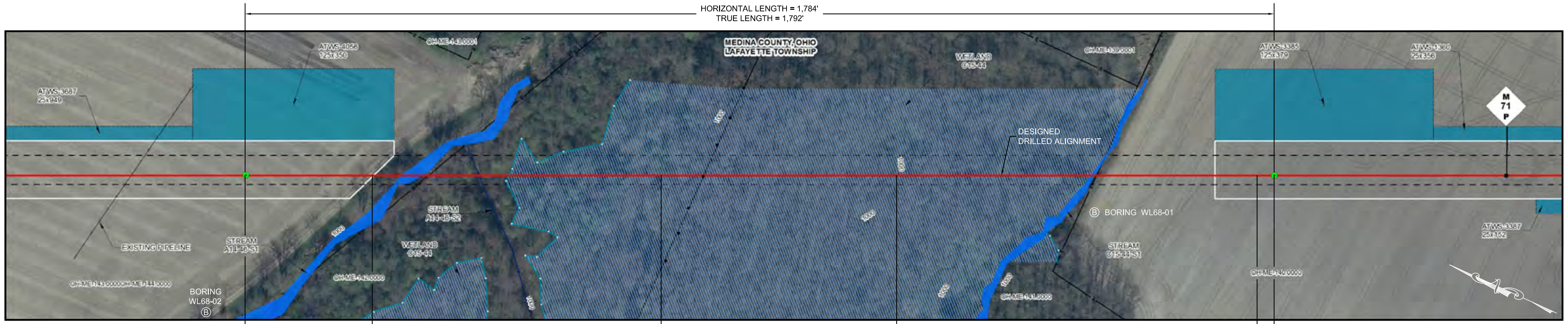
Ream and Pull Back								
Pass Description =	36-inch	48-inch				Swab	Pull Back	Total
Travel Speed, feet/minute =	2.0	2.0				8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0				15.0	15.0	
shifts/day =	1	1				1	1	
Reaming Duration, hours =	16.9	16.9				5.7	6.9	46.3
shifts =	1.4	1.4				0.5	0.6	3.9
Rig up, shifts =	0.5	0.5				0.5	0.5	2.0
Trips to change tools, shifts =	1.0	1.0				0.0		2.0
Pass Duration, days =	2.9	2.9				1.0	1.1	7.9

Summary				
HDD Duration at Site, days =	13.3			
Site Establishment	Move in	Rig Up	Rig Down	Move Out
shifts/day =	1	1	1	1
shifts =	0.5	1.0	1.0	0.5
days =	0.5	1.0	1.0	0.5

Figure 8: Estimated Construction Duration

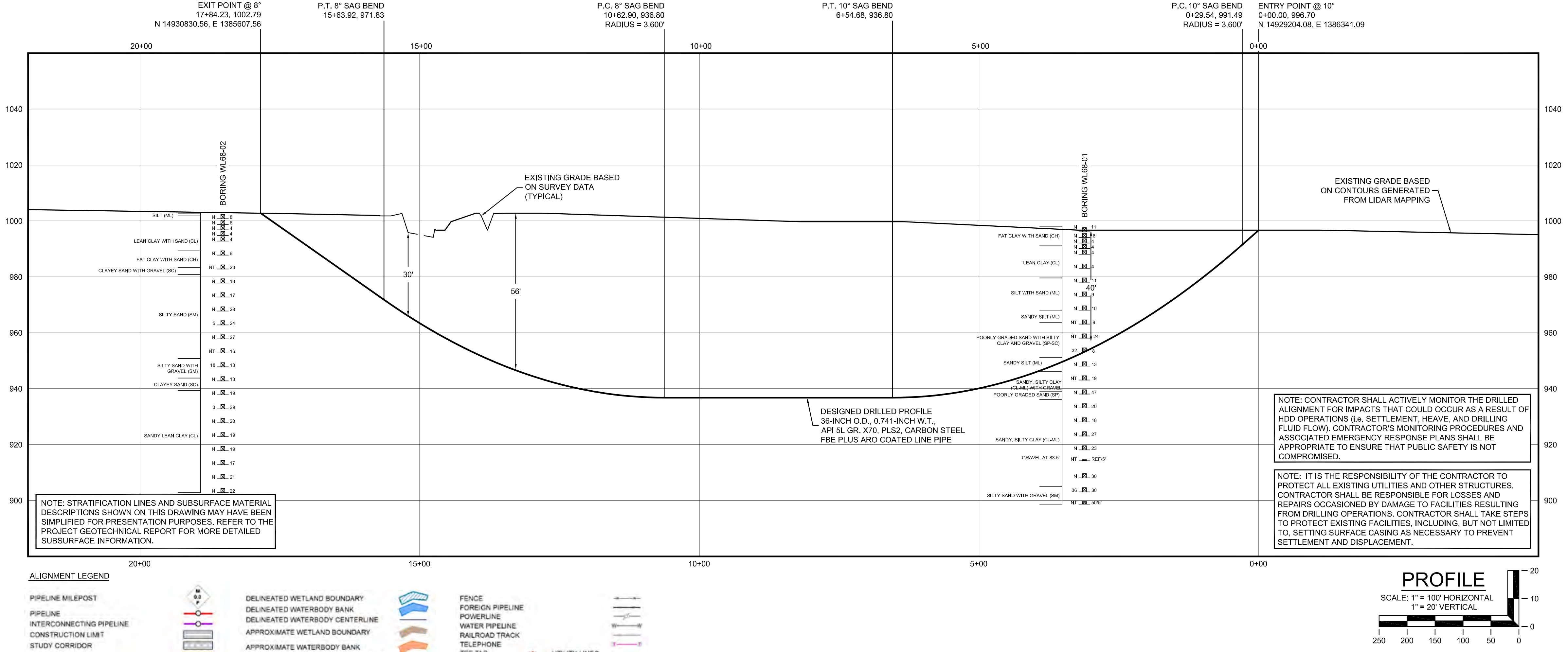
---

[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.



PLAN

SCALE: 1" = 100'



NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING MAY HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

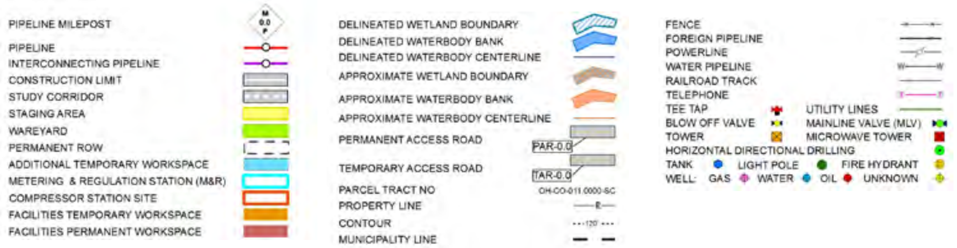
NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

PROFILE

SCALE: 1" = 100' HORIZONTAL
1" = 20' VERTICAL

ALIGNMENT LEGEND



GENERAL LEGEND

DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR, SURVEY, AND HYDROGRAPHIC DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

GEOTECHNICAL LEGEND

Ⓑ BORING LOCATION

SPLIT SPOON SAMPLE

53 ⊠ 23 ← PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

PUSH SAMPLE

CORE BARREL SAMPLE

UCS 6,250 ← UNCONFINED COMPRESSIVE STRENGTH (PSI)
53 6 ← MOHS HARDNESS
ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY FUGRO CONSULTANTS, INC, BATON ROUGE, LOUISIANA. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED SEPTEMBER 11, 2015 FOR ADDITIONAL INFORMATION.

2. THE LETTER "N" TO THE LEFT OF A SPLIT SPOON SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TESTS WERE PERFORMED.

3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGEMENT IN INTERPRETING THIS DATA.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE.

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		3	LKB	JMS	RE–ISSUED FOR FERC
		2	DLB	JMS	ADD DEPTH CRITERIA
		1	LKB	JMS	ISSUED FOR BID
WADS–A–1081	ALIGNMENT SHEET M.P. 71.07 TO M.P. 72.02	0	LKB	ACM	ISSUED FOR FERC

John D. Hair, P.E.
Consulting Engineer

2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS	PRELIMINARY		CONSTRUCTION	
TITLE	SIGNATURE	DATE	SIGNATURE	DATE
DRAWN BY:	DMP	08/07		
PROJECT MANAGER	JMS	08/07		
DESIGN ENGINEER	LKB	08/07		
DESIGN CHECKER	DLB	08/07		

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH WETLAND CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

MEDINA COUNTY, OHIO

NEXUS GAS TRANSMISSION

M.P. 71.1	W.O.	SCALE: AS SHOWN	DWG. WADS–H–1004	REV. 3

MP 86.9 East Branch Black River

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- A combination of LiDAR, hydrographic, and traditional survey data covering the proposed crossing location
- A geotechnical data report prepared by Fugro Consultants, Inc. titled "Geotechnical and Geophysical Data Report, East Branch Black River HDD Crossing, Nexus Gas Transmission Project, Lorain County Ohio" and dated September 11, 2015
- A reconnaissance of the proposed crossing location conducted in July of 2015 by a representative of JDH&A

General Site Description

The 36-inch East Branch Black River Crossing is located just southwest of Grafton, Ohio near the intersection of Indian Hollow Road and Crook Street. The crossing involves passing beneath East Branch Black River, as well as wetland areas on both sides of the channel. The proposed pipeline alignment cuts perpendicularly across a cut bank/point bar at the crossing location. The topography in the vicinity of the crossing is essentially flat, but with the west side cut bank of the river approximately 22 feet higher than the east side and point bar deposit. Both sides of the river are open farmland surrounded by forest land. An overview of the crossing site is provided in Figure 1.

Figure 1: Overview of the East Branch Black River Crossing

Subsurface Conditions

Three geotechnical borings were drilled as part of the site investigation conducted by Fugro Consultants, Inc. Two of the borings (EBL-04, and EBL-03) were taken on the west side of the river and one of the borings (EBL-01) was taken on the east side of the river. The borings generally encountered lean clay, fat clay, silty sand, and clayey sand, with gravel, overlying sedimentary bedrock (sandstone and shale). Unconfined compressive strength tests were performed on select rock samples. The strength averaged 4,280 psi, with the lowest value recorded being 30 psi and highest being 11,300 psi. The rock quality designation (RQD) generally indicates good quality bedrock, with the exception of some of the shale cores recovered, which indicate poor quality.

Refer to the report titled "Geotechnical and Geophysical Data Report, East Branch Black River HDD Crossing, Nexus Gas Transmission Project, Lorain County Ohio" and dated September 11, 2015, for additional information.

Design Geometry & Layout

The East Branch Black River HDD design involves a horizontal length of 1,809 feet. The design entry point is located on the west side of the river near the pipeline point of intersection (P.I.). The location results from offsetting the entry point 60 feet from the P.I. This allows 28 feet of depth at the edge of the wetland with a 12-degree entry angle. The exit point location on the east side of the river is based on an 8-degree angle with 40 feet of cover at the edge of the east wetland. The design achieves 71 feet of clearance beneath the bottom of the river. The design employs a radius of curvature of 3,600 feet, the industry standard for a 36-inch pipeline installation.

The exit point is located on the east side of the crossing. This is to take advantage of the long linear stretch of available right-of-way (ROW) for pull section fabrication. In this case, the pull section can be fabricated in a single segment and thus avoid downtime associated with performing tie-in welds.

The preliminary HDD plan and profile design drawing for crossing the East Branch Black River is attached to this report for reference.

Assessment of Feasibility

Based on a review of available geotechnical information, the drilled path will pass thorough sedimentary sandstone and shale bedrock over the majority of the length of the crossing. Although the shale may involve significant fractures at depth as indicated by low RQD values, it is our experience that shale is typically conducive to the HDD process despite displaying what are often low RQD values. Therefore, given the proposed length of 1,822 feet and the anticipated subsurface conditions, the crossing is feasible.

Risk Identification and Assessment

Potential construction impacts associated with the proposed Black River Crossing are inadvertent drilling fluid returns surfacing within the wetlands or within the river. There is also risk that sink holes will develop during reaming operations on the west side of the crossing along the HDD alignment. This is due to the 22 foot elevation differential between the entry and exit points. The sinkholes are most likely to form within 100 feet of the entry point.

HDD construction and operational risks associated with a large diameter rock crossing include failure of large diameter rock reaming tools downhole; hole misalignment at the soil/rock interface; and loss of drilling fluid circulation through existing fractures which could negatively impact cuttings removal. In addition, sink holes and hole collapse on the west side resulting from the elevation differential may increase the difficulty of reaming and cuttings removal over the west segment of the crossing.

The overall level of risk associated with installation of the proposed 36-inch pipeline under the East Branch Black River by HDD is average.

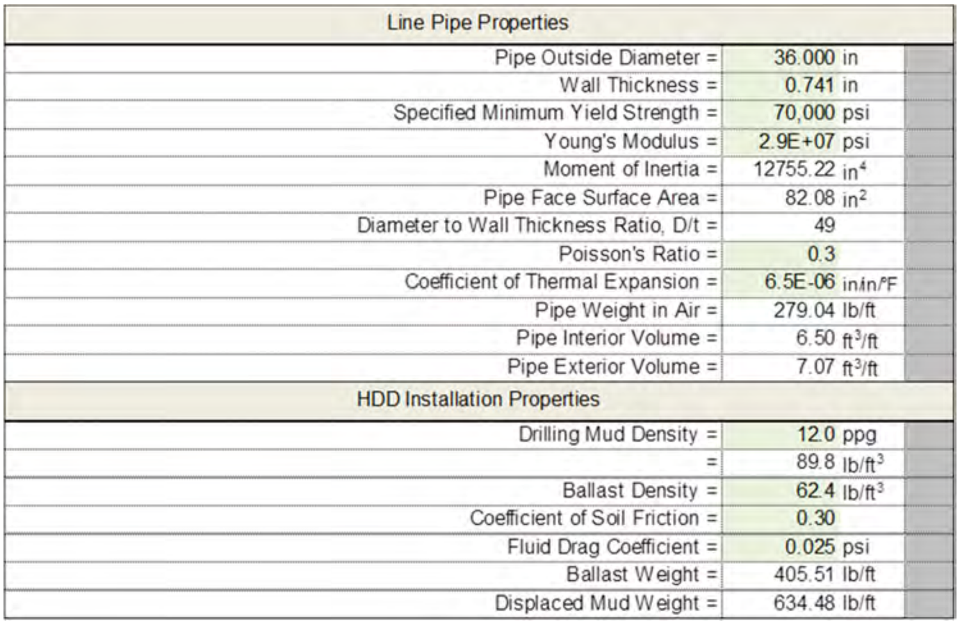
Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse-case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the loading scenarios described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 315,956 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 331,380 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 3. Detailed calculations for each loading scenario are summarized in Figures 4 and 5.



Line Pipe Properties		
Pipe Outside Diameter =	36.000	in
Wall Thickness =	0.741	in
Specified Minimum Yield Strength =	70,000	psi
Young's Modulus =	2.9E+07	psi
Moment of Inertia =	12755.22	in^4
Pipe Face Surface Area =	82.08	in^2
Diameter to Wall Thickness Ratio, D/t =	49	
Poisson's Ratio =	0.3	
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F
Pipe Weight in Air =	279.04	lb/ft
Pipe Interior Volume =	6.50	ft^3/ft
Pipe Exterior Volume =	7.07	ft^3/ft
HDD Installation Properties		
Drilling Mud Density =	12.0	ppg
=	89.8	lb/ft^3
Ballast Density =	62.4	lb/ft^3
Coefficient of Soil Friction =	0.30	
Fluid Drag Coefficient =	0.025	psi
Ballast Weight =	405.51	lb/ft
Displaced Mud Weight =	634.48	lb/ft

Figure 3: Pipe and Installation Properties

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Plpe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 360.7 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu\ \cos\theta$ = 38,092 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 12,240 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = 17,845 lb

Pulling Load on Exit Tangent = 68,176 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 121,333 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 8.77 ft
j = [(E I) / T]$^{1/2}$ = 1,746

Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 2.5E+06
X = (3 L) - [(j / 2) tanh(U/2)] = 688.43

U = (12 L) / j = 3.45
N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 127,992 lb

Bending Frictional Drag = 2 μ N = 76,795 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 17,055 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = 12,463 lb

Pulling Load on Exit Sag Bend = 106,313 lb
Total Pulling Load = 174,489 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 67.4 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 7,191 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 2,288 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 9,479 lb
Total Pulling Load = 183,969 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 754.0 ft
Segment Angle with Horizontal, θ = 12.0 °
Deflection Angle, α = 6.0 °
Average Tension, T = 240,350 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 19.72 ft
j = [(E I) / T]$^{1/2}$ = 1,241

Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 8.8E+06
X = (3 L) - [(j / 2) tanh(U/2)] = 1642.51

U = (12 L) / j = 7.29
N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 191,989 lb

Bending Frictional Drag = 2 μ N = 115,193 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 25,582 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = -28,013 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 112,762 lb
Total Pulling Load = 296,731 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 137.4 ft
Entry Angle, θ = 12.0 °
Effective Weight, $W_e = W + W_b - W_m$ = 279.0 lb/ft

Frictional Drag = $W_e\ L\ \mu\ \cos\theta$ = 11,252 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 0 lb
Fluidic drag is calculated as zero unless entire segment is submerged in drilling fluid.
Please reference Step 2, Drilled Path Input

Axial Segment Weight = $W_e\ L \sin\theta$ = 7,972 lb

Pulling Load on Entry Tangent = 19,225 lb
Total Pulling Load = 315,956 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	3,849	ok	0	ok	0	ok	0.06	ok	0.00	ok
	3,615	ok	0	ok	0	ok	0.06	ok	0.00	ok
PC										
	3,615	ok	12,083	ok	0	ok	0.32	ok	0.08	ok
	2,241	ok	12,083	ok	1291	ok	0.30	ok	0.12	ok
PT										
	2,241	ok	0	ok	1291	ok	0.04	ok	0.04	ok
	2,126	ok	0	ok	1291	ok	0.03	ok	0.04	ok
PC										
	2,126	ok	12,083	ok	1291	ok	0.30	ok	0.12	ok
	831	ok	12,083	ok	760	ok	0.28	ok	0.08	ok
PT										
	831	ok	0	ok	760	ok	0.01	ok	0.01	ok
Exit Point	0	ok	0	ok	0	ok	0.00	ok	0.00	ok

Figure 4: Installation Loading and Stress Analysis (As-Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Plpe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 666.2 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 70,351 lb

Fluidic Drag = 12 π D L C_d = 22,605 lb

Axial Segment Weight = W_e L sinθ = 32,957 lb

Pulling Load on Exit Tangent = 125,913 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 164,218 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 4.38 ft
j = [(E I) / T]$^{1/2}$ = 1,501

Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 3.4E+05
X = (3 L) - [(j / 2) tanh(U/2)] = 180.98

U = (12 L) / j = 2.01
N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 103,082 lb

Bending Frictional Drag = 2 μ N = 61,849 lb

Fluidic Drag = 12 π D L C_d = 8,527 lb

Axial Segment Weight = W_e L sinθ = 6,231 lb

Pulling Load on Exit Sag Bend = 76,608 lb
Total Pulling Load = 202,522 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 137.4 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ = 14,652 lb

Fluidic Drag = 12 π D L C_d = 4,662 lb

Axial Segment Weight = W_e L sinθ = 0 lb

Pulling Load on Bottom Tangent = 19,314 lb
Total Pulling Load = 221,836 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 377.0 ft
Segment Angle with Horizontal, θ = 12.0 °
Deflection Angle, α = 6.0 °
Average Tension, T = 262,234 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 9.86 ft
j = [(E I) / T]$^{1/2}$ = 1,188

Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 1.6E+06
X = (3 L) - [(j / 2) tanh(U/2)] = 562.89

U = (12 L) / j = 3.81
N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 136,689 lb

Bending Frictional Drag = 2 μ N = 82,013 lb

Fluidic Drag = 12 π D L C_d = 12,791 lb

Axial Segment Weight = W_e L sinθ = -14,007 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 80,798 lb
Total Pulling Load = 302,633 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 446.9 ft
Entry Angle, θ = 12.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 46,608 lb

Fluidic Drag = 12 π D L C_d = 15,161 lb

Axial Segment Weight = W_e L sinθ = -33,022 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 28,746 lb
Total Pulling Load = 331,380 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	4,037	ok	0	ok	0	ok	0.06	ok	0.01	ok
	3,687	ok	0	ok	1074	ok	0.06	ok	0.03	ok
PC										
	3,687	ok	24,167	ok	1074	ok	0.59	ok	0.30	ok
	2,703	ok	24,167	ok	1669	ok	0.57	ok	0.33	ok
PT										
	2,703	ok	0	ok	1669	ok	0.04	ok	0.06	ok
	2,467	ok	0	ok	1669	ok	0.04	ok	0.06	ok
PC										
	2,467	ok	24,167	ok	1669	ok	0.57	ok	0.33	ok
	1,534	ok	24,167	ok	1404	ok	0.55	ok	0.29	ok
PT										
	1,534	ok	0	ok	1404	ok	0.02	ok	0.04	ok
Exit Point	0	ok	0	ok	0	ok	0.00	ok	0.00	ok

Figure 5: Installation Loading and Stress Analysis (Worse-Case)

Hydrofracture Evaluation

The East Branch Black River crossing will be installed almost entirely through sedimentary bedrock. Since the Delft Equation (discussed in Section 5) is only applicable to uncemented subsurface material, an assessment of the risk of hydrofracture was not completed. In general, inadvertent drilling fluid returns due to hydrofracture do not typically occur on rock crossings. Instead, when passing through bedrock, inadvertent drilling fluid returns are more likely to occur by flowing through existing fractures, joints, or solution cavities.

Construction Duration

The estimated duration of construction for the East Branch Black River Crossing is 46 days. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated based on typical production rates for various subsurface materials outlined in the Pipeline Research Council International's "*Installation of Pipelines by Horizontal Directional Drilling*"[1], as well as JDH&A's past experience in similar subsurface conditions. Details relative to the estimate are provided in Figure 6.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.

General Data		Comments
Work Schedule, hours/shift =	12.0	36" East Branch Black River Crossing
days/week =	7.0	
Drilled Length, feet =	1,822	
Pilot Hole		
Production Rate, feet/hour =	25	
shifts/day =	1	
Drilling Duration, hours =	72.9	
shifts =	6.1	
Trips to change tools, shifts =	0.5	
Pilot Hole Duration, days =	6.6	

Ream and Pull Back								
Pass Description =	24-inch	36-inch	48-inch			Swab	Pull Back	Total
Travel Speed, feet/minute =	0.3	0.3	0.3			8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0	15.0			15.0	15.0	
shifts/day =	1	1	1			1	1	
Reaming Duration, hours =	123.4	123.4	123.4			5.8	7.0	383.1
shifts =	10.3	10.3	10.3			0.5	0.6	31.9
Rig up, shifts =	0.5	0.5	0.5			0.5	0.5	2.5
Trips to change tools, shifts =	1.0	1.0	1.0			0.0		3.0
Pass Duration, days =	11.8	11.8	11.8			1.0	1.1	37.4

Summary				
HDD Duration at Site, days =	46.0			
Site Establishment	Move in	Rig Up	Rig Down	Move Out
shifts/day =	1	1	1	1
shifts =	0.5	1.0	1.0	0.5
days =	0.5	1.0	1.0	0.5

Figure 6: Estimated Construction Duration

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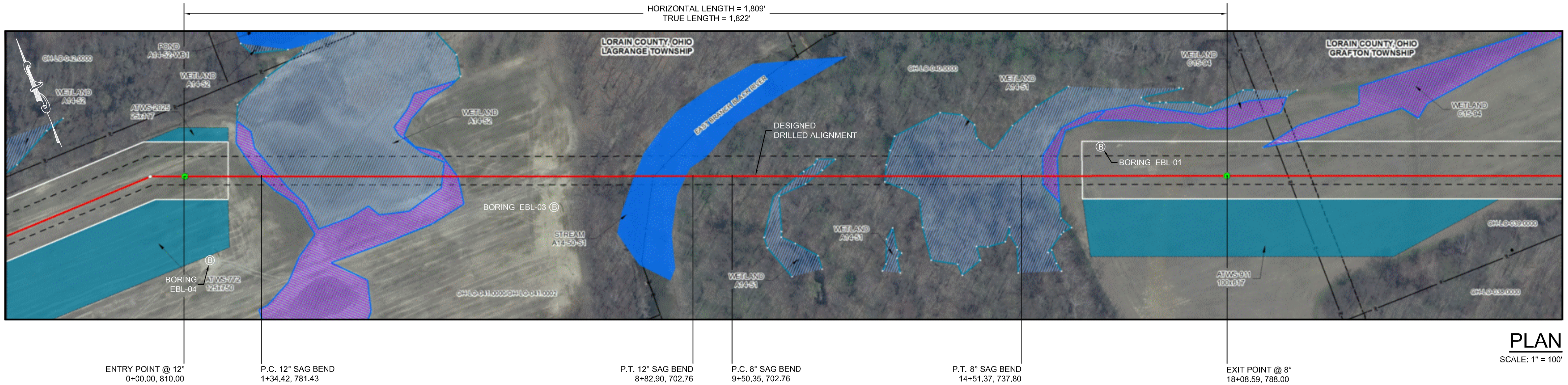
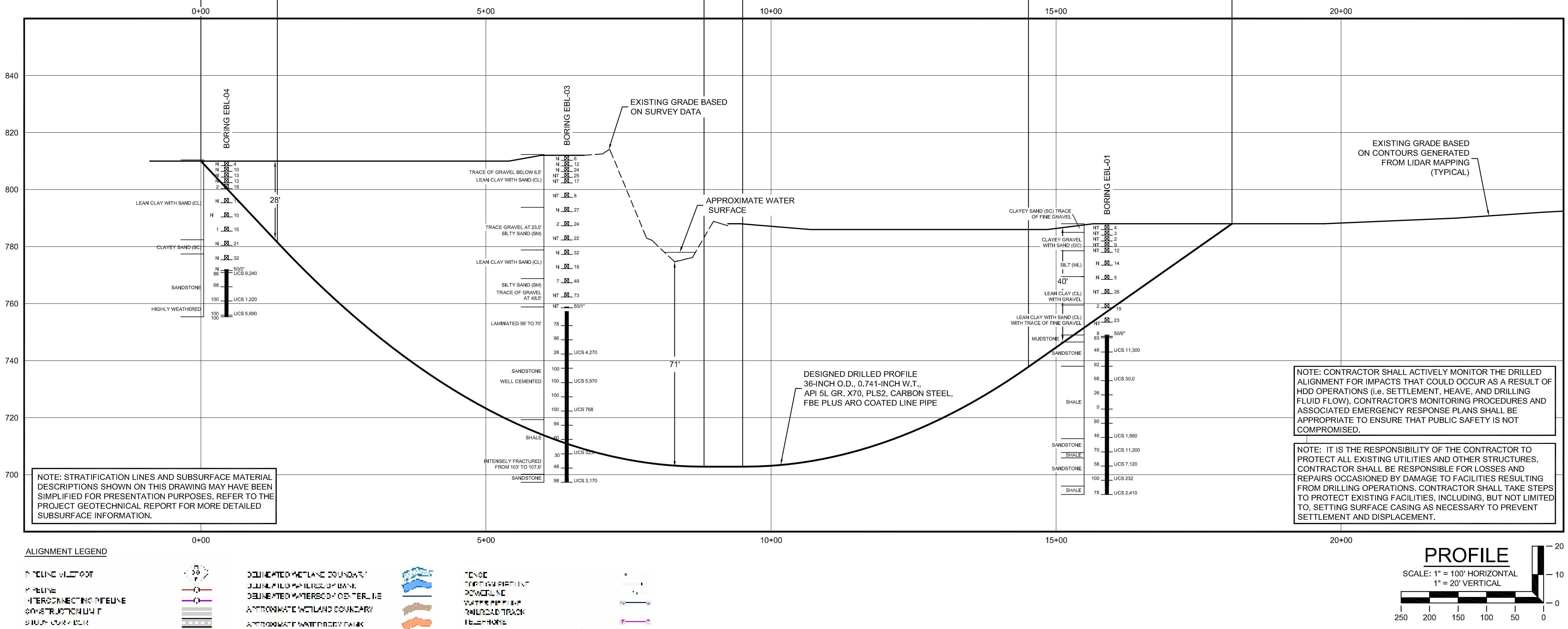
[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.



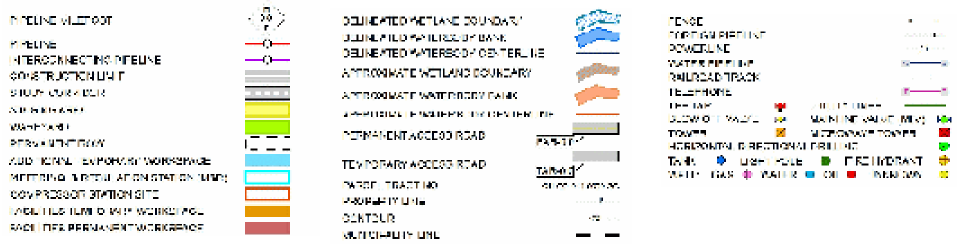


NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING MAY HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

ALIGNMENT LEGEND



GENERAL LEGEND

⊕ DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR, SURVEY, AND HYDROGRAPHIC DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

GEOTECHNICAL LEGEND

Ⓑ BORING LOCATION

SPLIT SPOON SAMPLE

53 ☒ 23 ← PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

PUSH SAMPLE

CORE BARREL SAMPLE

UCS 6,250 ← UNCONFINED COMPRESSIVE STRENGTH (PSI)
53 ▌ 6 ← MOHS HARDNESS
ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY FUGRO CONSULTANTS, INC, BATON ROUGE, LOUISIANA. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED SEPTEMBER 11, 2015 FOR ADDITIONAL INFORMATION.

2. THE LETTER "N" TO THE LEFT OF A SPLIT SPOON SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TESTS WERE PERFORMED.

3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGEMENT IN INTERPRETING THIS DATA.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE.

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		3	LKB	JMS	RE-ISSUED FOR FERC
		2	DLB	JMS	ADD DEPTH CRITERIA AND REVISE ENTRY POINT LOCATION
		1	LKB	JMS	ISSUED FOR BID
WADS-A-1097	ALIGNMENT SHEET M.P. 86.18 TO M.P. 87.13	0	LKB	ACM	ISSUED FOR FERC

John D. Hair, P.E.
Consulting Engineer
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS

TITLE	PRELIMINARY SIGNATURE	DATE	CONSTRUCTION SIGNATURE	DATE
DRAWN BY:	JMS	08/07		
PROJECT MANAGER	JMS	08/07		
DESIGN ENGINEER	LKB/ACM	08/07		
DESIGN CHECKER	ACM	08/07		

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH EAST BRANCH BLACK RIVER CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

LORAIN COUNTY, OHIO

NEXUS GAS TRANSMISSION

M.P. 86.5	W.O.	SCALE: AS SHOWN	DWG. WADS-H-1005	REV. 3

MP 92.5 West Branch Black River

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- A combination of LiDAR and traditional survey data covering the proposed crossing location
- A reconnaissance of the proposed crossing location conducted in July of 2015 by a representative of JDH&A

General Site Description

The 36-inch West Branch Black River Crossing is located approximately 2.5 miles southeast of Oberlin, Ohio near the intersection of West Road and Kipton Nickle Plate Road. The crossing involves passing beneath the meandering channel of the West Branch Black River, as well as West Road. The topography in the vicinity of the crossing is essentially flat, but with a topographic rise of approximately 20 feet conforming to the east bank of the river. Both sides of the river are mixtures of wooded patches and open farmland.

Figure 1: Overview of the West Branch Black River Crossing

Subsurface Conditions

At the time of this writing, site-specific subsurface information is not yet available.

Design Geometry & Layout

The West Branch Black River HDD design involves a horizontal length of 1,676 feet. The design geometry involves a 10-degree entry angle, an 8-degree exit angle, and radius of curvature of 3,600 feet. The HDD design achieves 40 feet of cover at the edge of the easternmost channel of the West Branch Black River, 55 feet beneath the western channel, and 56 feet of cover beneath West Road. The exit point is located in a farm field on the east side of West Branch Black River. There is approximately 1,739 feet of false right-of-way east of the exit point available for pull section fabrication.

The proposed HDD design for crossing the West Branch Black River, as well as available workspace for HDD operations, is shown on the preliminary HDD plan and profile drawing attached at the end of this report.

Assessment of Feasibility

Overall, given the length the proposed 36-inch installation, it is easily within the range of what has been successfully installed using HDD. It is anticipated the subsurface will consist of sedimentary bedrock conducive to the HDD process. However, the feasibility will need to be confirmed when site-specific geotechnical data is available.

Risk Identification and Assessment

Potential construction impacts due to installation by HDD include damage to West Road in the form of heaving or settlement, as well as drilling fluid surfacing within the West Branch Black River.

Based on the proposed length of the crossing, the overall risk of HDD operational problems and subsequent delays at this location are likely to be average. However, risk should be re-evaluated after site-specific geotechnical information is available.

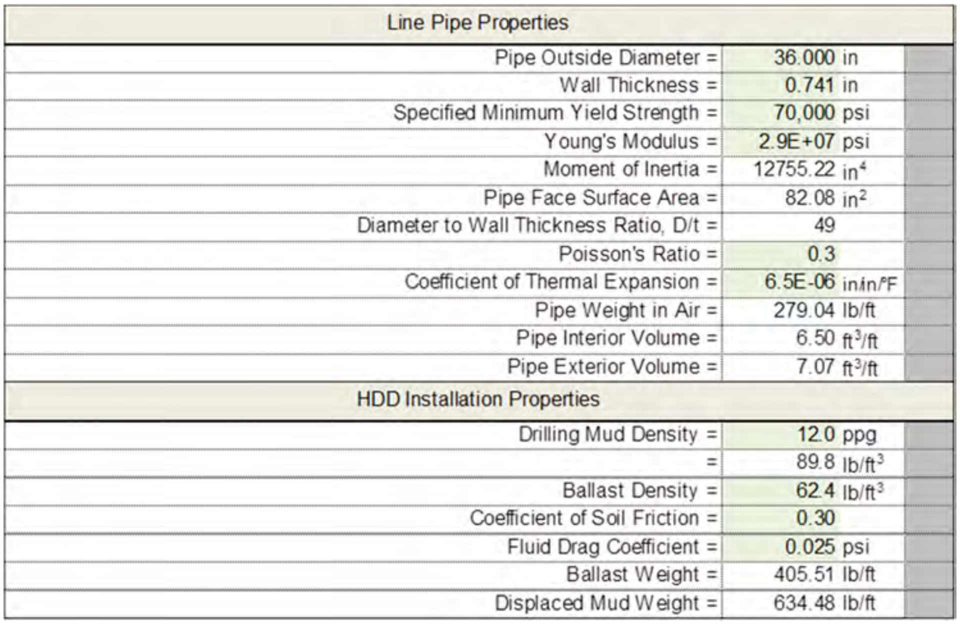
Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse-case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the loading scenarios described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 298,633 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 325,779 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 2. Detailed calculations for each loading scenario are summarized in Figures 3 and 4.



Line Pipe Properties		
Pipe Outside Diameter =	36.000	in
Wall Thickness =	0.741	in
Specified Minimum Yield Strength =	70,000	psi
Young's Modulus =	2.9E+07	psi
Moment of Inertia =	12755.22	in^4
Pipe Face Surface Area =	82.08	in^2
Diameter to Wall Thickness Ratio, D/t =	49	
Poisson's Ratio =	0.3	
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F
Pipe Weight in Air =	279.04	lb/ft
Pipe Interior Volume =	6.50	ft^3/ft
Pipe Exterior Volume =	7.07	ft^3/ft
HDD Installation Properties		
Drilling Mud Density =	12.0	ppg
=	89.8	lb/ft^3
Ballast Density =	62.4	lb/ft^3
Coefficient of Soil Friction =	0.30	
Fluid Drag Coefficient =	0.025	psi
Ballast Weight =	405.51	lb/ft
Displaced Mud Weight =	634.48	lb/ft

Figure 2: Pipe and Installation Properties

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Plpe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 405.6 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 42,830 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 13,762 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 20,064 lb

Pulling Load on Exit Tangent = 76,656 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 129,988 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R [1 - \cos(\alpha/2)]$ = 8.77 ft
$j = [(E\ I) / T]^{1/2}$ = 1,687
$Y = [18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1}]$ = 2.6E+06
$X = (3\ L) - [(j / 2) \tanh(U/2)]$ = 710.45
$U = (12\ L) / j$ = 3.58
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 128,578 lb

Bending Frictional Drag = $2\ \mu\ N$ = 77,147 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 17,055 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 12,463 lb

Pulling Load on Exit Sag Bend = 106,665 lb
Total Pulling Load = 183,320 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 53.0 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 5,646 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 1,797 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 7,443 lb
Total Pulling Load = 190,763 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 628.3 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 240,964 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R [1 - \cos(\alpha/2)]$ = 13.70 ft
$j = [(E\ I) / T]^{1/2}$ = 1,239
$Y = [18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1}]$ = 5.7E+06
$X = (3\ L) - [(j / 2) \tanh(U/2)]$ = 1268.28
$U = (12\ L) / j$ = 6.09
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 164,247 lb

Bending Frictional Drag = $2\ \mu\ N$ = 98,548 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 21,318 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -19,464 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 100,402 lb
Total Pulling Load = 291,165 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 96.7 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 10,155 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 3,281 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -5,969 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 7,467 lb
Total Pulling Load = 298,633 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	3,638	ok	0	ok	0	ok	0.06	ok	0.00	ok
	3,547	ok	0	ok	254	ok	0.06	ok	0.01	ok
PC										
	3,547	ok	12,083	ok	254	ok	0.32	ok	0.08	ok
	2,324	ok	12,083	ok	1082	ok	0.30	ok	0.11	ok
PT										
	2,324	ok	0	ok	1082	ok	0.04	ok	0.03	ok
	2,233	ok	0	ok	1082	ok	0.04	ok	0.03	ok
PC										
	2,233	ok	12,083	ok	1082	ok	0.30	ok	0.11	ok
	934	ok	12,083	ok	552	ok	0.28	ok	0.07	ok
PT										
	934	ok	0	ok	552	ok	0.01	ok	0.01	ok
Exit Point	0	ok	0	ok	-303	ok	0.00	ok	0.00	ok

Figure 3: Installation Loading and Stress Analysis (As-Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 711.1 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 75,089 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 24,127 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 35,177 lb
Pulling Load on Exit Tangent = 134,393 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 172,908 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 4.38 ft
$j = [(E\ I) / T]^{1/2}$ = 1,463
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 3.5E+05
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 187.72
$U = (12\ L) / j$ = 2.06
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 103,785 lb
Bending Frictional Drag = $2\ \mu\ N$ = 62,271 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 8,527 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 6,231 lb
Pulling Load on Exit Sag Bend = 77,030 lb
Total Pulling Load = 211,423 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 65.6 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 6,999 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 2,227 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 0 lb
Pulling Load on Bottom Tangent = 9,226 lb
Total Pulling Load = 220,648 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 314.2 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 257,841 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 6.85 ft
$j = [(E\ I) / T]^{1/2}$ = 1,198
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 9.1E+05
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 392.94
$U = (12\ L) / j$ = 3.15
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 122,430 lb
Bending Frictional Drag = $2\ \mu\ N$ = 73,458 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 10,659 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -9,732 lb Negative value indicates axial weight applied in direction of installation
Pulling Load on Entry Sag Bend = 74,385 lb
Total Pulling Load = 295,033 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 398.2 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 41,811 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 13,509 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -24,575 lb Negative value indicates axial weight applied in direction of installation
Pulling Load on Entry Tangent = 30,745 lb
Total Pulling Load = 325,779 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	3,969	ok	0	ok	0	ok	0.06	ok	0.01	ok
	3,594	ok	0	ok	1047	ok	0.06	ok	0.03	ok
PC										
	3,594	ok	24,167	ok	1047	ok	0.59	ok	0.30	ok
	2,688	ok	24,167	ok	1461	ok	0.57	ok	0.32	ok
PT										
	2,688	ok	0	ok	1461	ok	0.04	ok	0.05	ok
	2,576	ok	0	ok	1461	ok	0.04	ok	0.05	ok
PC										
	2,576	ok	24,167	ok	1461	ok	0.57	ok	0.31	ok
	1,637	ok	24,167	ok	1196	ok	0.56	ok	0.27	ok
PT										
	1,637	ok	0	ok	1196	ok	0.03	ok	0.03	ok
Exit Point	0	ok	0	ok	-303	ok	0.00	ok	0.00	ok

Figure 4: Installation Loading and Stress Analysis (Worse Case)

Hydrofracture Evaluation

At the time of this writing, site-specific geotechnical data is not available. Therefore, a hydrofracture evaluation could not be completed.

Construction Duration

The estimated duration of construction is 39 days based on assumed subsurface conditions consisting of sedimentary bedrock. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated based on information contained within the Pipeline Research Council International's "*Installation of Pipelines by Horizontal Directional Drilling*"[1], as well as JDH&A's past experience in similar subsurface conditions. Refer to Figure 5 for details relative to the estimate.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.

General Data		Comments
Work Schedule, hours/shift =	12.0	36" West Branch Black River Crossing. Subsurface conditions assumed to consist of sedimentary bedrock.
days/week =	7.0	
Drilled Length, feet =	1,686	
Pilot Hole		
Production Rate, feet/hour =	25	
shifts/day =	1	
Drilling Duration, hours =	67.4	
shifts =	5.6	
Trips to change tools, shifts =	0.5	
Pilot Hole Duration, days =	6.1	

Ream and Pull Back								
Pass Description =	24-inch	36-inch	48-inch			Swab	Pull Back	Total
Travel Speed, feet/minute =	0.3	0.3	0.3			8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0	15.0			15.0	15.0	
shifts/day =	1	1	1			1	1	
Reaming Duration, hours =	95.5	95.5	95.5			5.3	6.5	298.3
shifts =	8.0	8.0	8.0			0.4	0.5	24.9
Rig up, shifts =	0.5	0.5	0.5			0.5	0.5	2.5
Trips to change tools, shifts =	1.0	1.0	1.0			0.0		3.0
Pass Duration, days =	9.5	9.5	9.5			0.9	1.0	30.4

Summary	
HDD Duration at Site, days =	38.5

Site Establishment	Move in	Rig Up	Rig Down	Move Out
shifts/day =	1	1	1	1
shifts =	0.5	1.0	1.0	0.5
days =	0.5	1.0	1.0	0.5

Figure 5: Estimated Construction Duration

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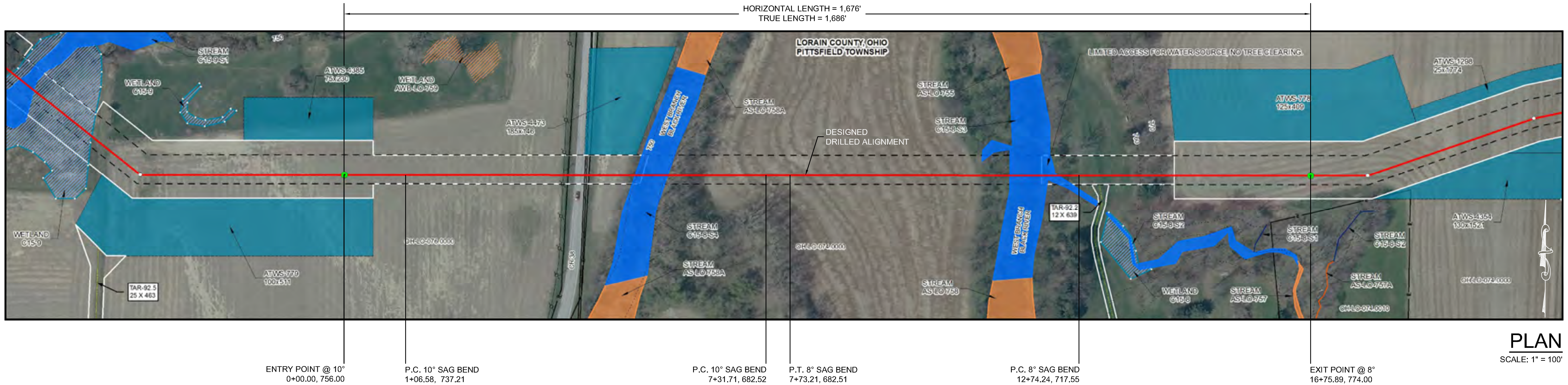
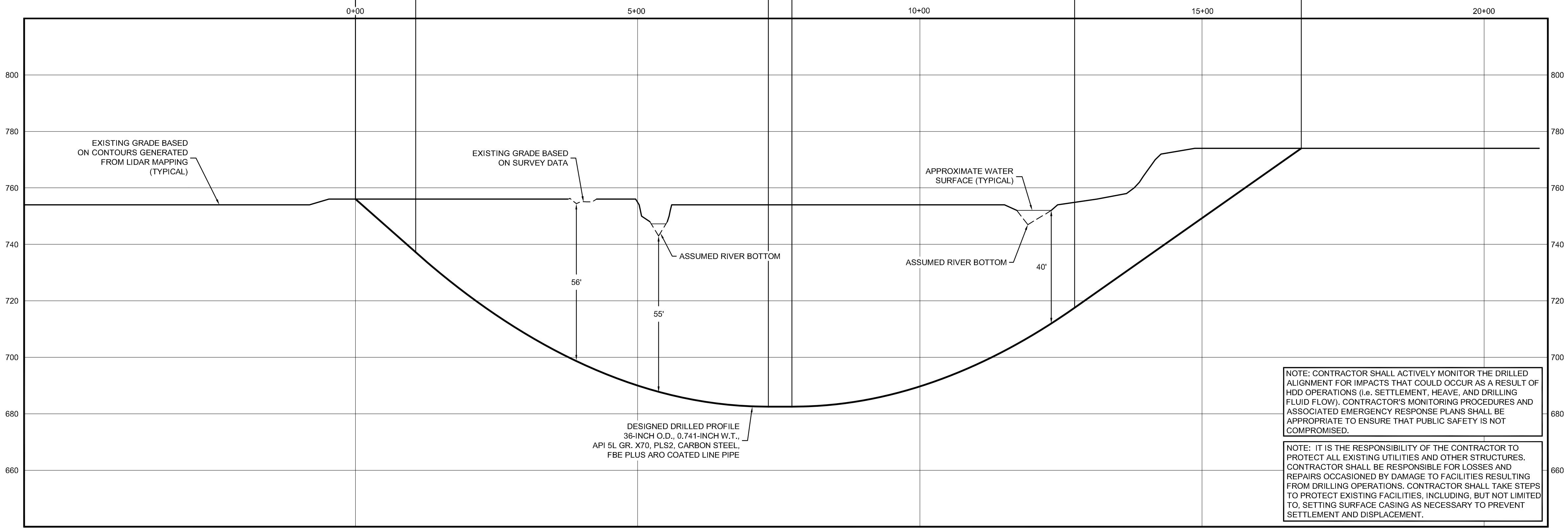
[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.



PLAN

SCALE: 1" = 100'



NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

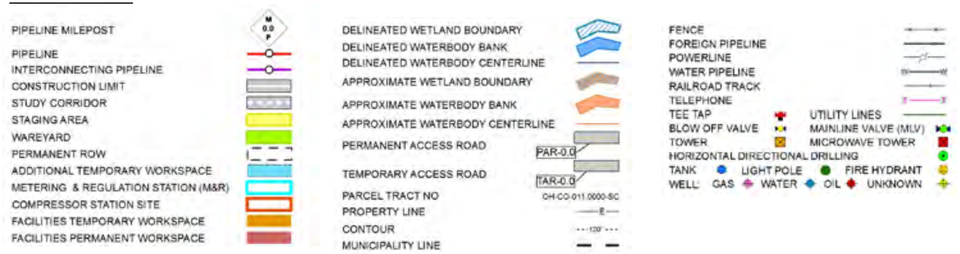
PROFILE

SCALE: 1" = 100' HORIZONTAL
1" = 20' VERTICAL

250 200 150 100 50 0

20 10 0

ALIGNMENT LEGEND



GENERAL LEGEND

⊕ DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR, SURVEY, AND HYDROGRAPHIC DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE.

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		3	LKB	JMS	RE-ISSUED FOR FERC
		2	DLB	JMS	ADD DEPTH CRITERIA/CENTERLINE AND REVISE ENTRY POINT LOCATION
		1	LKB	JMS	ISSUED FOR BID
WADS-A-1103	ALIGNMENT SHEET M.P. 91.86 TO M.P. 92.81	0	LKB	ACM	ISSUED FOR FERC

IG.#

John D. Hair, P.E.
Consulting Engineer
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS

TITLE	PRELIMINARY SIGNATURE	DATE	CONSTRUCTION SIGNATURE	DATE
DRAWN BY:	LKB	08/07		
PROJECT MANAGER	JMS	08/07		
DESIGN ENGINEER	LKB	08/07		
DESIGN CHECKER	DLB	08/07		

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH WEST BRANCH BLACK RIVER CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

LORAIN COUNTY, OHIO

NEXUS℠
GAS TRANSMISSION

M.P. 92.2	W.O.	SCALE: AS SHOWN	DWG. WADS-H-1006	REV. 3

MP 104.1 Vermilion River

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- A combination of LiDAR and traditional survey data covering the proposed crossing location
- A geotechnical data report prepared by Fugro Consultants, Inc. titled "Geotechnical and Geophysical Data Report, Vermilion River HDD Crossing (REV-1), Nexus Gas Transmission Project, Huron County, Ohio" and dated September 11, 2015
- A reconnaissance of the proposed crossing location conducted in July of 2015 by a representative of JDH&A

General Site Description

The 36-inch crossing of the Vermilion River is located near pipeline Mile Post 104.1, about two miles north of Wakeman, Ohio. Obstacles to be crossed include a shallow braided river and wetland complex, and Highway 62 (West Road). The area surrounding the river, approximately 800 feet on both sides, is wooded. In each direction beyond the woodlands are open farm fields. The topography on both sides is generally flat but drops off quickly toward the river. The elevation change is approximately 80 feet to the bottom of the river valley.

An overview of the proposed crossing location is provided in Figure 1. Photographs taken during the site reconnaissance are included as Figure 2 and Figure 3.

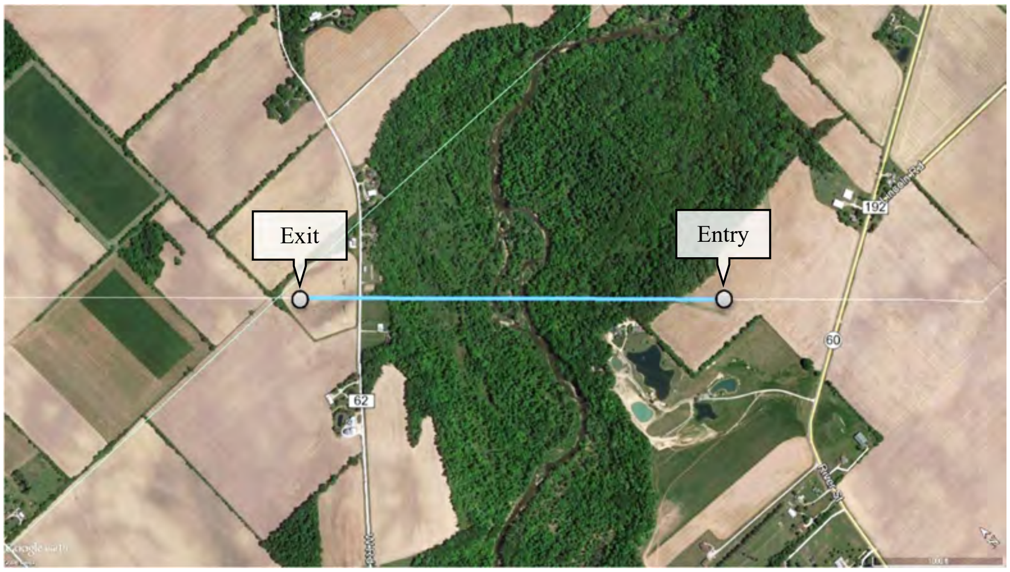


Figure 1: Overview of the Vermillion River Crossing

Figure 2: View west toward entry location

Figure 3: View west toward exit location from West Road

Subsurface Conditions

Four site-specific geotechnical borings were taken as part of the site investigation undertaken by Fugro Consultants, Inc. Two borings were taken on each side of the river. Each encountered approximately 20 feet of overburden soil (lean clay and sandy lean clay) overlying sedimentary bedrock consisting primarily of shale and siltstone, but with some claystone and sandstone. The unconfined compressive strength (UCS) of the bedrock ranged from 10 psi to 8,780 psi. In general, strength increases with depth. The majority of UCS values were less than 1,000 psi above elevation 760. Below elevation 760, UCS averaged 2,528 psi on the west side and 1,853 on the east side. Rock quality designation (RQD) index values generally indicate good quality bedrock, though the boring logs indicate several areas described as extremely fractured that did not necessarily correlate with the RQD values.

For detailed information relative to the subsurface investigation, refer to the geotechnical data report prepared by Fugro Consultants, Inc. titled “Geotechnical and Geophysical Data Report, Vermilion River HDD Crossing (REV-1), Nexus Gas Transmission Project, Huron County, Ohio” and dated September 11, 2015.

Design Geometry & Layout

The proposed crossing design involves a horizontal length of 3,184 feet. It utilizes a 10-degree entry angle, an 8-degree exit angle, and a radius of curvature of 3,600 feet. The crossing maintains 59 feet of cover beneath W Road, 40 feet of cover beneath the bottom of the slope on the west side of the crossing, just over 40 feet of cover beneath the Vermilion River, and 62 feet of cover beneath the slope on the east side of the crossing. Pull section fabrication will take place on the west side of the crossing since it provides sufficient unobstructed space for pull section stringing.

The proposed HDD design, as well as available workspace for HDD operations, is shown on the preliminary HDD plan and profile drawing included in this site-specific report.

Assessment of Feasibility

Based on available geotechnical data, it appears the crossing will be installed entirely through relatively weak sedimentary bedrock. HDD crossings with similar lengths and diameters have been installed through similar subsurface conditions in the past. Therefore, it is our opinion that with the right downhole tool selections and sound planning, skilled and experienced HDD contractors will be able to install the Vermilion River Crossing.

Risk Identification and Assessment

Notable risks associated with installation by HDD are the possibility of damage to West Road due to heaving or settlement, as well as inadvertent drilling fluid returns surfacing within the wetlands and river channels. The risk of inadvertent drilling fluid returns is elevated at this location due to the elevation differential of approximately 100 feet between the entry point and the bottom of the river valley. This requires a subsequently deep HDD segment which involves increased annular pressure associated with the static pressure head of the drilling fluid column.

Potential HDD construction and operational risks associated with the crossing include failure of large diameter rock reaming tools downhole, hole misalignment at the soil/rock interface, which may cause downhole tools to bind or the pull section to become lodged, and loss of drilling fluid circulation through existing joints and fractures within the sedimentary bedrock. Loss of circulation may negatively impact cuttings removal.

Overall, the proposed Vermilion River crossing is considered to have an average level of risk.

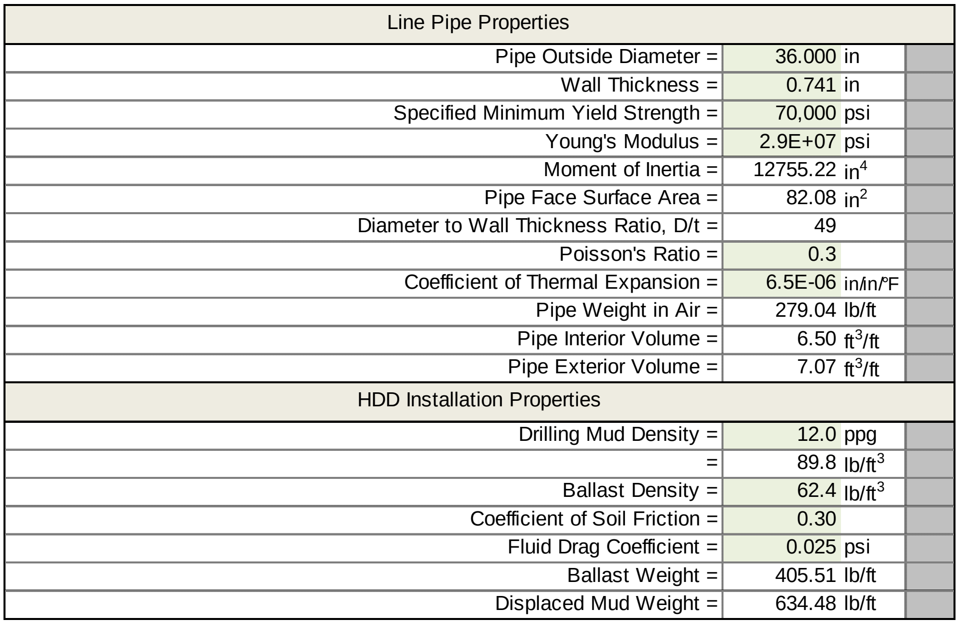
Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse-case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the loading scenarios described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 513,612 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 543,187 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 4. Detailed calculations for each scenario are summarized in Figures 5 and 6.



Line Pipe Properties		
Pipe Outside Diameter =	36.000	in
Wall Thickness =	0.741	in
Specified Minimum Yield Strength =	70,000	psi
Young's Modulus =	2.9E+07	psi
Moment of Inertia =	12755.22	in^4
Pipe Face Surface Area =	82.08	in^2
Diameter to Wall Thickness Ratio, D/t =	49	
Poisson's Ratio =	0.3	
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F
Pipe Weight in Air =	279.04	lb/ft
Pipe Interior Volume =	6.50	ft^3/ft
Pipe Exterior Volume =	7.07	ft^3/ft
HDD Installation Properties		
Drilling Mud Density =	12.0	ppg
=	89.8	lb/ft^3
Ballast Density =	62.4	lb/ft^3
Coefficient of Soil Friction =	0.30	
Fluid Drag Coefficient =	0.025	psi
Ballast Weight =	405.51	lb/ft
Displaced Mud Weight =	634.48	lb/ft

Figure 4: Pipe and Installation Properties

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 791.6 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 83,585 lb
Fluidic Drag = 12 π D L C_d = 26,857 lb
Axial Segment Weight = W_e L sinθ = 39,157 lb
Pulling Load on Exit Tangent = 149,600 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 204,456 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 8.77 ft
j = [(E I) / T]$^{1/2}$ = 1,345
Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 3.1E+06
X = (3 L) - [(j / 2) tanh(U/2)] = 850.44
U = (12 L) / j = 4.48
N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 133,659 lb
Bending Frictional Drag = 2 μ N = 80,195 lb
Fluidic Drag = 12 π D L C_d = 17,055 lb
Axial Segment Weight = W_e L sinθ = 12,463 lb
Pulling Load on Exit Sag Bend = 109,713 lb
Total Pulling Load = 259,313 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 728.6 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ = 77,692 lb
Fluidic Drag = 12 π D L C_d = 24,721 lb
Axial Segment Weight = W_e L sinθ = 0 lb
Pulling Load on Bottom Tangent = 102,413 lb
Total Pulling Load = 361,726 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 628.3 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 416,302 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 13.70 ft
j = [(E I) / T]$^{1/2}$ = 943
Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 6.3E+06
X = (3 L) - [(j / 2) tanh(U/2)] = 1413.96
U = (12 L) / j = 8.00
N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 178,831 lb
Bending Frictional Drag = 2 μ N = 107,299 lb
Fluidic Drag = 12 π D L C_d = 21,318 lb
Axial Segment Weight = W_e L sinθ = -19,464 lb Negative value indicates axial weight applied in direction of installation
Pulling Load on Entry Sag Bend = 109,153 lb
Total Pulling Load = 470,878 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 553.4 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 58,114 lb
Fluidic Drag = 12 π D L C_d = 18,777 lb
Axial Segment Weight = W_e L sinθ = -34,157 lb Negative value indicates axial weight applied in direction of installation
Pulling Load on Entry Tangent = 42,734 lb
Total Pulling Load = 513,612 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	6,257	ok	0	ok	0	ok	0.10	ok	0.01	ok
	5,737	ok	0	ok	1370	ok	0.09	ok	0.05	ok
PC										
	5,737	ok	12,083	ok	1370	ok	0.36	ok	0.16	ok
	4,407	ok	12,083	ok	2199	ok	0.33	ok	0.22	ok
PT										
	4,407	ok	0	ok	2199	ok	0.07	ok	0.11	ok
	3,159	ok	0	ok	2199	ok	0.05	ok	0.10	ok
PC										
	3,159	ok	12,083	ok	2199	ok	0.31	ok	0.20	ok
	1,823	ok	12,083	ok	1668	ok	0.29	ok	0.14	ok
PT										
	1,823	ok	0	ok	1668	ok	0.03	ok	0.06	ok
Exit Point	0	ok	0	ok	0	ok	0.00	ok	0.00	ok

Figure 5: Installation Loading and Stress Analysis (As-Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 1097.1 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu\ \cos\theta$ = 115,844 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 37,223 lb
Axial Segment Weight = $W_e\ L\ \sin\theta$ = 54,270 lb

Pulling Load on Exit Tangent = 207,337 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 247,663 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 4.38 ft
$j = [(E\ I) / T]^{1/2}$ = 1,222
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 4.5E+05
$X = (3\ L) - [\ (j / 2)\ \tanh(U/2)\ ]$ = 238.43
$U = (12\ L) / j$ = 2.47
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 109,823 lb
Bending Frictional Drag = $2\ \mu\ N$ = 65,894 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 8,527 lb
Axial Segment Weight = $W_e\ L\ \sin\theta$ = 6,231 lb

Pulling Load on Exit Sag Bend = 80,652 lb
Total Pulling Load = 287,989 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 742.3 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 79,151 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 25,185 lb
Axial Segment Weight = $W_e\ L\ \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 104,336 lb
Total Pulling Load = 392,325 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 314.2 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 434,750 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 6.85 ft
$j = [(E\ I) / T]^{1/2}$ = 922
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 1.1E+06
$X = (3\ L) - [\ (j / 2)\ \tanh(U/2)\ ]$ = 496.50
$U = (12\ L) / j$ = 4.09
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 139,873 lb
Bending Frictional Drag = $2\ \mu\ N$ = 83,924 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 10,659 lb
Axial Segment Weight = $W_e\ L\ \sin\theta$ = -9,732 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 84,851 lb
Total Pulling Load = 477,176 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 854.9 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu\ \cos\theta$ = 89,770 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 29,005 lb
Axial Segment Weight = $W_e\ L\ \sin\theta$ = -52,763 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 66,012 lb
Total Pulling Load = 543,187 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	6,618	ok	0	ok	0	ok	0.11	ok	0.01	ok
	5,814	ok	0	ok	2163	ok	0.09	ok	0.11	ok
PC										
	5,814	ok	24,167	ok	2163	ok	0.62	ok	0.45	ok
	4,780	ok	24,167	ok	2577	ok	0.61	ok	0.48	ok
PT										
	4,780	ok	0	ok	2577	ok	0.08	ok	0.15	ok
	3,509	ok	0	ok	2577	ok	0.06	ok	0.14	ok
PC										
	3,509	ok	24,167	ok	2577	ok	0.59	ok	0.45	ok
	2,526	ok	24,167	ok	2312	ok	0.57	ok	0.40	ok
PT										
	2,526	ok	0	ok	2312	ok	0.04	ok	0.11	ok
Exit Point	0	ok	0	ok	0	ok	0.00	ok	0.00	ok

Figure 5: Installation Loading and Stress Analysis (Worse-Case)

Hydrofracture Evaluation

Based on available geotechnical information, it is anticipated that the proposed crossing will be installed almost entirely through sedimentary bedrock. Since the Delft Method (discussed previously in Section 5) is only applicable to soil, a hydrofracture evaluation was not completed. In general, inadvertent drilling fluid returns due to hydrofracture do not typically occur on rock crossings, but instead occur by flowing through existing fractures, joints, or solution cavities.

Construction Duration

The estimated duration of construction for the proposed crossing is 78 days. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated by JDH&A based on information contained within the Pipeline Research Council International's "*Installation of Pipelines by Horizontal Directional Drilling*"[1], as well as past experience in similar subsurface conditions. Refer to Figure 7 for details relative to the estimate.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.

General Data		Comments						
Work Schedule, hours/shift =	12.0	36" Vermillion River Crossing						
days/week =	7.0							
Drilled Length, feet =	3,205							
Pilot Hole								
Production Rate, feet/hour =	20							
shifts/day =	1							
Drilling Duration, hours =	160.3							
shifts =	13.4							
Trips to change tools, shifts =	0.5							
Pilot Hole Duration, days =	13.9							
Ream and Pull Back								
Pass Description =	24-inch	36-inch	48-inch			Swab	Pull Back	Total
Travel Speed, feet/minute =	0.3	0.3	0.3			8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0	15.0			15.0	7.0	
shifts/day =	1	1	1			1	1	
Reaming Duration, hours =	217.1	217.1	217.1			10.1	12.3	673.8
shifts =	18.1	18.1	18.1			0.8	1.0	56.2
Rig up, shifts =	0.5	0.5	0.5			0.5	0.5	2.5
Trips to change tools, shifts =	1.0	1.0	1.0			0.0		3.0
Pass Duration, days =	19.6	19.6	19.6			1.3	1.5	61.7
Summary								
HDD Duration at Site, days =	77.5							
Site Establishment	Move in	Rig Up	Rig Down	Move Out				
shifts/day =	1	1	1	1				
shifts =	0.5	1.0	1.0	0.5				
days =	0.5	1.0	1.0	0.5				

Figure 7: Estimated Construction Duration

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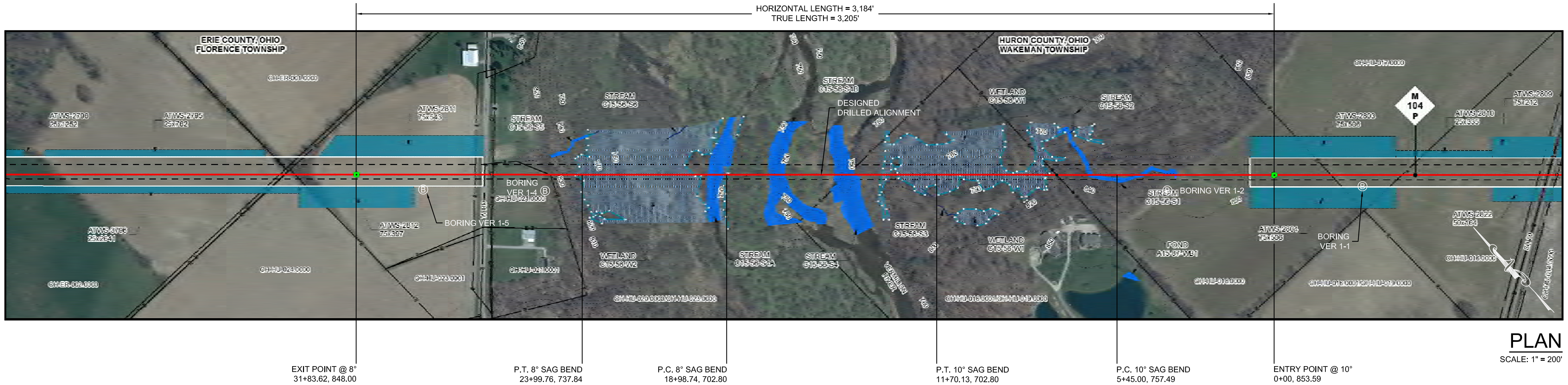
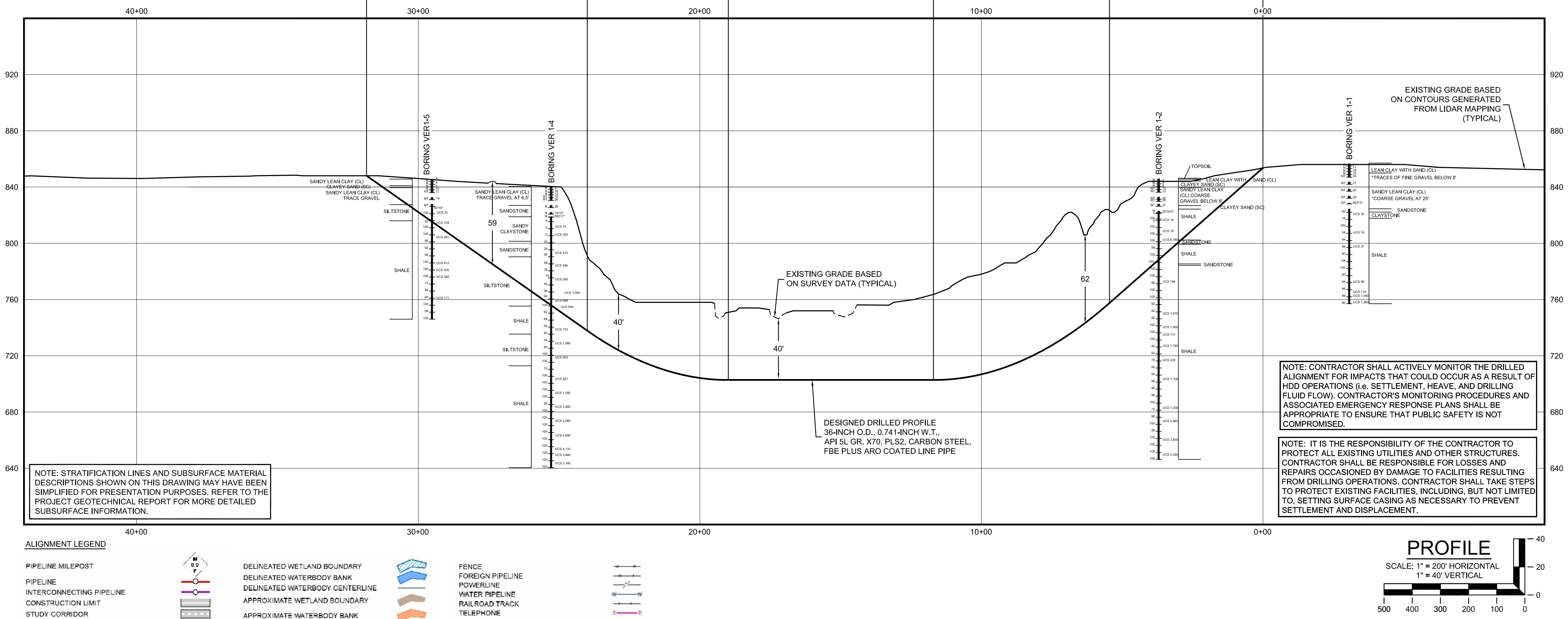
[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.





NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING MAY HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

GENERAL LEGEND

DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR, SURVEY, AND HYDROGRAPHIC DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

GEOTECHNICAL LEGEND

Ⓑ BORING LOCATION

SPLIT SPOON SAMPLE

53 ☒ 23 ← PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

PUSH SAMPLE

CORE BARREL SAMPLE

UCS 6,250 ← UNCONFINED COMPRESSIVE STRENGTH (PSI)
53 6 ← MOHS HARDNESS
ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY FUGRO CONSULTANTS, INC, BATON ROUGE, LOUISIANA. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED SEPTEMBER 11, 2015 FOR ADDITIONAL INFORMATION.

2. THE LETTER "N" TO THE LEFT OF A SPLIT SPOON SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TESTS WERE PERFORMED.

3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGEMENT IN INTERPRETING THIS DATA.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE.

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

ALIGNMENT LEGEND

PIPELINE MILEPOST
PIPELINE
INTERCONNECTING PIPELINE
CONSTRUCTION LIMIT
STUDY CORRIDOR
STAGING AREA
WAREYARD
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
METERING & REGULATION STATION (M&R)
COMPRESSOR STATION SITE
FACILITIES TEMPORARY WORKSPACE
FACILITIES PERMANENT WORKSPACE

DELINEATED WETLAND BOUNDARY
DELINEATED WATERBODY BANK
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY BANK
APPROXIMATE WATERBODY CENTERLINE
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
PARCEL TRACT NO CH-CO-011.0000-SC
PROPERTY LINE
CONTOUR --120--
MUNICIPALITY LINE

FENCE
FOREIGN PIPELINE
POWERLINE
WATER PIPELINE
RAILROAD TRACK
TELEPHONE
TEE TAP
UTILITY LINES
BLOW OFF VALVE
MAINLINE VALVE (MLV)
TOWER
MICROWAVE TOWER
HORIZONTAL DIRECTIONAL DRILLING
TANK ● LIGHT POLE ● FIRE HYDRANT
WELL: GAS ⊕ WATER ⊕ OIL ⊕ UNKNOWN

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		3	LKB	JMS	RE–ISSUED FOR FERC
		2	DLB	JMS	ADD DEPTH CRITERIA
WADS–A–1116	ALIGNMENT SHEET M.P. 104.17 TO M.P. 105.12	1	LKB	JMS	ISSUED FOR BID
WADS–A–1115	ALIGNMENT SHEET M.P. 103.22 TO M.P. 104.17	0	LKB	ACM	ISSUED FOR FERC

IG.#

John D. Hair, P.E.
Consulting Engineer
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS

TITLE	PRELIMINARY SIGNATURE	PRELIMINARY DATE	CONSTRUCTION SIGNATURE	CONSTRUCTION DATE
DRAWN BY:	JMS	08/07		
PROJECT MANAGER	JMS	08/07		
DESIGN ENGINEER	ACM	08/07		
DESIGN CHECKER	DLB	08/05		

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH VERMILION RIVER CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

HURON COUNTY, OHIO

NEXUS℠
GAS TRANSMISSION

M.P. 104.1 | W.O. | SCALE: AS SHOWN | DWG. WADS–H–1007 | REV. 3

MP 110.3 Interstate 80

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- A combination of LiDAR and survey data covering the proposed crossing location
- A geotechnical data report prepared by Fugro Consultants, Inc. titled "Geotechnical Data Report, Interstate 80 Road Crossing (Tract No. OH-ER-036.0000-RD), Nexus Gas Transmission Project, Lorain County Ohio" and dated October 26, 2015

General Site Description

The 36-inch Interstate 80 Crossing is located just east of Berlin Heights, Ohio. It involves passing beneath the eastbound and westbound lanes of I-80, as well as County Road 17 (Main Road), located immediately south of the interstate. Both sides of the interstate are open farm fields. The topography in the area is flat. An overview of the proposed crossing location is provided in Figure 1.

Figure 1: Overview of the Interstate 80 Crossing.

Subsurface Conditions

Two shallow borings to depths of approximately 30 feet were taken at the project site as part of a soils investigation for a previously planned conventional road bore crossing. The borings indicate mixtures of sand, silt, and clay, overlying shale sedimentary bedrock. Bedrock is estimated to begin around 29 feet below the ground surface.

Design Geometry & Layout

The proposed Interstate 80 Crossing has a horizontal length of 1,432 feet. It has been designed to achieve a minimum of 40 feet of cover beneath the bar ditch on the north side of Interstate 80. The design employs a 10-degree entry angle, an 8-degree exit angle, and a radius of curvature equal to 3,600 feet. The exit point is located on the south side of the interstate to take advantage of a linear stretch of pipeline right-of-way (ROW), which will allow the pull section to be fabricated in a single segment and thus avoid downtime associated with tie-in welds.

The preliminary HDD plan and profile design for crossing Interstate 80 is attached to this report for reference.

Assessment of Feasibility

Numerous 36-inch pipelines have been installed using HDD over similar distances through similar sedimentary bedrock. Therefore, unless subsurface conditions at depth change significantly from that anticipated, the proposed crossing of Interstate 80 is feasible.

Risk Identification and Assessment

Potential construction impacts associated with installation of the proposed crossing by HDD are heaving or ground settlement along the HDD alignment, resulting in damage to Interstate 80.

HDD construction and operational risks associated the proposed crossing include failure of large diameter rock reaming tools downhole, hole misalignment at the soil/rock interface which can lead to tools or the product pipeline getting lodged, and problems resulting from circulation loss through existing fractures in the bedrock.

The overall level of risk associated with installation of the Interstate 80 Crossing using HDD is considered low.

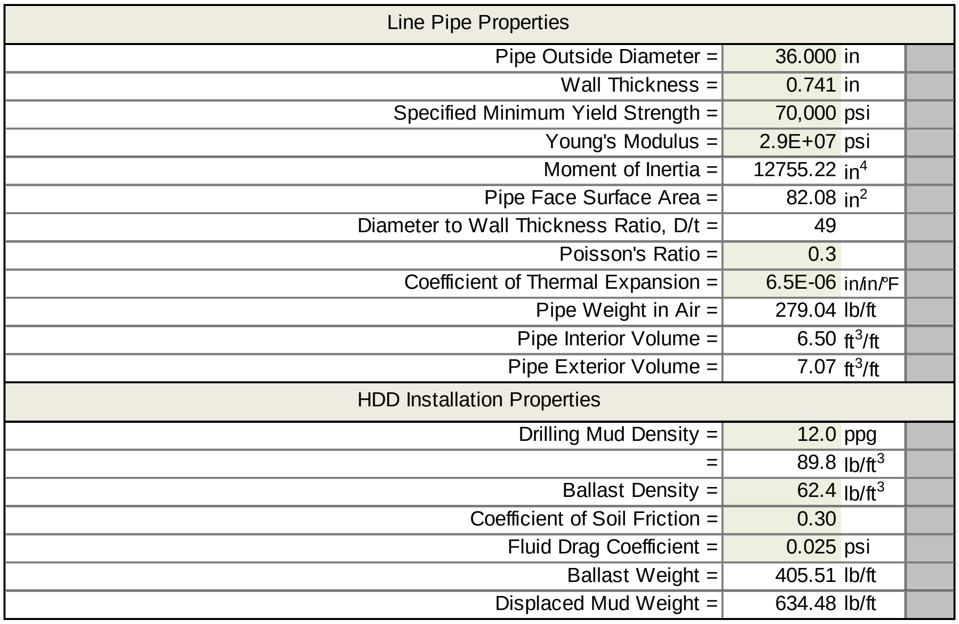
Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse-case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the conservative analysis described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 252,580 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 279,019 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 2. Detailed calculations for each loading scenario are summarized in Figures 3 and 4.



Line Pipe Properties		
Pipe Outside Diameter =	36.000	in
Wall Thickness =	0.741	in
Specified Minimum Yield Strength =	70,000	psi
Young's Modulus =	2.9E+07	psi
Moment of Inertia =	12755.22	in^4
Pipe Face Surface Area =	82.08	in^2
Diameter to Wall Thickness Ratio, D/t =	49	
Poisson's Ratio =	0.3	
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F
Pipe Weight in Air =	279.04	lb/ft
Pipe Interior Volume =	6.50	ft^3/ft
Pipe Exterior Volume =	7.07	ft^3/ft
HDD Installation Properties		
Drilling Mud Density =	12.0	ppg
=	89.8	lb/ft^3
Ballast Density =	62.4	lb/ft^3
Coefficient of Soil Friction =	0.30	
Fluid Drag Coefficient =	0.025	psi
Ballast Weight =	405.51	lb/ft
Displaced Mud Weight =	634.48	lb/ft

Figure 2: Pipe and Installation Properties

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 173.9 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 18,365 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 5,901 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 8,603 lb
Pulling Load on Exit Tangent = 32,869 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 85,298 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 8.77 ft
$j = [(E\ I) / T]^{1/2}$ = 2,082
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 2.1E+06
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 575.71
$U = (12\ L) / j$ = 2.90
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 125,564 lb
Bending Frictional Drag = $2\ \mu\ N$ = 75,339 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 17,055 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 12,463 lb
Pulling Load on Exit Sag Bend = 104,856 lb
Total Pulling Load = 137,726 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 95.9 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 10,226 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 3,254 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 0 lb
Pulling Load on Bottom Tangent = 13,479 lb
Total Pulling Load = 151,205 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 628.3 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 200,425 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 13.70 ft
$j = [(E\ I) / T]^{1/2}$ = 1,359
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 5.5E+06
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 1210.96
$U = (12\ L) / j$ = 5.55
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 160,978 lb
Bending Frictional Drag = $2\ \mu\ N$ = 96,587 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 21,318 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -19,464 lb
Negative value indicates axial weight applied in direction of installation
Pulling Load on Entry Sag Bend = 98,440 lb
Total Pulling Load = 249,646 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 38.0 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 3,990 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 1,289 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -2,345 lb
Negative value indicates axial weight applied in direction of installation
Pulling Load on Entry Tangent = 2,934 lb
Total Pulling Load = 252,580 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	3,077	ok	0	ok	0	ok	0.05	ok	0.00	ok
	3,041	ok	0	ok	65	ok	0.05	ok	0.00	ok
PC										
	3,041	ok	12,083	ok	65	ok	0.31	ok	0.07	ok
	1,842	ok	12,083	ok	893	ok	0.29	ok	0.09	ok
PT										
	1,842	ok	0	ok	893	ok	0.03	ok	0.02	ok
	1,678	ok	0	ok	893	ok	0.03	ok	0.02	ok
PC										
	1,678	ok	12,083	ok	893	ok	0.29	ok	0.09	ok
	400	ok	12,083	ok	363	ok	0.27	ok	0.06	ok
PT										
	400	ok	0	ok	363	ok	0.01	ok	0.00	ok
Exit Point	0	ok	0	ok	-4	ok	0.00	ok	0.00	ok

Figure 3: Installation Loading and Stress Analysis (As-Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
PIpe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 479.4 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu \cos\theta$ = 50,624 lb

Fluidic Drag = $12 \pi D L C_d$ = 16,266 lb

Axial Segment Weight = $W_e L \sin\theta$ = 23,716 lb

Pulling Load on Exit Tangent = 90,606 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 128,032 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R [1 - \cos(\alpha/2)]$ = 4.38 ft
$j = [(E I) / T]^{1/2}$ = 1,700

$Y = [18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1}]$ = 2.8E+05
$X = (3 L) - [(j / 2) \tanh(U/2)]$ = 150.58

$U = (12 L) / j$ = 1.77
$N = [(T h) - W_e \cos\theta (Y/144)] / (X / 12)$ = 100,153 lb

Bending Frictional Drag = $2 \mu N$ = 60,092 lb

Fluidic Drag = $12 \pi D L C_d$ = 8,527 lb

Axial Segment Weight = $W_e L \sin\theta$ = 6,231 lb

Pulling Load on Exit Sag Bend = 74,850 lb
Total Pulling Load = 165,457 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 109.6 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu$ = 11,685 lb

Fluidic Drag = $12 \pi D L C_d$ = 3,718 lb

Axial Segment Weight = $W_e L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 15,403 lb
Total Pulling Load = 180,859 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 314.2 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 216,833 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R [1 - \cos(\alpha/2)]$ = 6.85 ft
$j = [(E I) / T]^{1/2}$ = 1,306

$Y = [18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1}]$ = 8.3E+05
$X = (3 L) - [(j / 2) \tanh(U/2)]$ = 358.43

$U = (12 L) / j$ = 2.89
$N = [(T h) - W_e \cos\theta (Y/144)] / (X / 12)$ = 118,369 lb

Bending Frictional Drag = $2 \mu N$ = 71,021 lb

Fluidic Drag = $12 \pi D L C_d$ = 10,659 lb

Axial Segment Weight = $W_e L \sin\theta$ = -9,732 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 71,948 lb
Total Pulling Load = 252,808 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 339.4 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu \cos\theta$ = 35,646 lb

Fluidic Drag = $12 \pi D L C_d$ = 11,517 lb

Axial Segment Weight = $W_e L \sin\theta$ = -20,951 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 26,212 lb
Total Pulling Load = 279,019 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	3,399	ok	0	ok	0	ok	0.05	ok	0.00	ok
	3,080	ok	0	ok	858	ok	0.05	ok	0.02	ok
PC										
	3,080	ok	24,167	ok	858	ok	0.58	ok	0.28	ok
	2,203	ok	24,167	ok	1272	ok	0.56	ok	0.29	ok
PT										
	2,203	ok	0	ok	1272	ok	0.03	ok	0.03	ok
	2,016	ok	0	ok	1272	ok	0.03	ok	0.03	ok
PC										
	2,016	ok	24,167	ok	1272	ok	0.56	ok	0.29	ok
	1,104	ok	24,167	ok	1007	ok	0.55	ok	0.25	ok
PT										
	1,104	ok	0	ok	1007	ok	0.02	ok	0.02	ok
Exit Point	0	ok	0	ok	-4	ok	0.00	ok	0.00	ok

Figure 4: Installation Loading and Stress Analysis (Worse-Case)

Hydrofracture Evaluation

The Interstate 80 crossing will be installed almost entirely through bedrock. Since the Delft Equation (discussed previously in Section 5 of this report) is only applicable to uncemented subsurface material, a hydrofracture evaluation was not completed. In general, inadvertent drilling fluid returns due to hydrofracture do not typically occur on rock crossings, but instead occur by flowing through existing fractures, joints, or solution cavities.

Construction Duration

The estimated duration of construction is 38 days. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated based on information contained within the Pipeline Research Council International's "*Installation of Pipelines by Horizontal Directional Drilling*"[1], as well as JDH&A's past experience in similar subsurface conditions. Refer to Figure 5 for details relative to the estimate.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.

General Data		Comments
Work Schedule, hours/shift =	12.0	36" Interstate 80 Crossing
days/week =	7.0	
Drilled Length, feet =	1,439	
Pilot Hole		
Production Rate, feet/hour =	25	
shifts/day =	1	
Drilling Duration, hours =	57.6	
shifts =	4.8	
Trips to change tools, shifts =	0.5	
Pilot Hole Duration, days =	5.3	

Ream and Pull Back								
Pass Description =	24-inch	36-inch	48-inch			Swab	Pull Back	Total
Travel Speed, feet/minute =	0.3	0.3	0.3			8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0	15.0			15.0	15.0	
shifts/day =	1	1	1			1	1	
Reaming Duration, hours =	97.5	97.5	97.5			4.5	5.5	302.5
shifts =	8.1	8.1	8.1			0.4	0.5	25.2
Rig up, shifts =	0.5	0.5	0.5			0.5	0.5	2.5
Trips to change tools, shifts =	1.0	1.0	1.0			0.0		3.0
Pass Duration, days =	9.6	9.6	9.6			0.9	1.0	30.7

Summary	
HDD Duration at Site, days =	38.0

Site Establishment	Move in	Rig Up	Rig Down	Move Out
shifts/day =	1	1	1	1
shifts =	0.5	1.0	1.0	0.5
days =	0.5	1.0	1.0	0.5

Figure 5: Estimated Construction Duration

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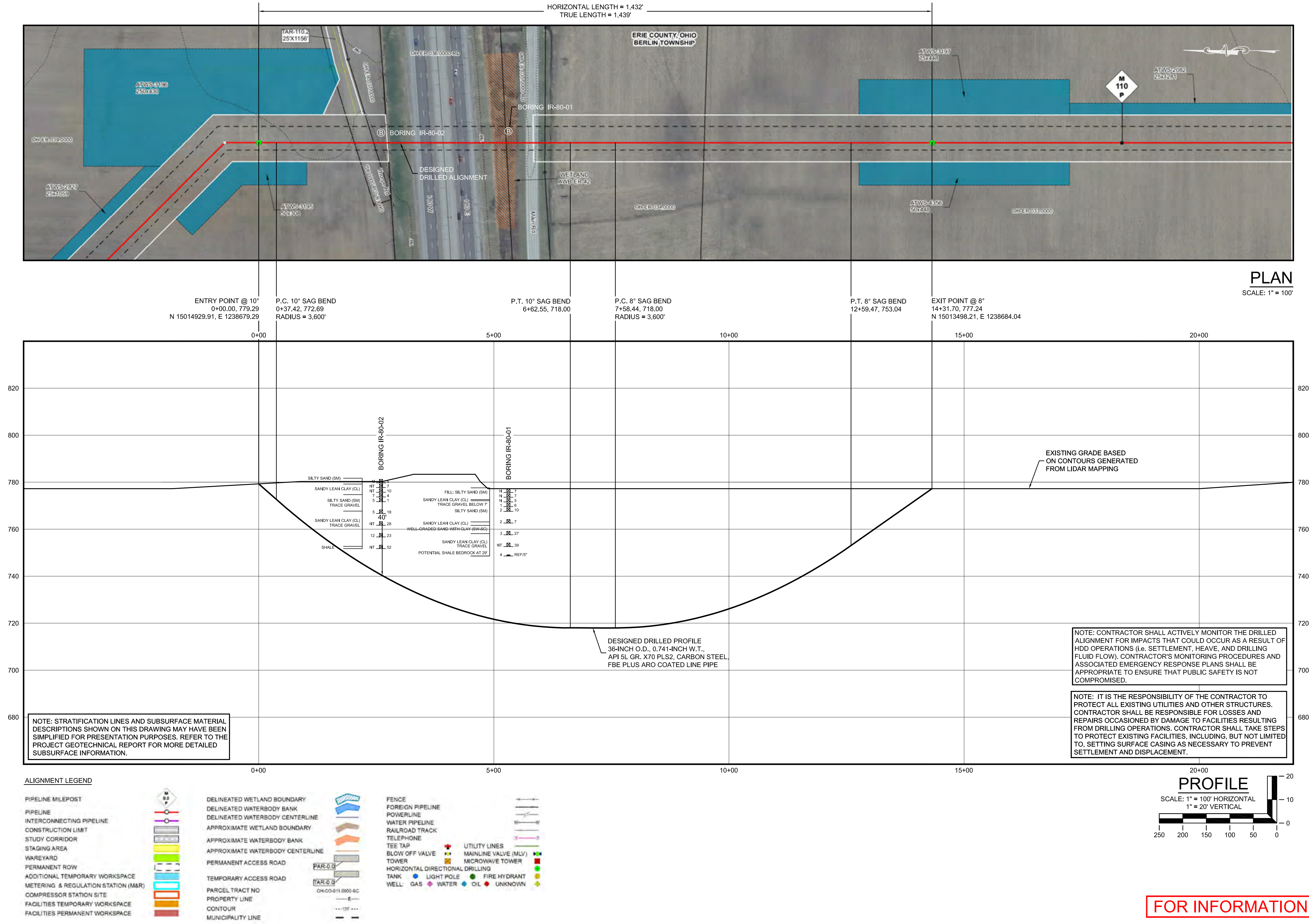
[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.



NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING MAY HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

GENERAL LEGEND

DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR AND SURVEY DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

GEOTECHNICAL LEGEND

Ⓑ BORING LOCATION

SPLIT SPOON SAMPLE

53 ⊠ 23 ← PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

PUSH SAMPLE

CORE BARREL SAMPLE

UCS 6,250 ← UNCONFINED COMPRESSIVE STRENGTH (PSI)
53 6 ← MOHS HARDNESS
ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY FUGRO CONSULTANTS, INC, BATON ROUGE, LOUISIANA. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED OCTOBER 26, 2015 FOR ADDITIONAL INFORMATION.

2. THE LETTER "N" TO THE LEFT OF A SPLIT SPOON SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TESTS WERE PERFORMED.

3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGEMENT IN INTERPRETING THIS DATA.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE.

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		3	LKB	JMS	RE-ISSUED FOR FERC
		2	DLB	JMS	ADD DEPTH CRITERIA
		1	LKB	JMS	ISSUED FOR BID
WADS-A-1123	ALIGNMENT SHEET M.P. 109.81 TO M.P. 110.57	0	LKB	ACM	ISSUED FOR FERC

IG.#

John D. Hair, P.E.
Consulting Engineer
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS	PRELIMINARY		CONSTRUCTION	
TITLE	SIGNATURE	DATE	SIGNATURE	DATE
DRAWN BY:	DMP	08/07		
PROJECT MANAGER	JMS	08/07		
DESIGN ENGINEER	DMP	08/07		
DESIGN CHECKER	DLB	08/07		

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH INTERSTATE 80 CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

ERIE COUNTY, OHIO

NEXUS GAS TRANSMISSION SM

M.P. 110.1	W.O.	SCALE: AS SHOWN	DWG. WADS-H-1008	REV. 3

MP 116.8 Huron River

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- A combination of LiDAR, hydrographic, and traditional survey data covering the proposed crossing location
- A geotechnical data report prepared by Fugro Consultants, Inc. titled "Geotechnical Data Report, Huron River HDD Crossing, Nexus Gas Transmission Project, Erie County, Ohio" and dated September 11, 2015
- A reconnaissance of the proposed crossing location conducted in July of 2015 by a representative of JDH&A

General Site Description

The 36-inch crossing of the Huron River is located near pipeline Mile Post 116.8, approximately 3 miles north of Milan, Ohio. The primary obstacles to be crossed are Highway 13 (Mudbrook Road) and the Huron River. The Huron River channel is approximately 200 feet wide at the crossing location, and based on hydrographic survey data, about 10 feet deep. The proposed HDD alignment is located north of, and runs parallel to, an existing overhead power corridor. Both sides of the crossing consist of wooded and agricultural land. Refer to Figure 1 for a general overview of the vicinity of the crossing. Figures 2 and 3 provide overviews of the entry and exit areas taken during the site reconnaissance.

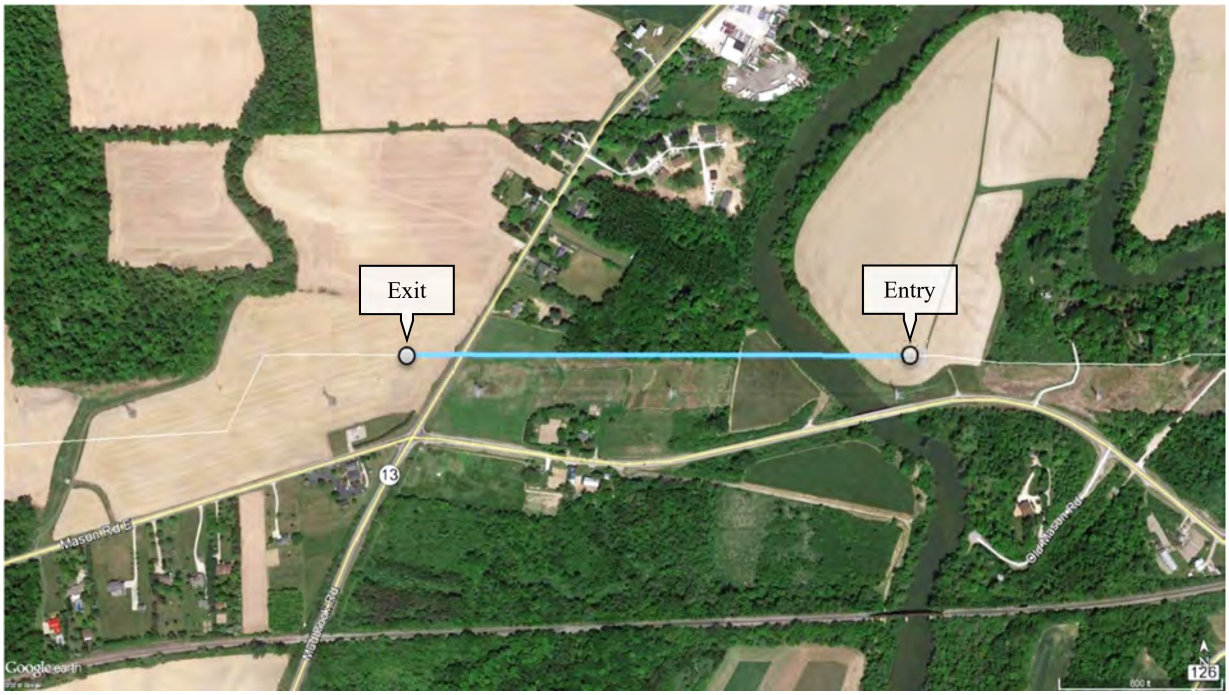


Figure 1: Overview of the Huron River Crossing

Figure 2: View looking north from Mason Road East toward entry point

Figure 3: View looking west from Mudbrook Road toward exit location

Subsurface Conditions

Four geotechnical borings were drilled at the proposed crossing site. Three of the borings were taken in a farm field on the east side of the river. One boring was taken west of Mudbrook Road. In general, the borings indicate mostly lean clay with increasing sand content with depth, overlying shale bedrock. The top of bedrock was encountered at approximately 30 feet below the ground surface on the east side and approximately 58 feet below the ground surface on the west side. In general, based on rock quality designation (RQD) index values, the bedrock is fair to good quality, with unconfined compressive strength (UCS) ranging from 4,070 psi to 13,600 psi. Methane gas was encountered at approximately 55 feet below the ground surface in boring HUR-02 and at approximately 53 feet below the surface in boring HUR-02A.

Refer to the Geotechnical data report prepared by Fugro Consultants, Inc. titled "Geotechnical Data Report, Huron River HDD Crossing, Nexus Gas Transmission Project, Erie County, Ohio" and dated September 11, 2015 for additional information.

Design Geometry & Layout

The proposed Huron River HDD design involves a horizontal length of 2,423 feet. It utilizes a 10-degree entry angle, an 8-degree exit angle, and radius of curvature of 3,600 feet. The crossing design is based on obtaining 40 feet of cover beneath the river and 40 feet of cover beneath Mudbrook Road.

The entry point is located on the east side of the crossing in a farm field, approximately 400 feet from the centerline of Huron River. The exit point is located on the west side of the crossing, approximately 250 feet west of Mudbrook Road in a farm field. The exit point is located on the west side to make use of the open farm fields for pull section fabrication, which allows continuous stringing and avoids the necessity for a tie-in weld during pullback.

Workspace available for HDD operations is shown on the HDD plan and profile drawing included in this site-specific report.

Assessment of Feasibility

Based on a review of available geotechnical and other site-specific mapping, the proposed 36-inch crossing of the Huron River is feasible. Although large diameter crossings through rock have a higher risk of operational problems, with the right downhole tool selections and sound planning, skilled and experienced HDD contractors will be able to complete the crossing. This is not to say the crossing will be easy. It involves an elevation differential of 47 feet. This means that during reaming operations, approximately 400 feet of the reamed hole on the west side will be empty as the drilling fluid seeks equilibrium at lower elevations. This can make hole stabilization difficult which in turn can complicate reaming operations.

Risk Identification and Assessment

The most significant impact associated with HDD construction at this location involves damage to Mudbrook Road due to sinkhole formation. As mentioned previously, the reamed hole on the west side beneath Mudbrook Road will likely be empty and will be susceptible to inflow of loose soil, which eventually can result in sinkhole formation at the ground surface. The risk of sinkhole formation in the overburden is amplified by what are likely to be extended reaming durations associated with passing through hard rock. Temporary surface casing may be required to reduce the risk of settlement to Mudbrook Road. Inadvertent drilling fluid returns surfacing within the river are also a possibility. Given the depth of cover however, the risk of drilling fluid impact to the river is considered low.

HDD construction and operational problems involved with the Huron River Crossing include the possibility of failure of large diameter rock reaming tools downhole, hole misalignment at the soil/rock interface which can lead to tools binding or the product pipeline getting lodged, and operational problems resulting from circulation loss downhole. In addition, caving of the reamed hole on the west side resulting from lack of drilling fluid can complicate reaming operations. Finally, methane gas was detected in two of the borings. Although in JDH&A’s experience it would be rare that a methane pocket would result in a failed HDD installation, there is the potential that methane gas, if the flow is great enough, could pose a safety risk during HDD operations. Prior to construction, HDD contractors should develop contingency measures to implement in the event that gas flow is encountered. Likewise, it also possible that the annulus surrounding the installed pipeline could serve as a conduit for continued gas flow to the surface. Therefore, a post-construction monitoring plan should be established so that remedial measures to control or eliminate gas flow, if needed, can be employed.

Based on the length of the crossing as well as the subsurface conditions, the risk level is considered average.

Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse-case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the loading scenarios described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 368,009 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 467,524 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 4. Detailed calculations for each scenario are summarized in Figures 5 and 6.

Line Pipe Properties		
Pipe Outside Diameter =	36.000	in
Wall Thickness =	0.741	in
Specified Minimum Yield Strength =	70,000	psi
Young's Modulus =	2.9E+07	psi
Moment of Inertia =	12755.22	in^4
Pipe Face Surface Area =	82.08	in^2
Diameter to Wall Thickness Ratio, D/t =	49	
Poisson's Ratio =	0.3	
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F
Pipe Weight in Air =	279.04	lb/ft
Pipe Interior Volume =	6.50	ft^3/ft
Pipe Exterior Volume =	7.07	ft^3/ft
HDD Installation Properties		
Drilling Mud Density =	12.0	ppg
=	89.8	lb/ft^3
Ballast Density =	62.4	lb/ft^3
Coefficient of Soil Friction =	0.30	
Fluid Drag Coefficient =	0.025	psi
Ballast Weight =	405.51	lb/ft
Displaced Mud Weight =	634.48	lb/ft

Figure 4: Pipe and Installation Properties

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
PIpe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 406.0 ft
Exit Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = 279.0 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 33,469 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 0 lb
Fluidic drag is calculated as zero unless entire segment is submerged in drilling fluid. Please reference Step 2, Drilled Path Input
Axial Segment Weight = $W_e\ L \sin\theta$ = -19,671 lb
Negative value indicates axial weight applied in direction of installation
Pulling Load on Exit Tangent = 13,797 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 628.3 ft
Segment Angle with Horizontal, θ = -10.0 °
Deflection Angle, α = -5.0 °
Average Tension, T = 79,670 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 13.70 ft
$j = [(E\ I) / T]^{1/2}$ = 2,155
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 4.0E+06
$X = (3\ L) - [\ (j\ /\ 2) \tanh(U/2)\ ]$ = 870.79
$U = (12\ L) / j$ = 3.50
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 151,604 lb
Bending Frictional Drag = $2\ \mu\ N$ = 90,962 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 21,318 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 19,464 lb
Pulling Load on Exit Sag Bend = 131,745 lb
Total Pulling Load = 145,542 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 762.3 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 81,290 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 25,866 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 0 lb
Pulling Load on Bottom Tangent = 107,156 lb
Total Pulling Load = 252,698 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 628.3 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 304,462 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 13.70 ft
$j = [(E\ I) / T]^{1/2}$ = 1,102
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 6.0E+06
$X = (3\ L) - [\ (j\ /\ 2) \tanh(U/2)\ ]$ = 1335.01
$U = (12\ L) / j$ = 6.84
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 169,456 lb
Bending Frictional Drag = $2\ \mu\ N$ = 101,673 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 21,318 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -19,464 lb
Negative value indicates axial weight applied in direction of installation
Pulling Load on Entry Sag Bend = 103,527 lb
Total Pulling Load = 356,225 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 152.6 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 16,024 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 5,177 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -9,418 lb
Negative value indicates axial weight applied in direction of installation
Pulling Load on Entry Tangent = 11,783 lb
Total Pulling Load = 368,009 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	4,484	ok	0	ok	0	ok	0.07	ok	0.01	ok
	4,340	ok	0	ok	401	ok	0.07	ok	0.01	ok
PC										
	4,340	ok	12,083	ok	401	ok	0.33	ok	0.10	ok
	3,079	ok	12,083	ok	1229	ok	0.31	ok	0.12	ok
PT										
	3,079	ok	0	ok	1229	ok	0.05	ok	0.04	ok
	1,773	ok	0	ok	1229	ok	0.03	ok	0.03	ok
PC										
	1,773	ok	12,083	ok	1229	ok	0.29	ok	0.11	ok
	168	ok	12,083	ok	401	ok	0.27	ok	0.06	ok
PT										
	168	ok	0	ok	401	ok	0.00	ok	0.00	ok
Exit Point	0	ok	0	ok	0	ok	0.00	ok	0.00	ok

Figure 5: Installation Loading and Stress Analysis (As-Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 707.4 ft
Exit Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 74,289 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 24,003 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 43,664 lb

Pulling Load on Exit Tangent = 141,955 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 314.2 ft
Segment Angle with Horizontal, θ = -10.0 °
Deflection Angle, α = -5.0 °
Average Tension, T = 186,767 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 6.85 ft
$j = [(E\ I) / T]^{1/2}$ = 1,407
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 7.7E+05
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 329.22
$U = (12\ L) / j$ = 2.68
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 115,386 lb
Bending Frictional Drag = $2\ \mu\ N$ = 69,232 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 10,659 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 9,732 lb

Pulling Load on Exit Sag Bend = 89,623 lb
Total Pulling Load = 231,578 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 843.7 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 89,970 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 28,627 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 118,597 lb
Total Pulling Load = 350,175 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 314.2 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 391,319 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 6.85 ft
$j = [(E\ I) / T]^{1/2}$ = 972
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 1.1E+06
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 476.07
$U = (12\ L) / j$ = 3.88
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 135,602 lb
Bending Frictional Drag = $2\ \mu\ N$ = 81,361 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 10,659 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -9,732 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 82,288 lb
Total Pulling Load = 432,463 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 454.0 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 47,680 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 15,405 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -28,024 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 35,061 lb
Total Pulling Load = 467,524 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	5,696	ok	0	ok	0	ok	0.09	ok	0.01	ok
	5,269	ok	0	ok	1194	ok	0.08	ok	0.04	ok
PC										
	5,269	ok	24,167	ok	1194	ok	0.61	ok	0.34	ok
	4,266	ok	24,167	ok	1608	ok	0.60	ok	0.36	ok
PT										
	4,266	ok	0	ok	1608	ok	0.07	ok	0.06	ok
	2,821	ok	0	ok	1608	ok	0.04	ok	0.06	ok
PC										
	2,821	ok	24,167	ok	1608	ok	0.57	ok	0.33	ok
	1,729	ok	24,167	ok	1194	ok	0.56	ok	0.28	ok
PT										
	1,729	ok	0	ok	1194	ok	0.03	ok	0.03	ok
Exit Point	0	ok	0	ok	-666	ok	0.00	ok	0.01	ok

Figure 6: Installation Loading and Stress Analysis (Worse-Case Scenario)

Hydrofracture Evaluation

The Huron River Crossing will be installed almost entirely through bedrock. Since the Delft Equation (Discussed previously in Section 5 of this report) is only applicable to soil, a hydrofracture evaluation was not completed. In general, inadvertent drilling fluid returns due to hydrofracture do not typically occur on rock crossings, but instead occur by flowing through existing fractures, joints, or solution cavities.

Construction Duration

The estimated duration of construction for the proposed crossing is 60 days. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated by JDH&A based on information contained within the Pipeline Research Council International's "*Installation of Pipelines by Horizontal Directional Drilling*"[1], as well as past experience in similar subsurface conditions. Refer to Figure 7 for details relative to the estimate.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.

General Data		Comments
Work Schedule, hours/shift =	12.0	36" Huron River Crossing.
days/week =	7.0	
Drilled Length, feet =	2,437	
Pilot Hole		
Production Rate, feet/hour =	25	
shifts/day =	1	
Drilling Duration, hours =	97.5	
shifts =	8.1	
Trips to change tools, shifts =	1.0	
Pilot Hole Duration, days =	9.1	

Ream and Pull Back								
Pass Description =	24-inch	36-inch	48-inch			Swab	Pull Back	Total
Travel Speed, feet/minute =	0.3	0.3	0.3			8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0	15.0			15.0	7.0	
shifts/day =	1	1	1			1	1	
Reaming Duration, hours =	165.1	165.1	165.1			7.7	9.4	512.3
shifts =	13.8	13.8	13.8			0.6	0.8	42.7
Rig up, shifts =	0.5	0.5	0.5			0.5	0.5	2.5
Trips to change tools, shifts =	1.0	1.0	1.0			0.0		3.0
Pass Duration, days =	15.3	15.3	15.3			1.1	1.3	48.2

Summary	
HDD Duration at Site, days =	59.3

Site Establishment	Move in	Rig Up	Rig Down	Move Out
shifts/day =	1	1	1	1
shifts =	0.5	1.0	1.0	0.5
days =	0.5	1.0	1.0	0.5

Figure 7: Estimated Construction Duration

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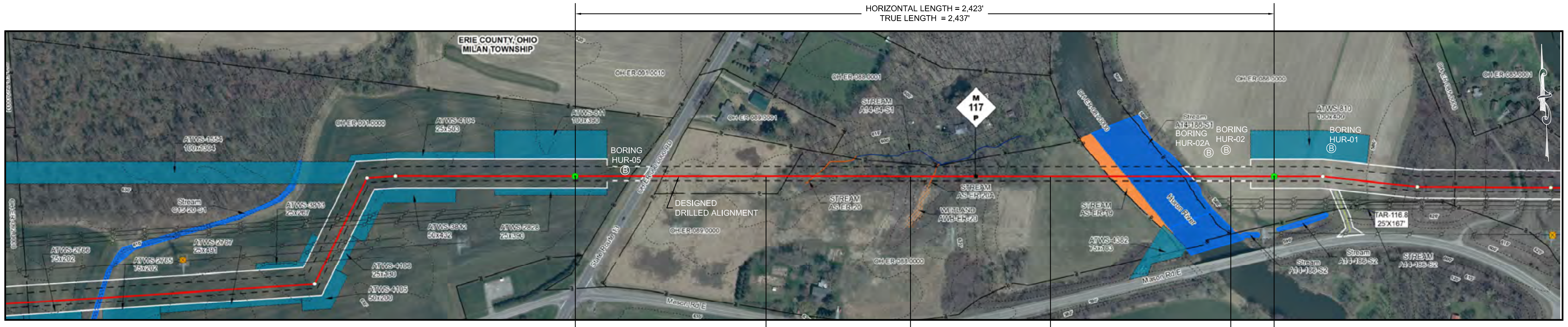
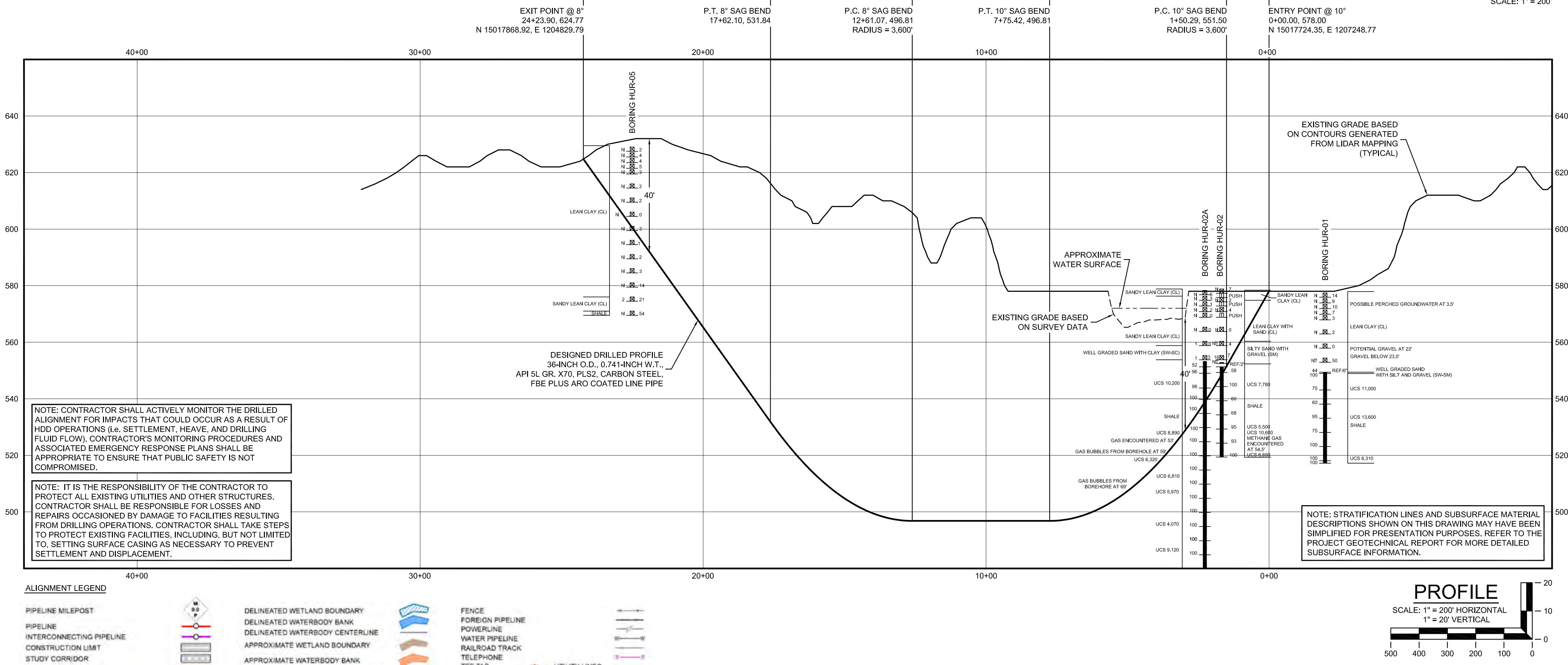
[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.



PLAN

SCALE: 1" = 200'



NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING MAY HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

PROFILE

SCALE: 1" = 200' HORIZONTAL
1" = 20' VERTICAL

ALIGNMENT LEGEND

PIPELINE MILEPOST	◇
PIPELINE	—○—
INTERCONNECTING PIPELINE	—○—
CONSTRUCTION LIMIT	▭
STUDY CORRIDOR	▭
STAGING AREA	🟨
WAREYARD	🟩
PERMANENT ROW	▭
ADDITIONAL TEMPORARY WORKSPACE	🟦
METERING & REGULATION STATION (M&R)	▭
COMPRESSOR STATION SITE	🟥
FACILITIES TEMPORARY WORKSPACE	🟧
FACILITIES PERMANENT WORKSPACE	🟥
DELINEATED WETLAND BOUNDARY	▨
DELINEATED WATERBODY BANK	🟦
DELINEATED WATERBODY CENTERLINE	—
APPROXIMATE WETLAND BOUNDARY	▨
APPROXIMATE WATERBODY BANK	🟧
APPROXIMATE WATERBODY CENTERLINE	—
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
PARCEL TRACT NO	OH-CO-011.0000-SC
PROPERTY LINE	—ℓ—
CONTOUR	- - 120' - -
MUNICIPALITY LINE	— —
FENCE	—×—
FOREIGN PIPELINE	—
POWERLINE	—
WATER PIPELINE	W—W
RAILROAD TRACK	—
TELEPHONE	T—T
TEE TAP	✚
UTILITY LINES	—
BLOW OFF VALVE	⋈
MAINLINE VALVE (MLV)	⋈
TOWER	⊠
MICROWAVE TOWER	■
HORIZONTAL DIRECTIONAL DRILLING	●
TANK	●
LIGHT POLE	●
FIRE HYDRANT	●
WELL: GAS	✚
WATER	●
OIL	●
UNKNOWN	✚

GENERAL LEGEND

◐ DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR, SURVEY, AND HYDROGRAPHIC DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

GEOTECHNICAL LEGEND

Ⓑ BORING LOCATION

SPLIT SPOON SAMPLE

53 ⊠ 23 ← PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

PUSH SAMPLE

CORE BARREL SAMPLE

UCS 6,250 ← UNCONFINED COMPRESSIVE STRENGTH (PSI)
53 6 ← MOHS HARDNESS
ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY FUGRO CONSULTANTS, INC, BATON ROUGE, LOUISIANA. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED SEPTEMBER 11, 2015 FOR ADDITIONAL INFORMATION.

2. THE LETTER "N" TO THE LEFT OF A SPLIT SPOON SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TESTS WERE PERFORMED.

3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGEMENT IN INTERPRETING THIS DATA.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE.

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		2	ACM	JMS	RE-ISSUED FOR FERC
WADS-A-1131	ALIGNMENT SHEET M.P. 117.20 TO M.P. 118.15	1	LKB	JMS	ISSUED FOR BID
WADS-A-1130	ALIGNMENT SHEET M.P. 116.25 TO M.P. 117.20	0	LKB	ACM	ISSUED FOR FERC

IG.#

John D. Hair, P.E.
Consulting Engineer

2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS

TITLE	PRELIMINARY SIGNATURE	DATE	CONSTRUCTION SIGNATURE	DATE
DRAWN BY:	DMP	08/07		
PROJECT MANAGER	JMS	08/07		
DESIGN ENGINEER	DMP	08/07		
DESIGN CHECKER	DLB	08/07		

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH HURON RIVER CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

ERIE COUNTY, OHIO

NEXUS℠ GAS TRANSMISSION

M.P. 116.8	W.O.	SCALE: AS SHOWN	DWG. WADS-H-1009	REV. 2

MP 146.3R Sandusky River

Base Data

In performing the HDD design and engineering analysis, we have relied upon the following information:

- A combination of LiDAR, hydrographic, and traditional survey data covering the proposed crossing location
- A reconnaissance of the proposed crossing location conducted in July of 2015 by a representative of JDH&A
- A geotechnical data report prepared by Fugro Consultants, Inc. titled "Geotechnical Data Report, Sandusky River HDD Crossing (REV-1), Nexus Gas Transmission Project, Sandusky County, Ohio" and dated October 2, 2015

General Site Description

The 36-inch Sandusky River Crossing is located near the intersection of State Highway 53 and Interstate 90 in Freemont, Ohio. The current revision of the HDD alignment has been shifted approximately 640 feet south of the original location (Revision 0) in order to avoid a municipal well protection zone and minimize the risk of impact to the wells. The primary obstacles to be crossed are the meandering Sandusky River as well as State Highway 53. The river is approximately 500 feet wide at the crossing location. Based on hydrographic data associated with the previous HDD alignment, the depth is approximately 15 feet. An overview of the proposed crossing location is provided in Figure 1.

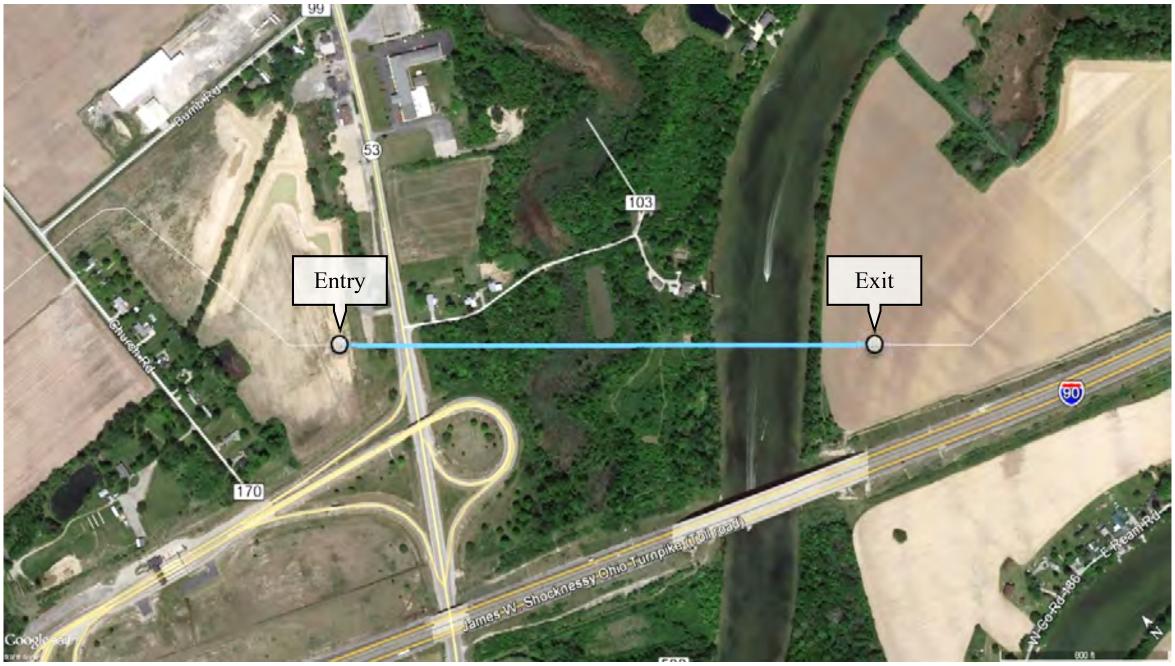


Figure 1: Overview of the Sandusky River Crossing

Subsurface Conditions

Three exploratory borings were taken as part of the geotechnical investigation conducted by Fugro Consultants, Inc. All of the borings are located on the west side of the river and approximately 500 to 600 feet north of the current alignment. SAN-1-4 encountered soft to very hard fat clay overlying dolomite bedrock. The top of bedrock was encountered at 60 feet. SAN-1-5 revealed loose to very loose fat clay to a depth of about 32 feet, and firm lean clay with gravel to 52 feet, overlying limestone bedrock. Boring SAN-1-2 encountered similar soils, with primarily clayey soils overlying limestone bedrock at approximately 75 feet. Rock quality designation (RQD) index values averaged 57 for SAN-1-4, 44 for SAN-1-5, and 86 for SAN-1-2 indicating fair to good quality rock. Small solution cavities are noted in all three borings. SAN-1-4 encountered voids from 101.5 feet to 103 feet and again at 105.5 feet. SAN-1-5 experienced small voids from 60.4 to 60.8 feet and SAN-1-2 from roughly 85 feet to termination at 135 feet. Unconfined compressive strength (UCS) of representative samples in borings SAN-1-2, SAN-1-4 and SAN-1-5 indicate values ranging from 5 psi to 11,400 psi, with an average of 4,689 psi.

In addition to the exploratory borings discussed above, four additional borings were taken as part of a subsurface investigation associated with a previous alignment located 800 to 1,500 feet to the southwest. The four additional borings encountered similar subsurface conditions to those described previously. Small voids or solution cavities were encountered in the dolomite/limestone bedrock in nearby borings SAN-02 and SAN-03 with similar loss of drilling fluids noted. UCS tests for bedrock ranged from 1,240 psi to 19,400 psi.

In addition to the possible voids in bedrock, other adverse soil conditions were encountered. Glacial till, while not revealed in the northern geotechnical borings, was observed in the four borings taken as part of the southern alignment, and therefore may be present at the crossing site. Cobble and boulders are commonly found in glacial deposits. Borings SAN-03 and SAN-05 revealed the presence of shale boulders but granite boulders were also suspected in the area.

Refer to the geotechnical data report prepared by Fugro Consultants, Inc. titled “Geotechnical Data Report, Sandusky River HDD Crossing (REV-1), Nexus Gas Transmission Project, Sandusky County, Ohio” and dated October 2, 2015 for additional information relative to the subsurface.

Design Geometry & Layout

The proposed crossing design involves a horizontal length of 2,586 feet. It utilizes a 10-degree entry angle, an 8-degree exit angle, and a radius of curvature of 3,600 feet. The crossing design maintains 40 feet of cover beneath the bottom of the east edge of the Sandusky River and 54 feet of cover beneath State Highway 53.

The exit point is located on the east side of the river in order to take advantage of an open farm field that can be used for pull section fabrication. Temporary workspace for pull section fabrication extends east and then curves to run parallel to Interstate 90, which allows for fabrication of the pull section in a single segment. The entry point is located on the west side of the river, just west of Ohio State Route 53 in an open field. A copy of the preliminary HDD plan and profile design drawing is included at the end of this section.

Assessment of Feasibility

Given solely the length and diameter of the proposed installation, it is within the range of what has been successfully completed using HDD. However, subsurface conditions have the potential to be problematic and increase the risk of HDD operational problems. More specifically, the boring logs indicate the presence of solution cavities in the limestone and dolomite bedrock. The risk of a twist-off during pilot hole drilling is magnified when large solution cavities are present. Penetration of a very large solution cavity during pilot hole drilling may leave the drill string and/or other tooling unconstrained potentially allowing it to deflect laterally. Continued rotation of a drill string when subjected to such deflection, particularly when it is under compression during pilot hole drilling, can result in failure of the drill pipe due to low-cycle fatigue.

Based on available geotechnical information, it appears that solution cavities are relatively small and limited in extent, and therefore should not prevent a successful installation. However, the risk of a encountering a large void that complicates HDD operations cannot be ruled out.

Risk Identification and Assessment

The primary construction impacts associated with installation by HDD at the Sandusky site are inadvertent drilling fluid returns surfacing within the river or within the topographically low marshy area near station 13+00. Likewise, drilling fluid impact to State Highway 53 in the form of heaving or settlement cannot be ruled out. Furthermore, due to karst features in the bedrock, there is a possibility that drilling fluid may impact water wells located within the municipal well protection zone. Although the risk is considered low given the distance (640 feet north of the current alignment), it is possible that drilling fluid could flow through a series of interconnected cavities and make its way into one of the wells.

Notable risks that may complicate HDD construction include encountering cobble or boulders, or as mentioned previously, penetrating karst features in bedrock, which may result in drill pipe failure. Other operational problems include failure of large diameter rock reaming tools downhole, hole misalignment at the soil/rock interface and operational problems resulting from loss of circulation.

Due to subsurface conditions, the risk level associated with the proposed crossing of the Sandusky River is average to high.

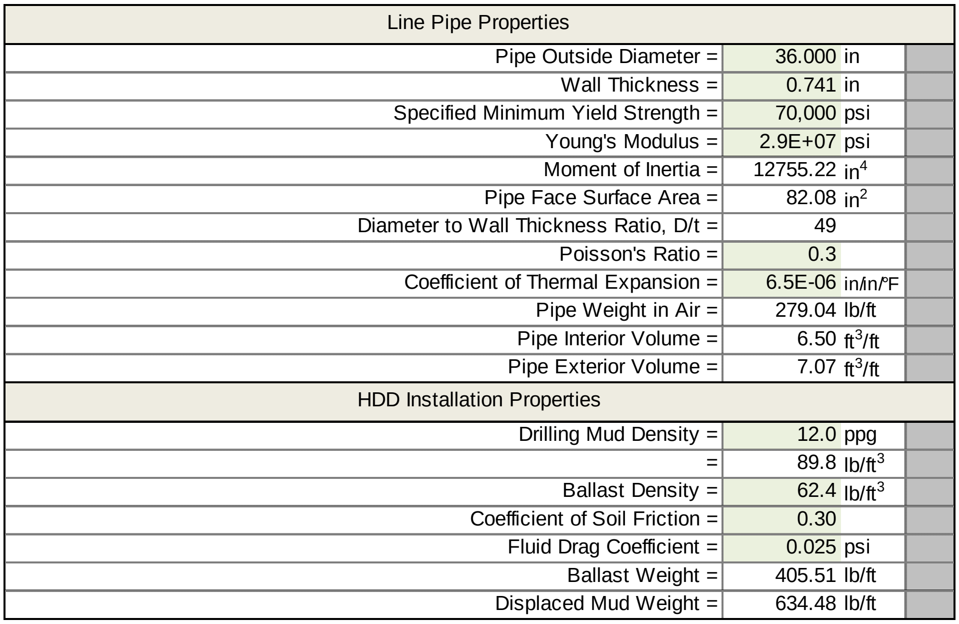
Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the conservative analysis described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 421,118 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 449,509. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 4. Detailed calculations for each installation loading scenario are summarized in Figures 5 and 6.



Line Pipe Properties		
Pipe Outside Diameter =	36.000	in
Wall Thickness =	0.741	in
Specified Minimum Yield Strength =	70,000	psi
Young's Modulus =	2.9E+07	psi
Moment of Inertia =	12755.22	in^4
Pipe Face Surface Area =	82.08	in^2
Diameter to Wall Thickness Ratio, D/t =	49	
Poisson's Ratio =	0.3	
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F
Pipe Weight in Air =	279.04	lb/ft
Pipe Interior Volume =	6.50	ft^3/ft
Pipe Exterior Volume =	7.07	ft^3/ft
HDD Installation Properties		
Drilling Mud Density =	12.0	ppg
=	89.8	lb/ft^3
Ballast Density =	62.4	lb/ft^3
Coefficient of Soil Friction =	0.30	
Fluid Drag Coefficient =	0.025	psi
Ballast Weight =	405.51	lb/ft
Displaced Mud Weight =	634.48	lb/ft

Figure 4: Pipe and Installation Properties

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 435.5 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu \cos\theta$ = 45,983 lb
Fluidic Drag = $12 \pi D L C_d$ = 14,775 lb
Axial Segment Weight = $W_e L \sin\theta$ = 21,541 lb

Pulling Load on Exit Tangent = 82,299 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 135,749 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R [1 - \cos(\alpha/2)]$ = 8.77 ft
$j = [(E I) / T]^{1/2}$ = 1,651
$Y = [18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1}]$ = 2.7E+06
$X = (3 L) - [(j / 2) \tanh(U/2)]$ = 724.25
$U = (12 L) / j$ = 3.65
$N = [(T h) - W_e \cos\theta (Y/144)] / (X / 12)$ = 128,969 lb
Bending Frictional Drag = $2 \mu N$ = 77,381 lb
Fluidic Drag = $12 \pi D L C_d$ = 17,055 lb
Axial Segment Weight = $W_e L \sin\theta$ = 12,463 lb

Pulling Load on Exit Sag Bend = 106,899 lb
Total Pulling Load = 189,198 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 735.3 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu$ = 78,403 lb
Fluidic Drag = $12 \pi D L C_d$ = 24,947 lb
Axial Segment Weight = $W_e L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 103,350 lb
Total Pulling Load = 292,548 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 628.3 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 345,331 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R [1 - \cos(\alpha/2)]$ = 13.70 ft
$j = [(E I) / T]^{1/2}$ = 1,035
$Y = [18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1}]$ = 6.1E+06
$X = (3 L) - [(j / 2) \tanh(U/2)]$ = 1368.18
$U = (12 L) / j$ = 7.29
$N = [(T h) - W_e \cos\theta (Y/144)] / (X / 12)$ = 172,856 lb
Bending Frictional Drag = $2 \mu N$ = 103,714 lb
Fluidic Drag = $12 \pi D L C_d$ = 21,318 lb
Axial Segment Weight = $W_e L \sin\theta$ = -19,464 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 105,567 lb
Total Pulling Load = 398,115 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 297.9 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu \cos\theta$ = 31,282 lb
Fluidic Drag = $12 \pi D L C_d$ = 10,107 lb
Axial Segment Weight = $W_e L \sin\theta$ = -18,386 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 23,003 lb
Total Pulling Load = 421,118 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	5,131	ok	0	ok	0	ok	0.08	ok	0.01	ok
	4,850	ok	0	ok	619	ok	0.08	ok	0.02	ok
PC										
	4,850	ok	12,083	ok	619	ok	0.34	ok	0.11	ok
	3,564	ok	12,083	ok	1448	ok	0.32	ok	0.14	ok
PT										
	3,564	ok	0	ok	1448	ok	0.06	ok	0.05	ok
	2,305	ok	0	ok	1448	ok	0.04	ok	0.04	ok
PC										
	2,305	ok	12,083	ok	1448	ok	0.30	ok	0.13	ok
	1,003	ok	12,083	ok	917	ok	0.28	ok	0.08	ok
PT										
	1,003	ok	0	ok	917	ok	0.02	ok	0.02	ok
Exit Point	0	ok	0	ok	-1	ok	0.00	ok	0.00	ok

Figure 5: Installation Loading and Stress Analysis (As-Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
PIpe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 741.0 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 78,242 lb
Fluidic Drag = 12 π D L C_d = 25,140 lb
Axial Segment Weight = W_e L sinθ = 36,654 lb

Pulling Load on Exit Tangent = 140,036 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 178,692 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 4.38 ft
j = $[(E\ I) / T]^{1/2}$ = 1,439
Y = $[18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1})]$ = 3.6E+05
X = (3 L) - [(j / 2) tanh(U/2)] = 192.10
U = (12 L) / j = 2.10
N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 104,253 lb
Bending Frictional Drag = 2 μ N = 62,552 lb
Fluidic Drag = 12 π D L C_d = 8,527 lb
Axial Segment Weight = W_e L sinθ = 6,231 lb

Pulling Load on Exit Sag Bend = 77,311 lb
Total Pulling Load = 217,347 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 748.9 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ = 79,860 lb
Fluidic Drag = 12 π D L C_d = 25,411 lb
Axial Segment Weight = W_e L sinθ = 0 lb

Pulling Load on Bottom Tangent = 105,271 lb
Total Pulling Load = 322,618 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 314.2 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 362,923 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 6.85 ft
j = $[(E\ I) / T]^{1/2}$ = 1,010
Y = $[18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1})]$ = 1.1E+06
X = (3 L) - [(j / 2) tanh(U/2)] = 461.25
U = (12 L) / j = 3.73
N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 132,805 lb
Bending Frictional Drag = 2 μ N = 79,683 lb
Fluidic Drag = 12 π D L C_d = 10,659 lb
Axial Segment Weight = W_e L sinθ = -9,732 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 80,610 lb
Total Pulling Load = 403,228 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 599.3 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 62,938 lb
Fluidic Drag = 12 π D L C_d = 20,335 lb
Axial Segment Weight = W_e L sinθ = -36,992 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 46,281 lb
Total Pulling Load = 449,509 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	5,476	ok	0	ok	0	ok	0.09	ok	0.01	ok
	4,913	ok	0	ok	1412	ok	0.08	ok	0.05	ok
PC										
	4,913	ok	24,167	ok	1412	ok	0.61	ok	0.35	ok
	3,931	ok	24,167	ok	1826	ok	0.59	ok	0.37	ok
PT										
	3,931	ok	0	ok	1826	ok	0.06	ok	0.08	ok
	2,648	ok	0	ok	1826	ok	0.04	ok	0.07	ok
PC										
	2,648	ok	24,167	ok	1826	ok	0.57	ok	0.35	ok
	1,706	ok	24,167	ok	1561	ok	0.56	ok	0.31	ok
PT										
	1,706	ok	0	ok	1561	ok	0.03	ok	0.05	ok
Exit Point	0	ok	0	ok	-1	ok	0.00	ok	0.00	ok

Figure 6: Installation Loading and Stress Analysis (Worse-Case)

Hydrofracture Evaluation

The Sandusky River crossing will be installed almost entirely through bedrock. Since the Delft Equation (Discussed previously in Section 5 of this report) is only applicable to uncemented subsurface materials, a hydrofracture evaluation was not completed. In general, inadvertent drilling fluid returns due to hydrofracture do not typically occur on rock crossings, but instead occur by flowing through existing fracture, joints, or solution cavities.

Construction Duration

The estimated duration of construction for the Sandusky River Crossing is 65 days. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated by JDH&A based on information contained within the Pipeline Research Council International's "Installation of Pipelines by Horizontal Directional Drilling"[1], as well as past experience in similar subsurface conditions. Refer to Figure 7 for additional information relative to the estimate.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.

General Data		Comments
Work Schedule, hours/shift =	12.0	36" Sandusky River Crossing
days/week =	7.0	
Drilled Length, feet =	2,600	
Pilot Hole		
Production Rate, feet/hour =	20	
shifts/day =	1	
Drilling Duration, hours =	130.0	
shifts =	10.8	
Trips to change tools, shifts =	0.5	
Pilot Hole Duration, days =	11.3	

Ream and Pull Back								
Pass Description =	24-inch	36-inch	48-inch			Swab	Pull Back	Total
Travel Speed, feet/minute =	0.3	0.3	0.3			8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0	15.0			15.0	15.0	
shifts/day =	1	1	1			1	1	
Reaming Duration, hours =	176.1	176.1	176.1			8.2	10.0	546.6
shifts =	14.7	14.7	14.7			0.7	0.8	45.6
Rig up, shifts =	0.5	0.5	0.5			0.5	0.5	2.5
Trips to change tools, shifts =	1.0	1.0	1.0			0.0		3.0
Pass Duration, days =	16.2	16.2	16.2			1.2	1.3	51.1

Summary	
HDD Duration at Site, days =	64.4

Site Establishment	Move in	Rig Up	Rig Down	Move Out
shifts/day =	1	1	1	1
shifts =	0.5	1.0	1.0	0.5
days =	0.5	1.0	1.0	0.5

Figure 7: Estimated Construction Duration

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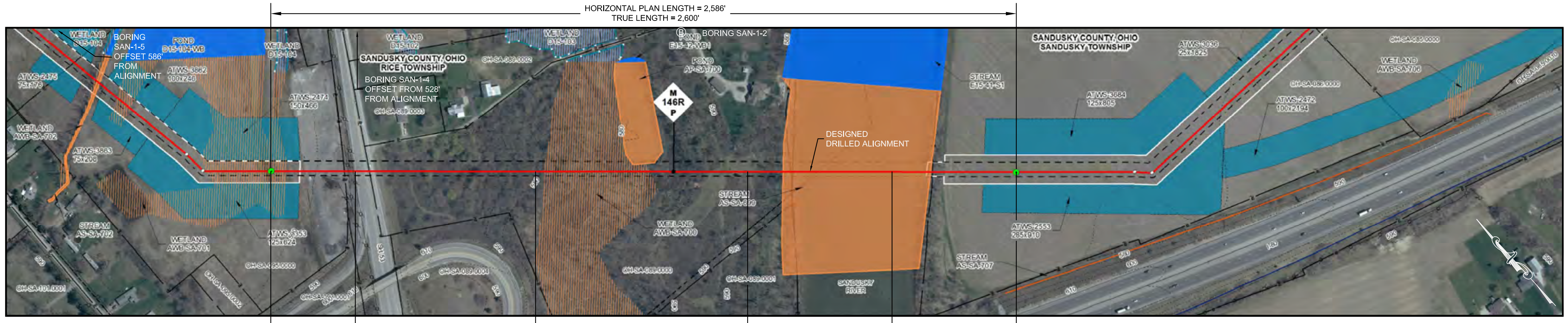
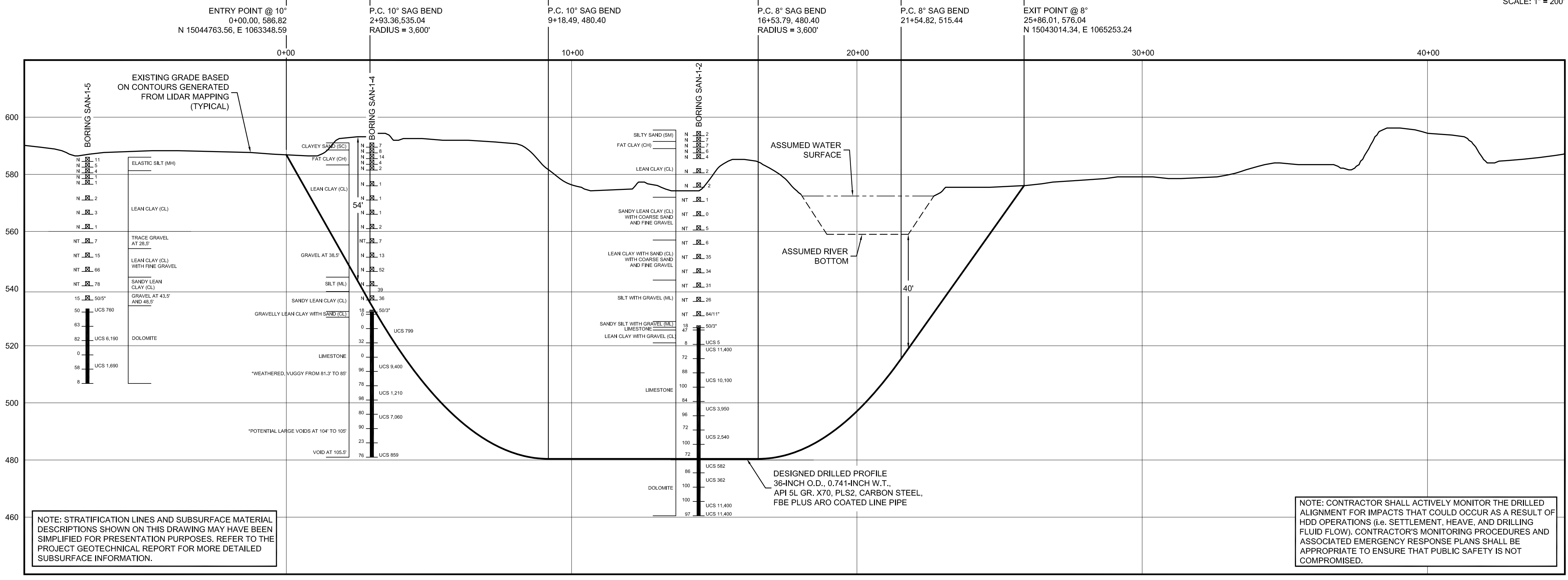
[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.



PLAN

SCALE: 1" = 200'



NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING MAY HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

PROFILE

SCALE: 1" = 200' HORIZONTAL
1" = 20' VERTICAL

500 400 300 200 100 0
0 10 20

ALIGNMENT LEGEND

PIPELINE MILEPOST
PIPELINE
INTERCONNECTING PIPELINE
CONSTRUCTION LIMIT
STUDY CORRIDOR
STAGING AREA
WAREYARD
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
METERING & REGULATION STATION (M&R)
COMPRESSOR STATION SITE
FACILITIES TEMPORARY WORKSPACE
FACILITIES PERMANENT WORKSPACE

DELINEATED WETLAND BOUNDARY
DELINEATED WATERBODY BANK
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY BANK
APPROXIMATE WATERBODY CENTERLINE
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
PARCEL TRACT NO OH-CO-011.0000-SC
PROPERTY LINE
CONTOUR ---120'---
MUNICIPALITY LINE

FENCE
FOREIGN PIPELINE
POWERLINE
WATER PIPELINE
RAILROAD TRACK
TELEPHONE
TEE TAP
UTILITY LINES
BLOW OFF VALVE
MAINLINE VALVE (MLV)
TOWER
MICROWAVE TOWER
HORIZONTAL DIRECTIONAL DRILLING
TANK ● LIGHT POLE ● FIRE HYDRANT
WELL: GAS ● WATER ● OIL ● UNKNOWN

GENERAL LEGEND

DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR, SURVEY, AND HYDROGRAPHIC DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

GEOTECHNICAL LEGEND

Ⓑ BORING LOCATION

SPLIT SPOON SAMPLE

53 23 — PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
— PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

PUSH SAMPLE

CORE BARREL SAMPLE

UCS 6,250 — UNCONFINED COMPRESSIVE STRENGTH (PSI)
53 6 — MOHS HARDNESS
— ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY FUGRO CONSULTANTS, INC, BATON ROUGE, LOUISIANA. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED OCTOBER 2, 2015 FOR ADDITIONAL INFORMATION.

2. THE LETTER "N" TO THE LEFT OF A SPLIT SPOON SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TESTS WERE PERFORMED.

3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGEMENT IN INTERPRETING THIS DATA.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE.

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		2	LKB	JMS	RE-ISSUED FOR FERC
		1	LKB	JMS	SHIFT HDD ALIGNMENT SOUTH, REVISE DESIGN, ISSUED FOR BID
CLYD-A-1161	ALIGNMENT SHEET M.P. 145.34 TO M.P. 146.29	0	LKB	JMS	ISSUED FOR FERC

IG.#

John D. Hair, P.E.
Consulting Engineer
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS

TITLE	PRELIMINARY SIGNATURE	PRELIMINARY DATE	CONSTRUCTION SIGNATURE	CONSTRUCTION DATE
DRAWN BY:	LKB	01/16		
PROJECT MANAGER	JMS	01/16		
DESIGN ENGINEER	LKB	01/16		
DESIGN CHECKER	JMS	01/28		

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH SANDUSKY RIVER
BY HORIZONTAL DIRECTIONAL DRILLING

SANDUSKY COUNTY, OHIO

NEXUS GAS TRANSMISSION

M.P. 146.3R	W.O.	SCALE: AS SHOWN	DWG. CLYD-H-1010	REV. 2

MP 162.6R Portage River

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- A combination of LiDAR, hydrographic, and traditional survey data covering the proposed crossing location
- A geotechnical data report prepared by Fugro Consultants, Inc. "Geotechnical Data Report, Portage River HDD Crossing, Nexus Gas Transmission Project, Sandusky County, Ohio" and dated September 11, 2015
- A reconnaissance of the proposed crossing location conducted in July of 2015 by a representative of JDH&A

General Site Description

The 36-inch Portage River Crossing is located near pipeline Mile Post 162.6R, southwest of Woodville, Ohio. The primary obstacles to be crossed are Pemberville Road, the channel of Portage River, and Fort Findlay Road. The land on each side of the river is essentially flat. Land use is agricultural. At the proposed crossing location, the Portage River is roughly 240 feet from bank to bank, and just over 4 feet deep at the deepest point based on hydrographic survey data. The topography slopes gently to the south toward Portage River, then rises approximately 20 feet up the south bank, and then flattens toward the south. An overview of the proposed crossing location is shown in Figure 1. Photographs taken during the site reconnaissance are provided in Figures 2 and 3.

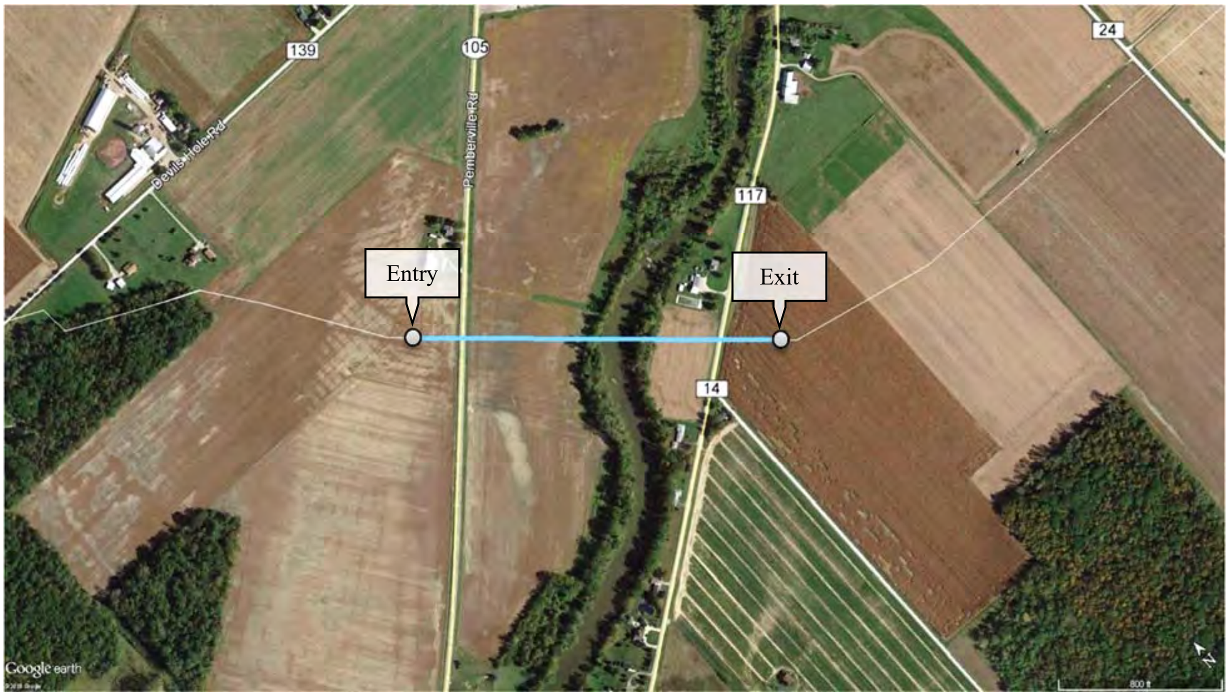


Figure 1: Overview of the Portage River Crossing

Figure 2: View looking west toward entry location

Figure 3: Portage River at proposed crossing location

Subsurface Conditions

Four geotechnical borings were taken at the proposed crossing site as part of the site-specific investigation conducted by Fugro Consultants, Inc. Two borings were taken on the north side of the river and two on the south side of the river. The borings generally encountered lean clay and gravel to depths of approximately 10 to 20 feet below the ground surface. Limestone was encountered beneath the clay at elevation 620 feet in all four borings. The boring logs indicate drilling fluid circulation was lost in two of the borings, with possible small voids encountered in all three of the borings. Unconfined compressive strength for the limestone ranged from 1,380 psi to 11,300 psi. Rock Quality Designation (RQD) index values indicate good quality, competent bedrock overall.

Refer to the geotechnical data report prepared by Fugro Consultants, Inc. "Geotechnical Data Report, Portage River HDD Crossing, Nexus Gas Transmission Project, Sandusky County, Ohio" and dated September 11, 2015 for additional information.

Design Geometry & Layout

The proposed Portage River HDD design has a horizontal length of 1,790 feet. It utilizes a 10-degree entry angle, an 8-degree exit angle, and maintains 40 feet of cover beneath Pemberville Road and Fort Findlay Road. The crossing passes deep within limestone bedrock and maintains 67 feet of separation from the bottom of Portage River.

The entry point is located on the north side of the crossing in a farm field, approximately 262 feet from the centerline of Pemberville Road and 1,005 feet from the centerline of Portage River. The exit point is located on the south side of Fort Findlay Road in a farm field, approximately 270 feet from the centerline of Fort Findlay Road and 785 feet from the centerline of the river. The exit point is located on the south side to make use of the open farm fields for pull section fabrication, which allows continuous stringing and avoids the necessity for a tie-in weld during pullback.

The proposed HDD design, as well as available workspace for HDD operations, is shown on the preliminary HDD plan and profile drawing included at the end of this site-specific report.

Assessment of Feasibility

Given solely the length and diameter of the proposed installation, it is within the range of what has been successfully completed using HDD. However, subsurface conditions have the potential to be problematic and increase the risk of HDD operational problems. More specifically, the borings logs indicate solution cavities are present in the limestone and dolomite bedrock. The risk of a twist-off during pilot hole drilling is magnified when large solution cavities are present. Penetration of a very large solution cavity during pilot hole drilling may leave the drill string and/or other tooling unconstrained potentially allowing it to deflect laterally. Continued rotation of a drill string when subjected to such deflection, particularly when it is under compression during pilot hole drilling, can result in failure of the drill pipe due to low-cycle fatigue.

Based on available geotechnical information, it appears that solution cavities are relatively small and limited in overall extent. Therefore, the cavities should not prevent a successful installation. However, the risk of a encountering a large void cannot be ruled out.

Risk Identification and Assessment

Notable risks to consider at this crossing are impacts to both Pemberville and Fort Findlay Road resulting from drilling fluid flow (inadvertent returns, settlement, or heave), as well as inadvertent drilling fluid returns within the Portage River.

Construction risks associated with the Portage River Crossing include failure of large diameter rock reaming tools downhole, hole misalignment at the soil/rock interface which can lead to tools or the product pipeline getting lodged, and operational problems resulting from circulation loss through existing fractures or voids. Small solution cavities (voids) were noted in two of the borings. Although small voids can serve as a flow conduit for drilling fluid, they generally do not prevent a successful installation. However, a very large solution cavity, if encountered, can seriously restrict HDD operations.

Overall, the risk level for the Portage River crossing is considered average.

Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse-case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the conservative analysis described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 307,266 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 334,509 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 4. Detailed calculations for each installation loading scenario are summarized in Figures 5 and 6.

Line Pipe Properties			
Pipe Outside Diameter =	36.000	in	
Wall Thickness =	0.741	in	
Specified Minimum Yield Strength =	70,000	psi	
Young's Modulus =	2.9E+07	psi	
Moment of Inertia =	12755.22	in^4	
Pipe Face Surface Area =	82.08	in^2	
Diameter to Wall Thickness Ratio, D/t =	49		
Poisson's Ratio =	0.3		
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F	
Pipe Weight in Air =	279.04	lb/ft	
Pipe Interior Volume =	6.50	ft^3/ft	
Pipe Exterior Volume =	7.07	ft^3/ft	
HDD Installation Properties			
Drilling Mud Density =	12.0	ppg	
=	89.8	lb/ft^3	
Ballast Density =	62.4	lb/ft^3	
Coefficient of Soil Friction =	0.30		
Fluid Drag Coefficient =	0.025	psi	
Ballast Weight =	405.51	lb/ft	
Displaced Mud Weight =	634.48	lb/ft	

Figure 4: Pipe and Installation Properties

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
PIpe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30

Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 357.0 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu\ \cos\theta$ = 37,697 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 12,113 lb

Axial Segment Weight = $W_e\ L\ \sin\theta$ = 17,660 lb

Pulling Load on Exit Tangent = 67,470 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °

Average Tension, T = 120,612 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 8.77 ft

$j = [(E\ I) / T]^{1/2}$ = 1,751

$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 2.5E+06

$X = (3\ L) - [\ (j\ /\ 2)\ \tanh(U/2)\ ]$ = 686.52

$U = (12\ L) / j$ = 3.44

$N = [(T\ h) - W_e\ \cos\theta\ (Y/144)] / (X / 12)$ = 127,943 lb

Bending Frictional Drag = $2\ \mu\ N$ = 76,766 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 17,055 lb

Axial Segment Weight = $W_e\ L\ \sin\theta$ = 12,463 lb

Pulling Load on Exit Sag Bend = 106,284 lb
Total Pulling Load = 173,754 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 139.5 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 14,873 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 4,732 lb

Axial Segment Weight = $W_e\ L\ \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 19,605 lb
Total Pulling Load = 193,359 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 628.3 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °

Average Tension, T = 243,625 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 13.70 ft

$j = [(E\ I) / T]^{1/2}$ = 1,232

$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 5.7E+06

$X = (3\ L) - [\ (j\ /\ 2)\ \tanh(U/2)\ ]$ = 1271.56

$U = (12\ L) / j$ = 6.12

$N = [(T\ h) - W_e\ \cos\theta\ (Y/144)] / (X / 12)$ = 164,463 lb

Bending Frictional Drag = $2\ \mu\ N$ = 98,678 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 21,318 lb

Axial Segment Weight = $W_e\ L\ \sin\theta$ = -19,464 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 100,532 lb
Total Pulling Load = 293,890 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 173.2 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu\ \cos\theta$ = 18,189 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 5,877 lb

Axial Segment Weight = $W_e\ L\ \sin\theta$ = -10,691 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 13,375 lb
Total Pulling Load = 307,266 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	3,743	ok	0	ok	0	ok	0.06	ok	0.00	ok
	3,581	ok	0	ok	448	ok	0.06	ok	0.01	ok
PC										
	3,581	ok	12,083	ok	448	ok	0.32	ok	0.09	ok
	2,356	ok	12,083	ok	1276	ok	0.30	ok	0.12	ok
PT										
	2,356	ok	0	ok	1276	ok	0.04	ok	0.04	ok
	2,117	ok	0	ok	1276	ok	0.03	ok	0.03	ok
PC										
	2,117	ok	12,083	ok	1276	ok	0.30	ok	0.12	ok
	822	ok	12,083	ok	745	ok	0.28	ok	0.07	ok
PT										
	822	ok	0	ok	745	ok	0.01	ok	0.01	ok
Exit Point	0	ok	0	ok	-7	ok	0.00	ok	0.00	ok

Figure 5: Installation Loading and Stress Analysis (As-Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
PIpe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30

Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 662.5 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 69,957 lb

Fluidic Drag = 12 π D L C_d = 22,478 lb

Axial Segment Weight = W_e L sinθ = 32,773 lb

Pulling Load on Exit Tangent = 125,207 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °

Average Tension, T = 163,494 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 4.38 ft

j = $[(E I) / T]^{1/2}$ = 1,504

Y = $[18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1}]$ = 3.4E+05

X = (3 L) - [(j / 2) tanh(U/2)] = 180.41

U = (12 L) / j = 2.01

N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 103,024 lb

Bending Frictional Drag = 2 μ N = 61,814 lb

Fluidic Drag = 12 π D L C_d = 8,527 lb

Axial Segment Weight = W_e L sinθ = 6,231 lb

Pulling Load on Exit Sag Bend = 76,573 lb
Total Pulling Load = 201,780 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 153.2 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ = 16,331 lb

Fluidic Drag = 12 π D L C_d = 5,197 lb

Axial Segment Weight = W_e L sinθ = 0 lb

Pulling Load on Bottom Tangent = 21,528 lb
Total Pulling Load = 223,308 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 314.2 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °

Average Tension, T = 260,582 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 6.85 ft

j = $[(E I) / T]^{1/2}$ = 1,191

Y = $[18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1}]$ = 9.2E+05

X = (3 L) - [(j / 2) tanh(U/2)] = 395.06

U = (12 L) / j = 3.16

N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 122,701 lb

Bending Frictional Drag = 2 μ N = 73,621 lb

Fluidic Drag = 12 π D L C_d = 10,659 lb

Axial Segment Weight = W_e L sinθ = -9,732 lb

Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 74,548 lb
Total Pulling Load = 297,856 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 474.7 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 49,845 lb

Fluidic Drag = 12 π D L C_d = 16,105 lb

Axial Segment Weight = W_e L sinθ = -29,297 lb

Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 36,653 lb
Total Pulling Load = 334,509 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	4,075	ok	0	ok	0	ok	0.06	ok	0.01	ok
	3,629	ok	0	ok	1240	ok	0.06	ok	0.04	ok
PC										
	3,629	ok	24,167	ok	1240	ok	0.59	ok	0.32	ok
	2,721	ok	24,167	ok	1654	ok	0.57	ok	0.33	ok
PT										
	2,721	ok	0	ok	1654	ok	0.04	ok	0.06	ok
	2,458	ok	0	ok	1654	ok	0.04	ok	0.06	ok
PC										
	2,458	ok	24,167	ok	1654	ok	0.57	ok	0.33	ok
	1,525	ok	24,167	ok	1389	ok	0.55	ok	0.29	ok
PT										
	1,525	ok	0	ok	1389	ok	0.02	ok	0.04	ok
Exit Point	0	ok	0	ok	-7	ok	0.00	ok	0.00	ok

Figure 6: Installation Loading and Stress Analysis (Worse-Case)

Hydrofracture Evaluation

The Portage River Crossing will be installed almost entirely through bedrock. Since the Delft Equation (Discussed previously in Section 5 of this report) is only applicable to soil, a hydrofracture evaluation was not completed. In general, inadvertent drilling fluid returns due to hydrofracture do not typically occur on rock crossings, but instead occur by flowing through existing fractures, joints, or solution cavities.

Construction Duration

The estimated duration of construction for the Portage River Crossing is 46 days. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated by JDH&A based on information contained within the Pipeline Research Council International's "*Installation of Pipelines by Horizontal Directional Drilling*"[1], as well as past experience in similar subsurface conditions. Refer to Figure 7 for details relative to the estimate.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.

General Data		Comments						
Work Schedule, hours/shift =	12.0	36" Portage River Crossing						
days/week =	7.0							
Drilled Length, feet =	1,801							
Pilot Hole								
Production Rate, feet/hour =	25							
shifts/day =	1							
Drilling Duration, hours =	72.0							
shifts =	6.0							
Trips to change tools, shifts =	0.5							
Pilot Hole Duration, days =	6.5							
Ream and Pull Back								
Pass Description =	24-inch	36-inch	48-inch			Swab	Pull Back	Total
Travel Speed, feet/minute =	0.3	0.3	0.3			8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0	15.0			15.0	15.0	
shifts/day =	1	1	1			1	1	
Reaming Duration, hours =	122.0	122.0	122.0			5.7	6.9	378.6
shifts =	10.2	10.2	10.2			0.5	0.6	31.6
Rig up, shifts =	0.5	0.5	0.5			0.5	0.5	2.5
Trips to change tools, shifts =	1.0	1.0	1.0			0.0		3.0
Pass Duration, days =	11.7	11.7	11.7			1.0	1.1	37.1
Summary								
HDD Duration at Site, days =	45.6							
Site Establishment	Move in	Rig Up	Rig Down	Move Out				
shifts/day =	1	1	1	1				
shifts =	0.5	1.0	1.0	0.5				
days =	0.5	1.0	1.0	0.5				

Figure 7: Estimated Construction Duration

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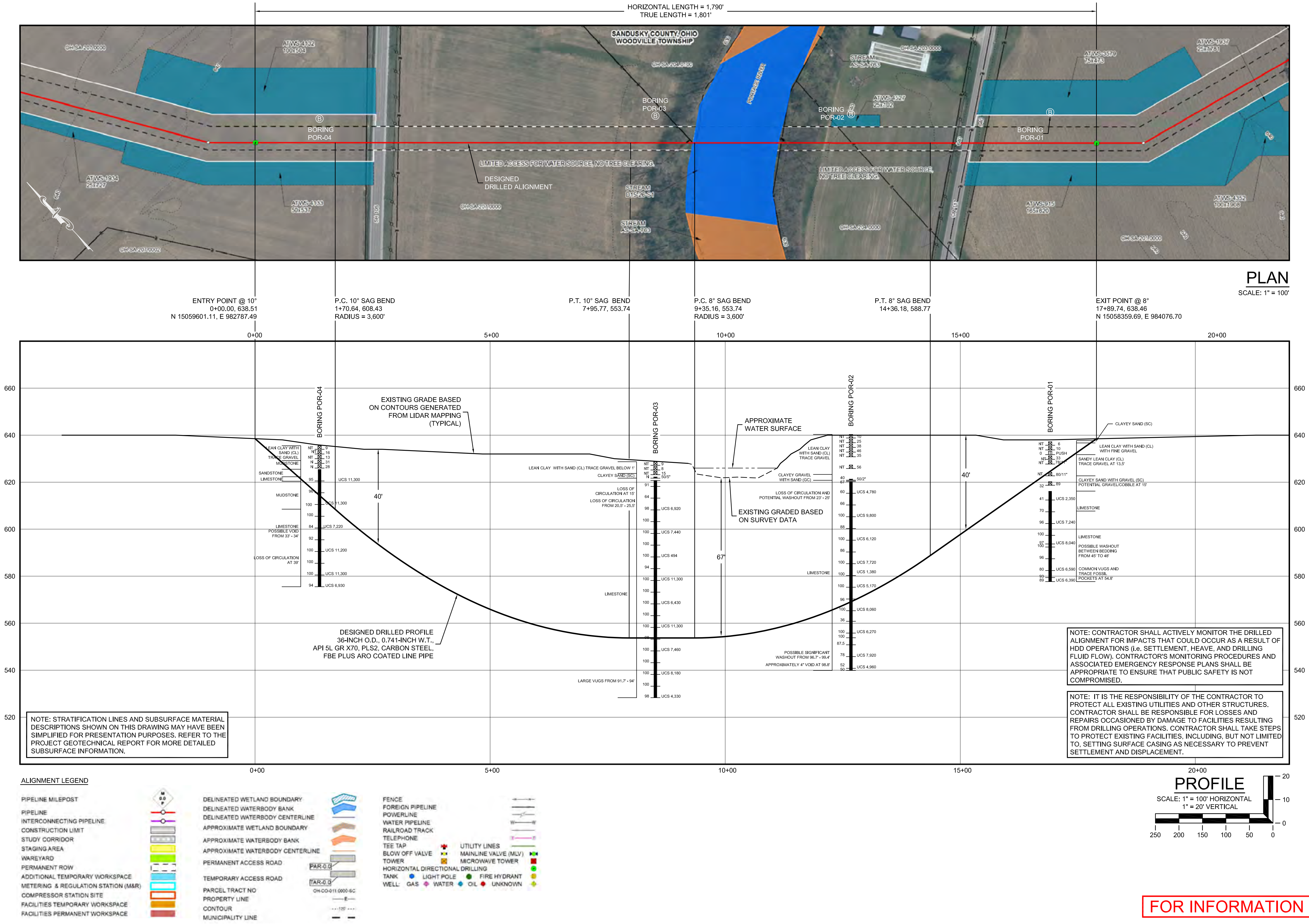
[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.



NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING MAY HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

GENERAL LEGEND

⊕ DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR, SURVEY, AND HYDROGRAPHIC DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

GEOTECHNICAL LEGEND

Ⓑ BORING LOCATION

SPLIT SPOON SAMPLE

53 ☒ 23 — PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
— PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

PUSH SAMPLE

CORE BARREL SAMPLE

UCS 6,250 — UNCONFINED COMPRESSIVE STRENGTH (PSI)
TSS 1,350 — TENSILE SPLITTING STRENGTH (PSI)
53 6 — MOHS HARDNESS
— ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY FUGRO CONSULTANTS, INC, BATON ROUGE, LOUISIANA. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED SEPTEMBER 11, 2015 FOR ADDITIONAL INFORMATION.

2. THE LETTER "N" TO THE LEFT OF A SPLIT SPOON SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TESTS WERE PERFORMED.

3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGEMENT IN INTERPRETING THIS DATA.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

		3	LKB	JMS	RE-ISSUED FOR FERC
		2	DLB	JMS	ADD DEPTH CRITERIA AND UPDATE CENTERLINE
		1	LKB	JMS	ISSUED FOR BID
CLYD-A-1179	ALIGNMENT SHEET M.P. 162.32 TO M.P. 163.27	0	LKB	ACM	ISSUED FOR FERC
DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION

IG.#

John D. Hair, P.E.
Consulting Engineer
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS				
	PRELIMINARY		CONSTRUCTION	
DRAWN BY:	ACM/DMP	08/07		
PROJECT MANAGER	JMS	08/07		
DESIGN ENGINEER	DMP	08/07		
DESIGN CHECKER	DLB	08/07		
TITLE	SIGNATURE	DATE	SIGNATURE	DATE

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH PORTAGE RIVER CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

SANDUSKY COUNTY, OHIO

NEXUS GAS TRANSMISSION

M.P. 162.6R	W.O.	SCALE: AS SHOWN	DWG. CLYD-H-1011	REV. 3

MP 180.1R Findlay Road

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- A combination of LiDAR and traditional survey data covering the proposed crossing location
- A geotechnical data report prepared by Fugro Consultants, Inc. titled "Geotechnical Data Report, State Route No. 64 HDD Crossing, Nexus Gas Transmission Project, Wood County Ohio" and dated October 2, 2015
- A reconnaissance of the proposed crossing location conducted in July of 2015 by a representative of JDH&A

General Site Description

The 36-inch State Route 64 (Findlay Road) Crossing is located near pipeline Mile Post 180.1R, approximately 1 mile east of the proposed Maumee River Crossing, and just south of Waterville, Ohio. The primary obstacles to be crossed include Findlay Road and a small stream that runs parallel to the road on the west side. The stream is approximately 75 feet wide from the top of west bank to the top of the east bank. The topography in the area is flat. The land is partially wooded in the proximity of the road. The east side of the crossing consists of open farm fields bound by a wooded patch to the south. The west side of the crossing is an open farm field bound by woods to the north and west. Refer to Figure 1 for a general overview of the crossing location and Figure 2 for a photo showing the general location of the exit point.

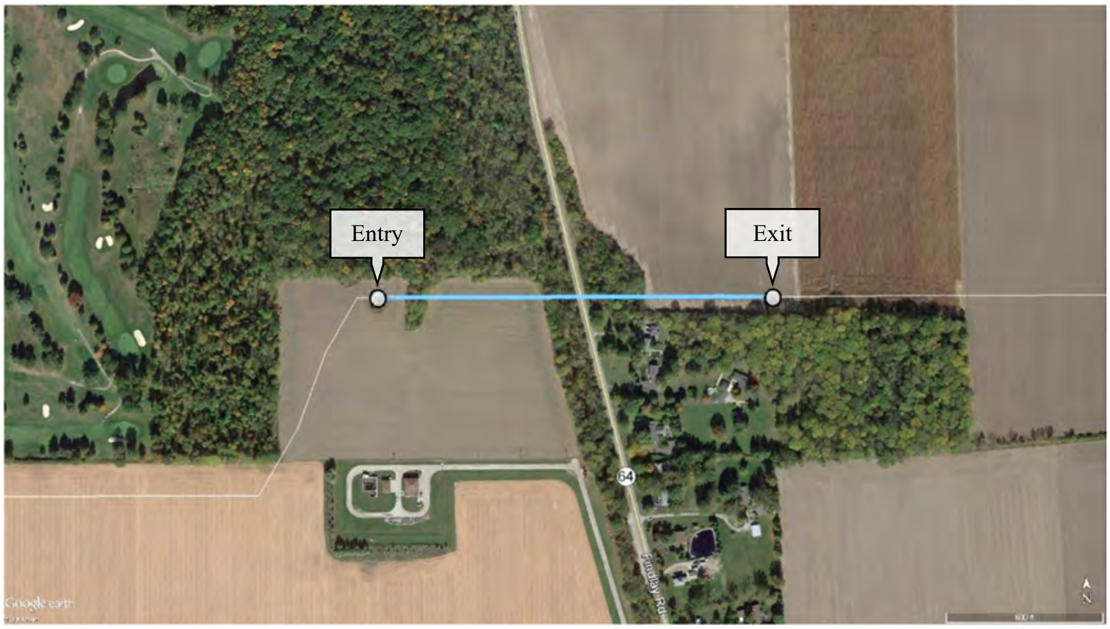


Figure 1: Overview of the State Route 64 (Findlay Road) Crossing

Figure 2: View looking east from tree line toward exit point

Subsurface Conditions

Four site-specific geotechnical borings were taken at the proposed crossing site as part of the site investigation conducted by Fugro Consultants, Inc. Borings SR-64-1 and SR-64-2 were taken on the east side of the Findlay Road and Borings SR-64-3 and SR-64-4 were taken on the west side. Two of the borings, SR-64-2 and SR-64-3, were terminated at a depth of 125 feet below the ground surface. The remaining were terminated at a depth of 75 feet below the ground surface. Each of the borings encountered mostly lean clay, silt, and sand overlying dolomite bedrock. The bedrock surface was encountered approximately 68 feet below the ground surface at approximate elevation 695.

For detailed information, refer to the geotechnical data report prepared by Fugro Consultants, Inc. titled "Geotechnical Data Report, State Route No. 64 HDD Crossing, Nexus Gas Transmission Project, Wood County Ohio" and dated October 2, 2015.

Design Geometry & Layout

The proposed Findlay Road HDD design involves a horizontal length of 1,522 feet. It is a minimum length design, which uses 8-degree entry and exit angles, and radius of curvature of 3,600 feet. The crossing design achieves a minimum of 30 feet of cover beneath the stream. In this case, the design utilizes a shallow entry angle and a reduced depth of cover beneath the stream to keep the HDD segment above bedrock, within the overburden soils.

The entry point is located on the west side of the crossing in a farm field, approximately 790 feet from the centerline of Findley Road. The exit point is located on the east side of the crossing, approximately 575 feet east of Findlay Road, also in a farm field. The exit point is located on the east side to make use of the open farm fields for pull section fabrication, which allows continuous stringing and avoids the necessity for a tie-in weld during pullback.

The preliminary HDD plan and profile drawing is included in this site-specific report for reference.

Assessment of Feasibility

Based on the design length, pipeline diameter, and subsurface conditions consisting primarily of clay, it is our opinion that installation by HDD is feasible.

Risk Identification and Assessment

The most significant risk of impact due to installation by HDD at this location is the possibility of damaging Findlay Road due to heaving or settlement, or drilling fluid surfacing with the stream.

Based on the length and the anticipated subsurface conditions, the level of risk associated with the proposed Findlay Road Crossing is low.

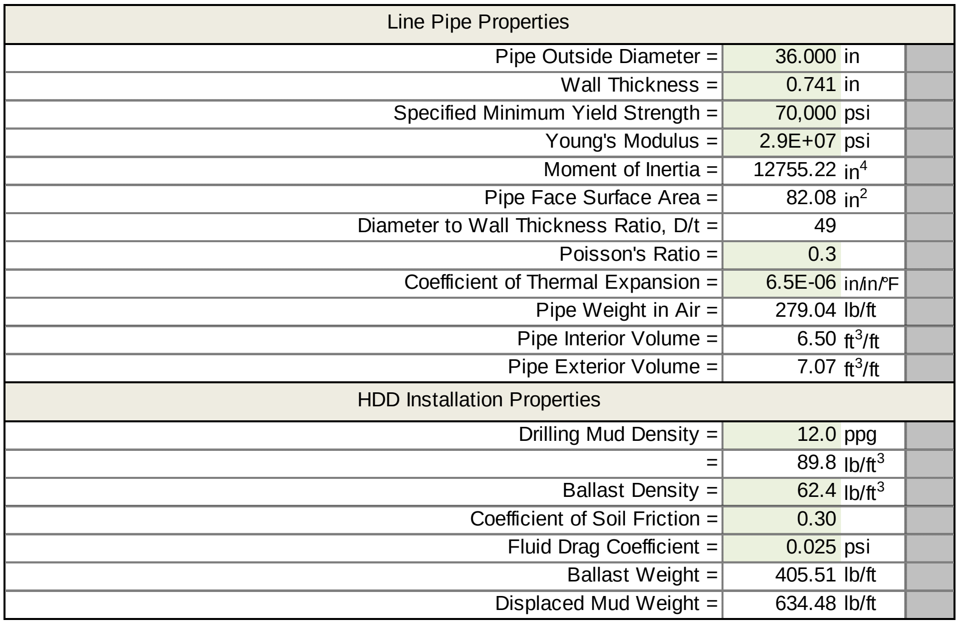
Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse-case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in **Error! Reference source not found.**1.

Table 1: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the loading scenarios described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 242,069 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 271,405 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 3. Detailed calculations for each loading scenario are summarized in Figures 4 and 5.



Line Pipe Properties		
Pipe Outside Diameter =	36.000	in
Wall Thickness =	0.741	in
Specified Minimum Yield Strength =	70,000	psi
Young's Modulus =	2.9E+07	psi
Moment of Inertia =	12755.22	in^4
Pipe Face Surface Area =	82.08	in^2
Diameter to Wall Thickness Ratio, D/t =	49	
Poisson's Ratio =	0.3	
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F
Pipe Weight in Air =	279.04	lb/ft
Pipe Interior Volume =	6.50	ft^3/ft
Pipe Exterior Volume =	7.07	ft^3/ft
HDD Installation Properties		
Drilling Mud Density =	12.0	ppg
=	89.8	lb/ft^3
Ballast Density =	62.4	lb/ft^3
Coefficient of Soil Friction =	0.30	
Fluid Drag Coefficient =	0.025	psi
Ballast Weight =	405.51	lb/ft
Displaced Mud Weight =	634.48	lb/ft

Figure 3: Pipe and Installation Properties

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Plpe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 158.5 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 16,734 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 5,377 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 7,839 lb

Pulling Load on Exit Tangent = 29,950 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 82,318 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 8.77 ft
$j = [(E\ I) / T]^{1/2}$ = 2,120
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 2.1E+06
$X = (3\ L) - [\ (j\ /\ 2) \tanh(U/2)\ ]$ = 564.47
$U = (12\ L) / j$ = 2.85
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 125,365 lb

Bending Frictional Drag = $2\ \mu\ N$ = 75,219 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 17,055 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 12,463 lb

Pulling Load on Exit Sag Bend = 104,736 lb
Total Pulling Load = 134,686 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 69.8 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 7,444 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 2,369 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 9,812 lb
Total Pulling Load = 144,499 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = 8.0 °
Deflection Angle, α = 4.0 °
Average Tension, T = 186,523 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 8.77 ft
$j = [(E\ I) / T]^{1/2}$ = 1,408
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 3.0E+06
$X = (3\ L) - [\ (j\ /\ 2) \tanh(U/2)\ ]$ = 823.01
$U = (12\ L) / j$ = 4.28
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 132,429 lb

Bending Frictional Drag = $2\ \mu\ N$ = 79,458 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 17,055 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -12,463 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 84,049 lb
Total Pulling Load = 228,548 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 150.1 ft
Entry Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 15,854 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 5,094 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -7,427 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 13,521 lb
Total Pulling Load = 242,069 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	2,949	ok	0	ok	0	ok	0.05	ok	0.00	ok
	2,784	ok	0	ok	316	ok	0.04	ok	0.01	ok
PC										
	2,784	ok	12,083	ok	316	ok	0.31	ok	0.08	ok
	1,760	ok	12,083	ok	847	ok	0.29	ok	0.09	ok
PT										
	1,760	ok	0	ok	847	ok	0.03	ok	0.02	ok
	1,641	ok	0	ok	847	ok	0.03	ok	0.02	ok
PC										
	1,641	ok	12,083	ok	847	ok	0.29	ok	0.09	ok
	365	ok	12,083	ok	316	ok	0.27	ok	0.06	ok
PT										
	365	ok	0	ok	316	ok	0.01	ok	0.00	ok
Exit Point	0	ok	0	ok	-18	ok	0.00	ok	0.00	ok

Figure 4: Installation Loading and Stress Analysis (As-Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 464.5 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu \cos\theta$ = 49,046 lb

Fluidic Drag = $12 \pi D L C_d$ = 15,759 lb

Axial Segment Weight = $W_e L \sin\theta$ = 22,977 lb

Pulling Load on Exit Tangent = 87,782 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 125,137 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R [1 - \cos(\alpha/2)]$ = 4.38 ft
$j = [(E I) / T]^{1/2}$ = 1,719

$Y = [18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1}]$ = 2.8E+05
$X = (3 L) - [(j / 2) \tanh(U/2)]$ = 147.97

$U = (12 L) / j$ = 1.75
$N = [(T h) - W_e \cos\theta (Y/144)] / (X / 12)$ = 99,918 lb

Bending Frictional Drag = $2 \mu N$ = 59,951 lb

Fluidic Drag = $12 \pi D L C_d$ = 8,527 lb

Axial Segment Weight = $W_e L \sin\theta$ = 6,231 lb

Pulling Load on Exit Sag Bend = 74,710 lb
Total Pulling Load = 162,492 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 14.8 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu$ = 1,576 lb

Fluidic Drag = $12 \pi D L C_d$ = 501 lb

Axial Segment Weight = $W_e L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 2,077 lb
Total Pulling Load = 164,569 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = 8.0 °
Deflection Angle, α = 4.0 °
Average Tension, T = 197,448 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R [1 - \cos(\alpha/2)]$ = 4.38 ft
$j = [(E I) / T]^{1/2}$ = 1,369

$Y = [18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1}]$ = 3.8E+05
$X = (3 L) - [(j / 2) \tanh(U/2)]$ = 205.73

$U = (12 L) / j$ = 2.20
$N = [(T h) - W_e \cos\theta (Y/144)] / (X / 12)$ = 105,769 lb

Bending Frictional Drag = $2 \mu N$ = 63,461 lb

Fluidic Drag = $12 \pi D L C_d$ = 8,527 lb

Axial Segment Weight = $W_e L \sin\theta$ = -6,231 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 65,757 lb
Total Pulling Load = 230,326 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 456.1 ft
Entry Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu \cos\theta$ = 48,166 lb

Fluidic Drag = $12 \pi D L C_d$ = 15,476 lb

Axial Segment Weight = $W_e L \sin\theta$ = -22,564 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 41,078 lb
Total Pulling Load = 271,405 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	3,307	ok	0	ok	0	ok	0.05	ok	0.00	ok
	2,806	ok	0	ok	961	ok	0.04	ok	0.02	ok
PC										
	2,806	ok	24,167	ok	961	ok	0.57	ok	0.28	ok
	2,005	ok	24,167	ok	1226	ok	0.56	ok	0.28	ok
PT										
	2,005	ok	0	ok	1226	ok	0.03	ok	0.03	ok
	1,980	ok	0	ok	1226	ok	0.03	ok	0.03	ok
PC										
	1,980	ok	24,167	ok	1226	ok	0.56	ok	0.28	ok
	1,069	ok	24,167	ok	961	ok	0.55	ok	0.25	ok
PT										
	1,069	ok	0	ok	961	ok	0.02	ok	0.02	ok
Exit Point	0	ok	0	ok	-18	ok	0.00	ok	0.00	ok

Figure 5: Installation Loading and Stress Analysis (Worse-Case)

Hydrofracture Evaluation

The risk of inadvertent drilling fluid returns due to hydrofracture was evaluated using the Delft Method. The Delft Method is described in Section 5 of the report. In summary, the risk of inadvertent drilling fluid returns due to hydrofracture is low over the majority of the length of the crossing. The factor of safety remains above 2.0 until station 13+93. Therefore, inadvertent drilling fluid returns due to hydrofracture are not anticipated under normal drilling operations through station 13+93. At station 14+58, approximately 65 feet from the exit point, the factor of safety drops below 1.0, indicating an increased risk of inadvertent drilling fluid returns due to hydrofracture. Inadvertent drilling fluid returns due to hydrofracture near the exit point, where cover is shallow, is a common occurrence in the HDD industry during pilot hole drilling. These returns typically occur within temporary workspace and are easily contained. Refer to Figure 6 for results presented in graphical format.

It is important to keep in mind that inadvertent drilling fluid returns may occur due to mechanisms unrelated to hydrofracture. It remains possible that inadvertent drilling fluid returns will occur by flowing to the ground surface through preexisting fractures or porous seams in the soil mass.

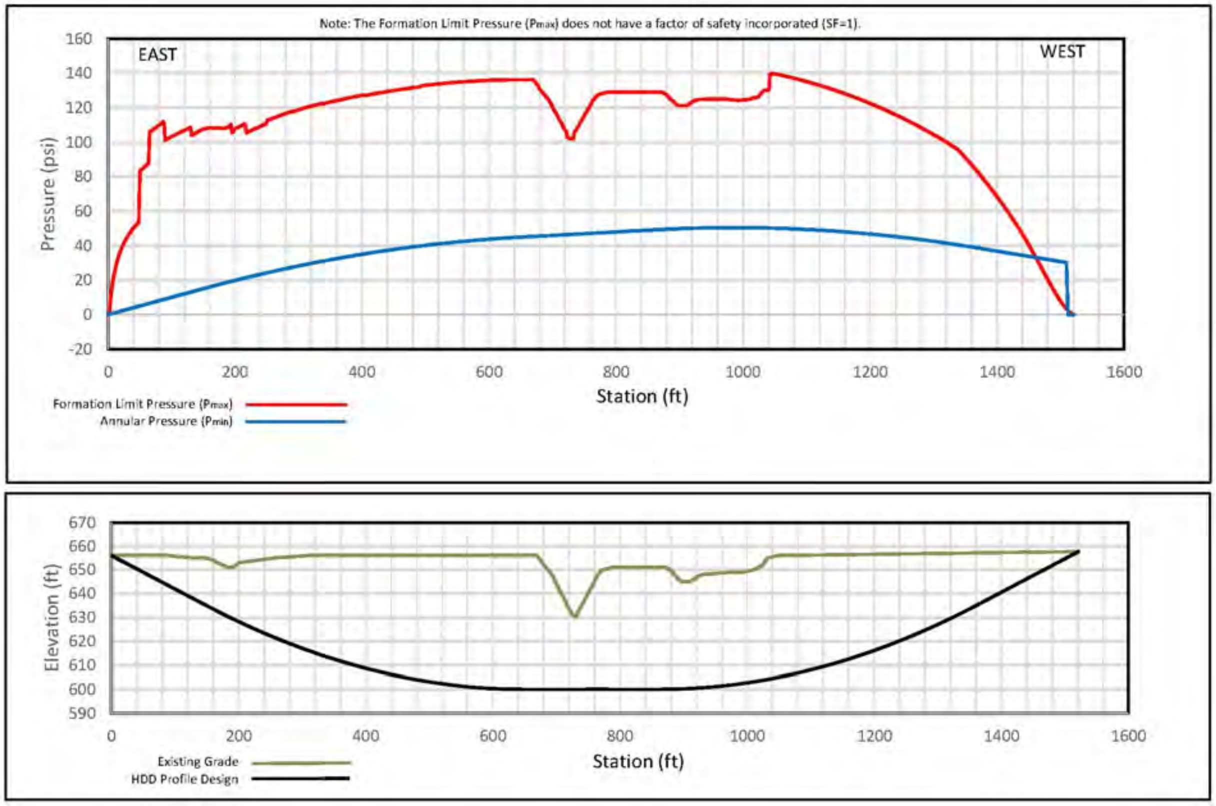
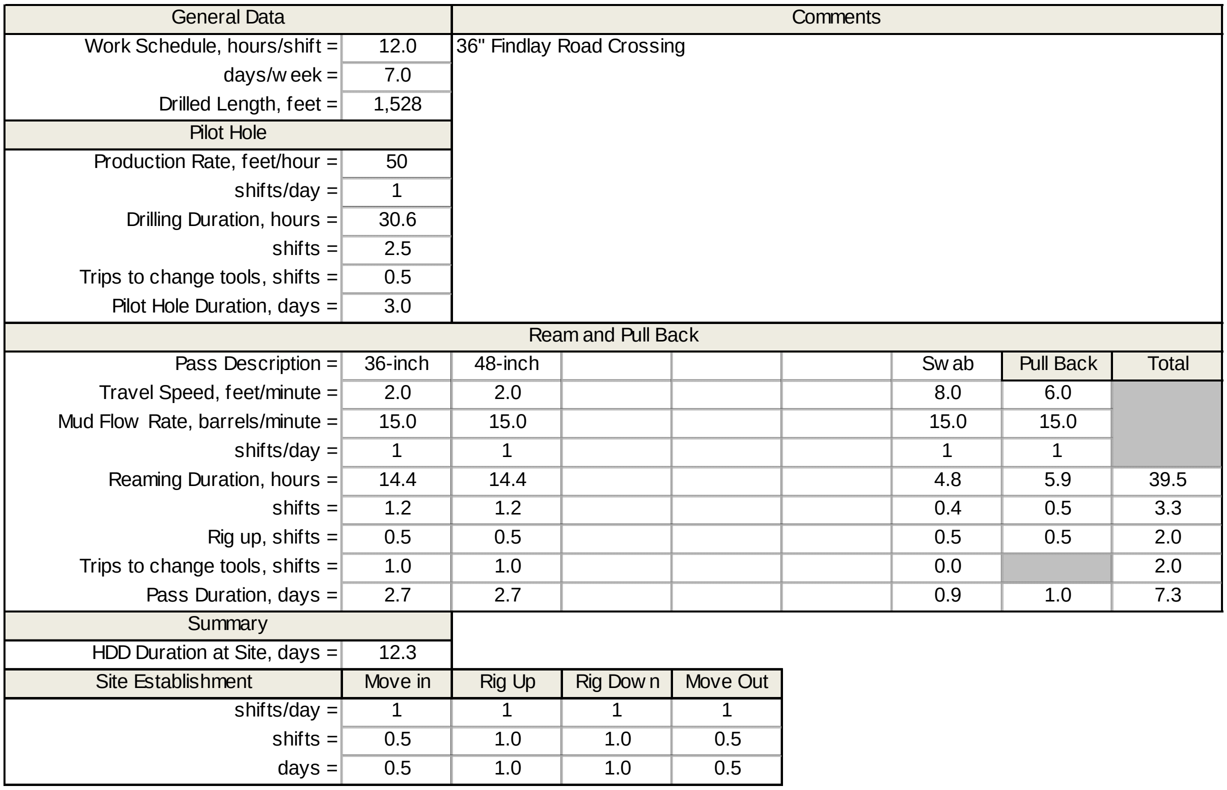


Figure 6: Hydrofracture Evaluation (Formation Limit Pressure –vs-Annular Pressure)

Construction Duration

The estimated duration of construction for the proposed crossing is 13 days. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated by JDH&A based on information contained within the Pipeline Research Council International's "*Installation of Pipelines by Horizontal Directional Drilling*"[1], as well as past experience in similar subsurface conditions. Refer to Figure 7 for details relative to the estimate.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.



General Data		Comments
Work Schedule, hours/shift =	12.0	36" Findlay Road Crossing
days/week =	7.0	
Drilled Length, feet =	1,528	
Pilot Hole		
Production Rate, feet/hour =	50	
shifts/day =	1	
Drilling Duration, hours =	30.6	
shifts =	2.5	
Trips to change tools, shifts =	0.5	
Pilot Hole Duration, days =	3.0	

Ream and Pull Back								
Pass Description =	36-inch	48-inch				Swab	Pull Back	Total
Travel Speed, feet/minute =	2.0	2.0				8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0				15.0	15.0	
shifts/day =	1	1				1	1	
Reaming Duration, hours =	14.4	14.4				4.8	5.9	39.5
shifts =	1.2	1.2				0.4	0.5	3.3
Rig up, shifts =	0.5	0.5				0.5	0.5	2.0
Trips to change tools, shifts =	1.0	1.0				0.0		2.0
Pass Duration, days =	2.7	2.7				0.9	1.0	7.3

Summary	
HDD Duration at Site, days =	12.3

Site Establishment	Move in	Rig Up	Rig Down	Move Out
shifts/day =	1	1	1	1
shifts =	0.5	1.0	1.0	0.5
days =	0.5	1.0	1.0	0.5

Figure 7: Estimated Construction Duration

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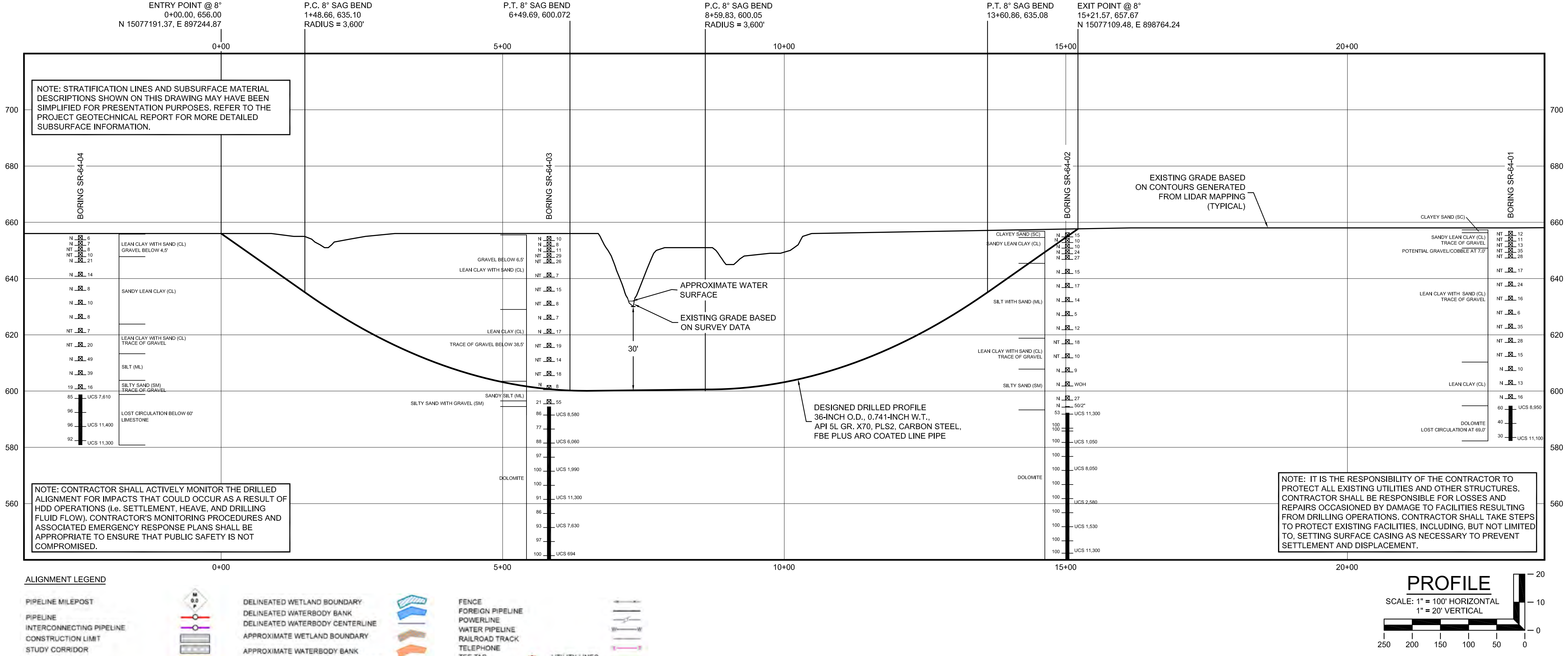
[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.



NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING MAY HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

ALIGNMENT LEGEND

PIPELINE MILEPOST
PIPELINE
INTERCONNECTING PIPELINE
CONSTRUCTION LIMIT
STUDY CORRIDOR
STAGING AREA
WAREYARD
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
METERING & REGULATION STATION (M&R)
COMPRESSOR STATION SITE
FACILITIES TEMPORARY WORKSPACE
FACILITIES PERMANENT WORKSPACE
DELINEATED WETLAND BOUNDARY
DELINEATED WATERBODY BANK
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY BANK
APPROXIMATE WATERBODY CENTERLINE
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
PARCEL TRACT NO OH-CO-011.0000-SC
PROPERTY LINE
CONTOUR
MUNICIPALITY LINE
FENCE
FOREIGN PIPELINE
POWERLINE
WATER PIPELINE
RAILROAD TRACK
TELEPHONE
TEE TAP
BLOW OFF VALVE
TOWER
HORIZONTAL DIRECTIONAL DRILLING
UTILITY LINES
MAINLINE VALVE (MLV)
MICROWAVE TOWER
TANK ● LIGHT POLE ● FIRE HYDRANT ●
WELL: GAS ✦ WATER ● OIL ● UNKNOWN ✦

GENERAL LEGEND

DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR, SURVEY, AND HYDROGRAPHIC DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

GEOTECHNICAL LEGEND

Ⓑ BORING LOCATION

SPLIT SPOON SAMPLE

53 23 ← PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

PUSH SAMPLE

CORE BARREL SAMPLE

UCS 6,250 ← UNCONFINED COMPRESSIVE STRENGTH (PSI)
TSS 1,350 ← TENSILE SPLITTING STRENGTH (PSI)
53 6 ← MOHS HARDNESS
ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY FUGRO CONSULTANTS, INC, BATON ROUGE, LOUISIANA. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED OCTOBER 2, 2015 FOR ADDITIONAL INFORMATION.

2. THE LETTER "N" TO THE LEFT OF A SPLIT SPOON SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TESTS WERE PERFORMED.

3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGEMENT IN INTERPRETING THIS DATA.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

		3	LKB	JMS	RE-ISSUED FOR FERC
		2	LKB	JMS	REVISE HDD EXIT POINT AND UPDATE CENTERLINE
		1	LKB	JMS	ISSUED FOR BID
CLYD-A-1197	ALIGNMENT SHEET M.P. 179.37 TO M.P. 180.32	0	LKB	JMS	ISSUED FOR FERC
DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION

IG.#

John D. Hair, P.E.
Consulting Engineer
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS				
	PRELIMINARY		CONSTRUCTION	
DRAWN BY:	DMP	08/07		
PROJECT MANAGER	JSM	08/07		
DESIGN ENGINEER	DMP	08/07		
DESIGN CHECKER	DLB	08/07		
TITLE	SIGNATURE	DATE	SIGNATURE	DATE

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH FINDLAY ROAD CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

WOOD COUNTY, OHIO

NEXUS GAS TRANSMISSION

M.P. 180.1R	W.O.	SCALE: AS SHOWN	DWG. CLYD-H-1012	REV. 3

MP 181.2 Maumee River

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- A combination of LiDAR, hydrographic, and traditional survey data covering the proposed crossing location
- A geotechnical data report prepared by Fugro Consultants, Inc. titled "Geotechnical and Geophysical Data Report, Maumee River HDD Crossing, Nexus Gas Transmission Project, Lucas County, Ohio" and dated September 11, 2015
- A reconnaissance of the proposed crossing location conducted in July of 2015 by a representative of JDH&A

General Site Description

The 36-inch Maumee River Crossing is located just south of Waterville, Ohio near the north edge of Missionary Island. The crossing involves passing beneath the Maumee River as well as US Highway 24 (Anthony Wayne Trail) on the west side of the West River Road on the east side of the river. The width of the river at the proposed crossing location is approximately 2,000 feet. The area is mostly comprised of agricultural land with a mix of woods. The terrain is relatively flat, but drops off near the Maumee River. From the plateaus on each side of the river, the elevation drops off about 40 to 50 feet from the upland farm fields on each side to the edge of water. An overview of the proposed crossing location is provided in Figures 1. Photos taken at the time of the site reconnaissance are included in Figures 2 and 3.

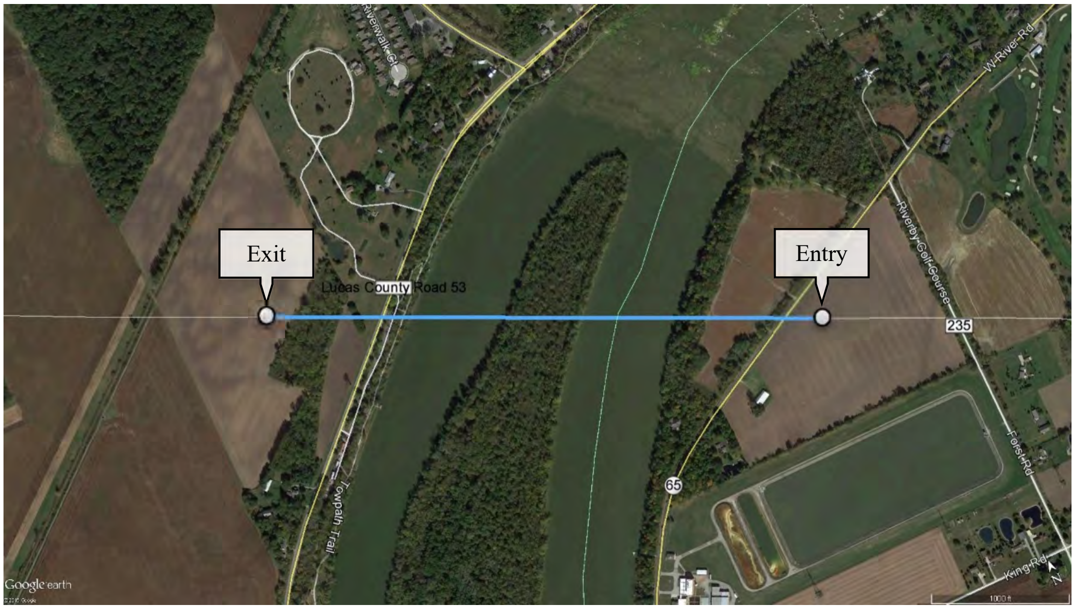


Figure 1: Overview of the Maumee River Crossing

Figure 2: View from West River Road toward entry location

Figure 3: Maumee River (west channel)

Subsurface Conditions

Four geotechnical borings have been taken as part of the site investigation conducted by Fugro Consultants, Inc. Two borings were taken on the west side of the river, both of which were drilled to a depth of 105 feet. Both borings encountered primarily lean clay to lean clay with sand overlying sedimentary bedrock. The top of bedrock was encountered at 85 feet in boring MAU-05 and 98 feet boring MAU-06. Borings MAU-01 and MAU-02 were drilled on the east side of the river. MAU-01 was drilled to 67 feet below the ground surface and encountered fat clay with occasional gravel and gravelly fat clay. Boring MAU-02 encountered mostly sandy lean clay with gravel to a depth of 78 feet. Sand with silt and gravel was encountered at 79 feet with sedimentary bedrock in the form of limestone and siltstone at a depth of 82 feet. The field logs indicate extensive fracturing in the limestone and siltstone. Rock quality designation (RQD) ranged from 0 to 66, with the average value being 12, indicating very poor quality bedrock. Unconfined compressive strength (UCS) of the bedrock averaged 5,988 psi.

Refer to the geotechnical data report prepared by Fugro Consultants, Inc. titled “Geotechnical and Geophysical Data Report, Maumee River HDD Crossing, Nexus Gas Transmission Project, Lucas County, Ohio” and dated September 11, 2015 for additional information.

Design Geometry & Layout

The Maumee River HDD design involves a horizontal length of 3,999 feet. The design length results from an entry angle of 12-degrees, an exit angle of 8-degrees, and a radius of curvature equal to 3,600 feet. In this case, it was not possible to maintain sufficient depth of cover beneath the river while staying above the bedrock surface. Therefore, the design is based on penetrating bedrock, which achieves 75 feet of cover beneath the Maumee River.

The west side of the crossing was chosen for the proposed exit point due to the open farm fields which are free of obstructions, which allow the pipeline pull section to be fabricated in a single segment and thus avoid tie-in welds during pullback.

The preliminary HDD plan and profile design drawing for the Maumee River Crossing is attached to this report for reference.

Assessment of Feasibility

Based on a review of available geotechnical information, the HDD segment must pass through approximately 325 feet of overburden soil containing occasional coarse granular material on the east side of the crossing, before penetrating sedimentary bedrock at a depth of approximately 75 feet. According to preliminary field logs, the bedrock is characterized by extreme fracturing, which in some cases can be problematic for installation by HDD. Although the feasibility of the Maumee River cannot be ruled out, subsurface conditions are present that increase the risk of HDD operational problems.

Risk Identification and Assessment

Potential construction impacts resulting from installation by HDD include possible damage to U.S. Highway 24 and West River Road due to heaving or settlement. In addition, there is risk that inadvertent drilling fluid returns will surface within the Maumee River.

HDD construction and operational risks associated with the crossing involve penetrating bedrock at depths in excess of 75 feet on the east side and almost 100 feet on the west side. Penetrating a deep bedrock surface during pilot hole drilling can sometimes be difficult due to bit deflection. The bit may deflect and skip across the top of the bedrock instead of penetrating it, resulting in unacceptable radius of curvature. A deep bedrock surface can be problematic during reaming and pullback operations due to misalignment at the soil/rock interface. Downhole reaming tools or the pull section may also hang up on the rock interface. Additional risks include failure of large diameter rock reaming tools downhole and operational problems associated with fractured bedrock, including loss of drilling fluid circulation.

Due to subsurface conditions, the risk level associated with the proposed crossing of the Maumee River is high.

Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse-case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the loading scenarios described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 632,344 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 662,330 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 4. Detailed calculations for each scenario are summarized in Figures 5 and 6.

Line Pipe Properties		
Pipe Outside Diameter =	36.000	in
Wall Thickness =	0.741	in
Specified Minimum Yield Strength =	70,000	psi
Young's Modulus =	2.9E+07	psi
Moment of Inertia =	12755.22	in^4
Pipe Face Surface Area =	82.08	in^2
Diameter to Wall Thickness Ratio, D/t =	49	
Poisson's Ratio =	0.3	
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F
Pipe Weight in Air =	279.04	lb/ft
Pipe Interior Volume =	6.50	ft^3/ft
Pipe Exterior Volume =	7.07	ft^3/ft
HDD Installation Properties		
Drilling Mud Density =	12.0	ppg
=	89.8	lb/ft^3
Ballast Density =	62.4	lb/ft^3
Coefficient of Soil Friction =	0.30	
Fluid Drag Coefficient =	0.025	psi
Ballast Weight =	405.51	lb/ft
Displaced Mud Weight =	634.48	lb/ft

Figure 4: Pipe and Installation Properties

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 362.6 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 38,289 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 12,303 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = 17,937 lb

Pulling Load on Exit Tangent = 68,529 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 121,693 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 8.77 ft
$j = [(E\ I) / T]^{1/2}$ = 1,743

$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 2.6E+06
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 689.38

$U = (12\ L) / j$ = 3.46
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 128,017 lb

Bending Frictional Drag = $2\ \mu\ N$ = 76,810 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 17,055 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = 12,463 lb

Pulling Load on Exit Sag Bend = 106,328 lb
Total Pulling Load = 174,857 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 2316.0 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 246,962 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 78,581 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 325,543 lb
Total Pulling Load = 500,400 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 628.3 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 558,632 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 13.70 ft
$j = [(E\ I) / T]^{1/2}$ = 814

$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 6.5E+06
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 1478.17

$U = (12\ L) / j$ = 9.27
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 191,018 lb

Bending Frictional Drag = $2\ \mu\ N$ = 114,611 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 21,318 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = -19,464 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 116,465 lb
Total Pulling Load = 616,865 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 200.5 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 21,050 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 6,801 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = -12,372 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 15,479 lb
Total Pulling Load = 632,344 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	7,704	ok	0	ok	0	ok	0.12	ok	0.02	ok
	7,515	ok	0	ok	466	ok	0.12	ok	0.03	ok
PC										
	7,515	ok	12,083	ok	466	ok	0.38	ok	0.14	ok
	6,096	ok	12,083	ok	1295	ok	0.36	ok	0.16	ok
PT										
	6,096	ok	0	ok	1295	ok	0.10	ok	0.05	ok
	2,130	ok	0	ok	1295	ok	0.03	ok	0.04	ok
PC										
	2,130	ok	12,083	ok	1295	ok	0.30	ok	0.12	ok
	835	ok	12,083	ok	764	ok	0.28	ok	0.08	ok
PT										
	835	ok	0	ok	764	ok	0.01	ok	0.01	ok
Exit Point	0	ok	0	ok	0	ok	0.00	ok	0.00	ok

Figure 5: Installation Loading and Stress Analysis (As-Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 668.1 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 70,548 lb

Fluidic Drag = 12 π D L C_d = 22,668 lb

Axial Segment Weight = W_e L sinθ = 33,050 lb

Pulling Load on Exit Tangent = 126,266 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 164,579 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 4.38 ft
j = [(E I) / T]$^{1/2}$ = 1,499

Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 3.4E+05
X = (3 L) - [(j / 2) tanh(U/2)] = 181.26

U = (12 L) / j = 2.01
N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 103,112 lb

Bending Frictional Drag = 2 μ N = 61,867 lb

Fluidic Drag = 12 π D L C_d = 8,527 lb

Axial Segment Weight = W_e L sinθ = 6,231 lb

Pulling Load on Exit Sag Bend = 76,626 lb
Total Pulling Load = 202,892 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 2329.7 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ = 248,421 lb

Fluidic Drag = 12 π D L C_d = 79,045 lb

Axial Segment Weight = W_e L sinθ = 0 lb

Pulling Load on Bottom Tangent = 327,466 lb
Total Pulling Load = 530,358 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 314.2 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 576,966 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 6.85 ft
j = [(E I) / T]$^{1/2}$ = 801

Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 1.3E+06
X = (3 L) - [(j / 2) tanh(U/2)] = 549.29

U = (12 L) / j = 4.71
N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 153,813 lb

Bending Frictional Drag = 2 μ N = 92,288 lb

Fluidic Drag = 12 π D L C_d = 10,659 lb

Axial Segment Weight = W_e L sinθ = -9,732 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 93,215 lb
Total Pulling Load = 623,573 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 501.9 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 52,706 lb

Fluidic Drag = 12 π D L C_d = 17,029 lb

Axial Segment Weight = W_e L sinθ = -30,978 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 38,757 lb
Total Pulling Load = 662,330 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	8,069	ok	0	ok	0	ok	0.13	ok	0.02	ok
	7,597	ok	0	ok	1259	ok	0.12	ok	0.06	ok
PC										
	7,597	ok	24,167	ok	1259	ok	0.65	ok	0.40	ok
	6,461	ok	24,167	ok	1673	ok	0.63	ok	0.41	ok
PT										
	6,461	ok	0	ok	1673	ok	0.10	ok	0.08	ok
	2,472	ok	0	ok	1673	ok	0.04	ok	0.06	ok
PC										
	2,472	ok	24,167	ok	1673	ok	0.57	ok	0.33	ok
	1,538	ok	24,167	ok	1408	ok	0.55	ok	0.29	ok
PT										
	1,538	ok	0	ok	1408	ok	0.02	ok	0.04	ok
Exit Point	0	ok	0	ok	0	ok	0.00	ok	0.00	ok

Figure 6: Installation Loading and Stress Analysis (Worse-Case)

Hydrofracture Evaluation

The majority of the Maumee River Crossing will be installed through bedrock. Since the Delft Method discussed in Section 5 of the report is only applicable to uncemented subsurface materials, a hydrofracture evaluation was not completed. In general, inadvertent drilling fluid returns due to hydrofracture do not typically occur on rock crossings, but instead occur by flowing through existing fractures, joints, or solution cavities.

Construction Duration

The estimated duration of construction for the Maumee River Crossing is 81 days. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated by JDH&A based on information contained within the Pipeline Research Council International's "*Installation of Pipelines by Horizontal Directional Drilling*"[1], as well as past experience in similar subsurface conditions. Details relative to the estimate are provided in Figure 7.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.

General Data		Comments						
Work Schedule, hours/shift =	12.0	36" Maumee River Crossing						
days/week =	7.0							
Drilled Length, feet =	4,018							
Pilot Hole								
Production Rate, feet/hour =	20							
shifts/day =	1							
Drilling Duration, hours =	200.9							
shifts =	16.7							
Trips to change tools, shifts =	2.0							
Pilot Hole Duration, days =	18.7							
Ream and Pull Back								
Pass Description =	24-inch	36-inch	48-inch			Swab	Pull Back	Total
Travel Speed, feet/minute =	0.4	0.4	0.4			8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0	15.0			15.0	15.0	
shifts/day =	1	1	1			1	1	
Reaming Duration, hours =	195.7	195.7	195.7			12.7	15.5	615.1
shifts =	16.3	16.3	16.3			1.1	1.3	51.3
Rig up, shifts =	0.5	0.5	0.5			0.5	0.5	2.5
Trips to change tools, shifts =	2.0	2.0	2.0			0.0		6.0
Pass Duration, days =	18.8	18.8	18.8			1.6	1.8	59.8
Summary								
HDD Duration at Site, days =	80.5							
Site Establishment	Move in	Rig Up	Rig Down	Move Out				
shifts/day =	1	1	1	1				
shifts =	0.5	1.0	1.0	0.5				
days =	0.5	1.0	1.0	0.5				

Figure 7: Estimated Construction Duration

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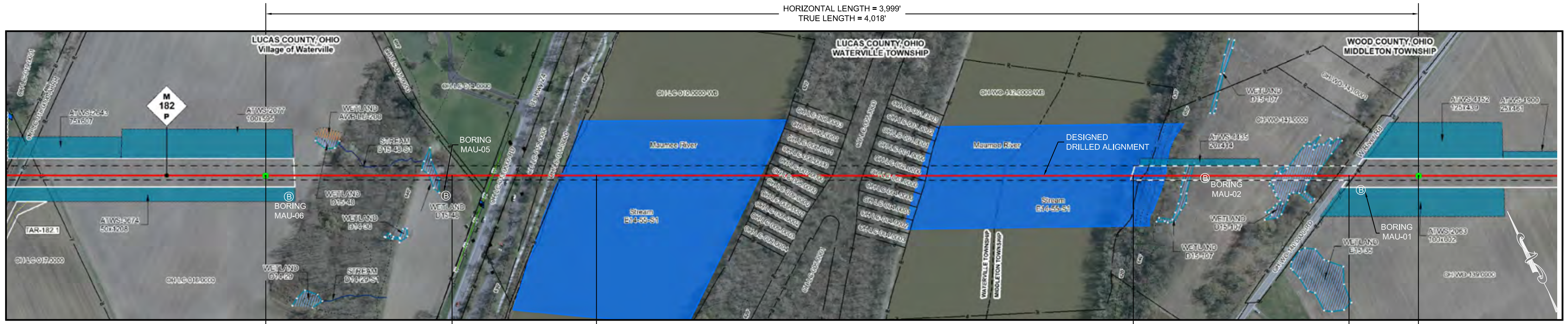
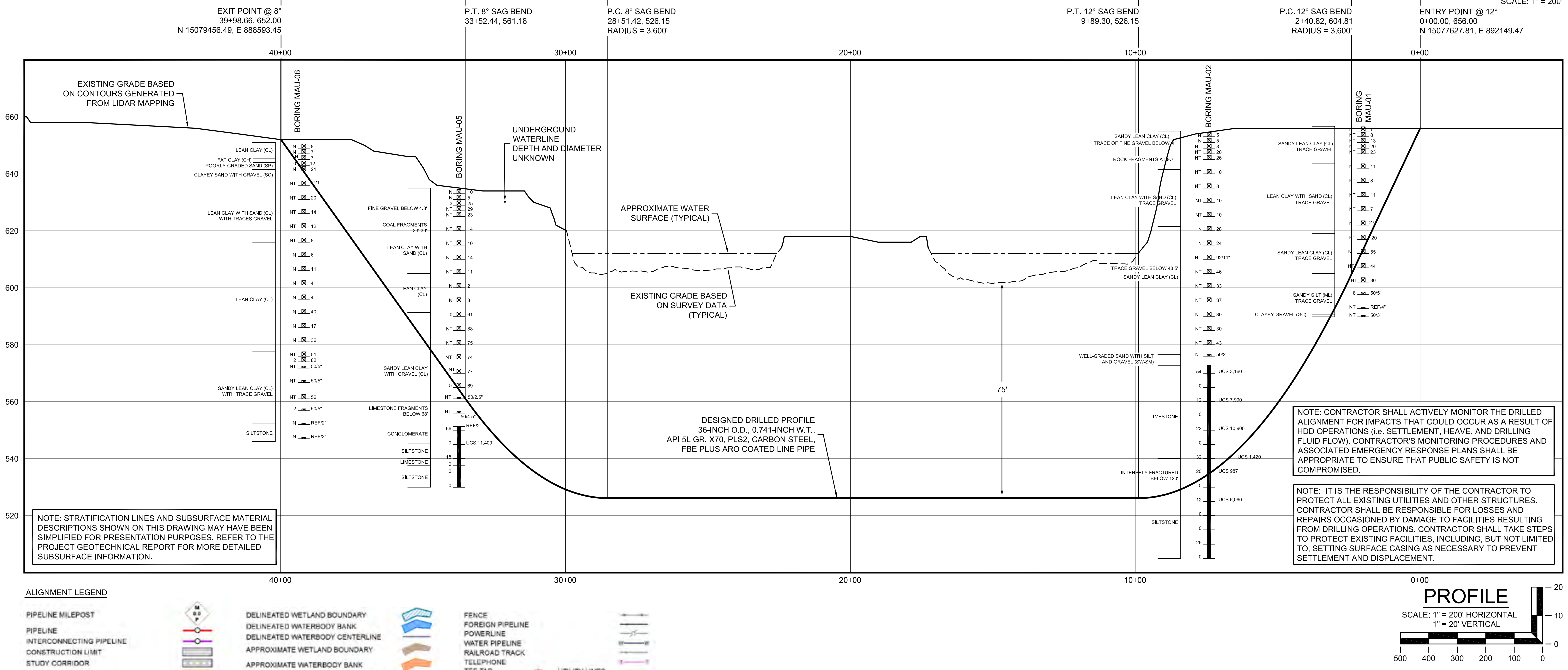
[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.



PLAN

SCALE: 1" = 200'



NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING MAY HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

PROFILE

SCALE: 1" = 200' HORIZONTAL
1" = 20' VERTICAL

ALIGNMENT LEGEND

- PIPELINE MILEPOST
- PIPELINE
- INTERCONNECTING PIPELINE
- CONSTRUCTION LIMIT
- STUDY CORRIDOR
- STAGING AREA
- WAREYARD
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- METERING & REGULATION STATION (M&R)
- COMPRESSOR STATION SITE
- FACILITIES TEMPORARY WORKSPACE
- FACILITIES PERMANENT WORKSPACE
- DELINEATED WETLAND BOUNDARY
- DELINEATED WATERBODY BANK
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WATERBODY CENTERLINE
- PERMANENT ACCESS ROAD PAR-0.0
- TEMPORARY ACCESS ROAD TAR-0.0
- PARCEL TRACT NO OH-CO-011.0000-SC
- PROPERTY LINE
- CONTOUR
- MUNICIPALITY LINE
- FENCE
- FOREIGN PIPELINE
- POWERLINE
- WATER PIPELINE
- RAILROAD TRACK
- TELEPHONE
- TEE TAP
- UTILITY LINES
- BLOW OFF VALVE
- MAINLINE VALVE (MLV)
- TOWER
- MICROWAVE TOWER
- HORIZONTAL DIRECTIONAL DRILLING
- TANK ● LIGHT POLE ● FIRE HYDRANT
- WELL: GAS ◆ WATER ◆ OIL ◆ UNKNOWN

GENERAL LEGEND

DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR, SURVEY, AND HYDROGRAPHIC DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

GEOTECHNICAL LEGEND

Ⓑ BORING LOCATION

SPLIT SPOON SAMPLE

53 23 ← PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

PUSH SAMPLE

CORE BARREL SAMPLE

UCS 6,250 ← UNCONFINED COMPRESSIVE STRENGTH (PSI)
TSS 1,350 ← TENSILE SPLITTING STRENGTH (PSI)
53 6 ← MOHS HARDNESS
ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY FUGRO CONSULTANTS, INC, BATON ROUGE, LOUISIANA. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED SEPTEMBER 11, 2015 FOR ADDITIONAL INFORMATION.

2. THE LETTER "N" TO THE LEFT OF A SPLIT SPOON SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TESTS WERE PERFORMED.

3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGEMENT IN INTERPRETING THIS DATA.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		2	ACM	JMS	RE-ISSUED FOR FERC
CLYD-A-1199	ALIGNMENT SHEET M.P. 181.26 TO M.P. 182.21	1	LKB	JMS	ISSUED FOR BID
CLYD-A-1198	ALIGNMENT SHEET M.P. 180.32 TO M.P. 181.26	0	LKB	ACM	ISSUED FOR FERC

John D. Hair, P.E.
Consulting Engineer
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS	PRELIMINARY		CONSTRUCTION	
TITLE	SIGNATURE	DATE	SIGNATURE	DATE
DRAWN BY:	DMP	08/07		
PROJECT MANAGER	JMS	08/07		
DESIGN ENGINEER	LKB	08/26		
DESIGN CHECKER	AM	08/26		

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH MAUMEE RIVER CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

WOOD AND LUCAS COUNTIES, OHIO

NEXUS GAS TRANSMISSION SM

M.P. 181.2 | W.O. | SCALE: AS SHOWN | DWG. CLYD-H-1013 | REV. 2

MP 215.0 River Raisin

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- A combination of LiDAR and traditional survey data covering the proposed crossing location
- A geotechnical data report prepared by Fugro Consultants, Inc. titled "Geotechnical Data Report, Raisin River HDD Crossing (REV-1), Nexus Gas Transmission Project, Lenawee County, Ohio" and dated September 11, 2015
- A reconnaissance of the proposed crossing location conducted in July of 2015 by a representative of JDH&A

General Site Description

The proposed 36-inch River Raisin Crossing at approximately pipeline Mile Post 215.0, approximately 2 miles south of Blissfield, Michigan. The proposed crossing alignment trends in the north-south direction, cutting perpendicularly across Beamer Road. The river is approximately 100 feet wide at the crossing location. At the time of this writing, hydrographic survey shots indicating the depth of the river were not yet available. The land on the south side of the crossing consists of open farm fields. Immediately north of the river, the land is wooded. The wooded land is followed by open farm fields. An overview of the proposed crossing location is provided in Figures 1 through 3.

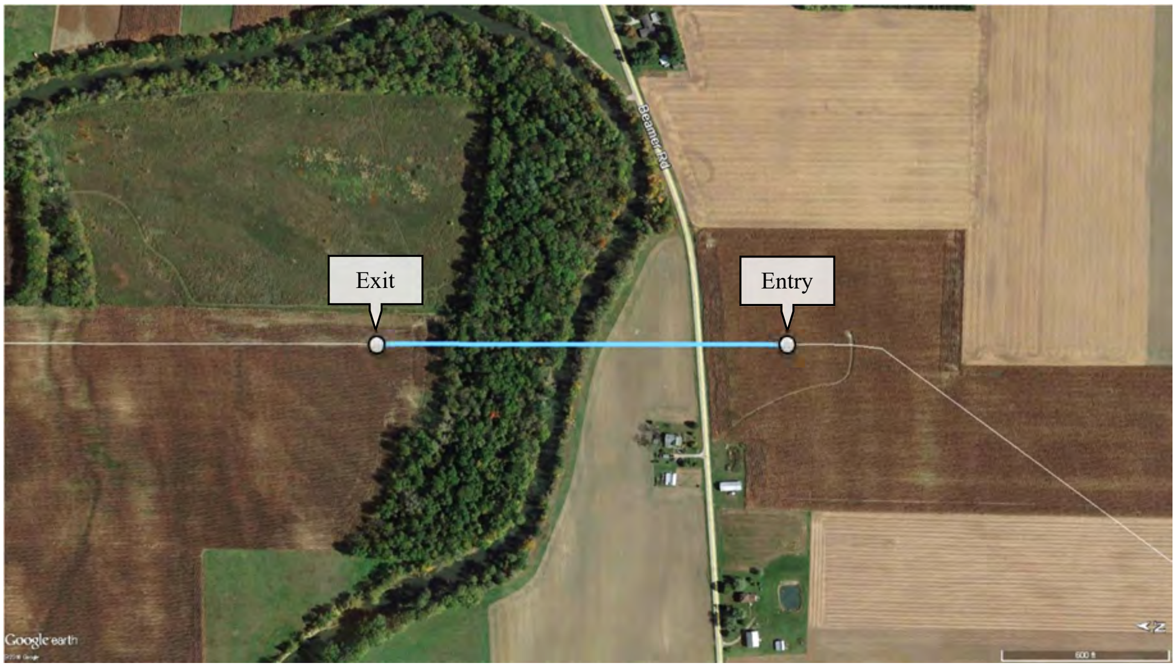


Figure 1: Overview of the River Raisin Crossing

Figure 2: View toward entry location from Beamer Road

Figure 3: View toward exit location

Subsurface Conditions

Three site-specific geotechnical borings were taken as part of the site-investigation conducted by Fugro Consultants, Inc. Borings RAI-1-1 and RAI-1-2, taken on the south side of the river, encountered primarily lean clay, lean clay with sand, sand, silt, and silt with clay and gravel. Boring RAI-1-3, taken on the north side of the river, primarily encountered lean clay, silty sand, and sand with silt.

Design Geometry & Layout

The proposed crossing involves a horizontal length of 1,479 feet. It utilizes a 10-degree entry angle, an 8-degree exit angle, and a radius of curvature of 3,600 feet. The crossing design is based on obtaining a minimum of 40 feet of cover at the edge of Beamer Road and tree line/slope on the north side of the crossing.

The exit point is located on the north side of the crossing to take advantage of available workspace for pull section fabrication, which will allow the pull section to be fabricated in a single segment. Pulling in a single segment will eliminate risk of getting the pull section stuck during downtime associated with a tie-in weld. The entry point is located in an open field on the south side of the river

The preliminary HDD design, as well as available workspace for HDD operations, is shown on the plan and profile drawing included in this site-specific report.

Assessment of Feasibility

The proposed River Raisin installation is feasible. With a horizontal length of 1,479 feet and subsurface conditions consisting of mixtures of lean clay and sand, the River Raisin crossing should be a straightforward installation. Numerous 36-inch HDD installations of similar distances through similar subsurface conditions have been completed.

Risk Identification and Assessment

Possible construction impacts associated with installation by HDD include damage to Beamer Road in the form of heaving or settlement, as well as drilling fluid surfacing in the river.

Based on the proposed length of the crossing and anticipated subsurface conditions, the overall risk level associated with installation by HDD is considered low.

Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse-case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the loading scenarios described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 259,367 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 284,195 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 4. Detailed calculations for each scenario are summarized in Figures 4 and 6.

Line Pipe Properties			
Pipe Outside Diameter =	36.000	in	
Wall Thickness =	0.741	in	
Specified Minimum Yield Strength =	70,000	psi	
Young's Modulus =	2.9E+07	psi	
Moment of Inertia =	12755.22	in^4	
Pipe Face Surface Area =	82.08	in^2	
Diameter to Wall Thickness Ratio, D/t =	49		
Poisson's Ratio =	0.3		
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F	
Pipe Weight in Air =	279.04	lb/ft	
Pipe Interior Volume =	6.50	ft^3/ft	
Pipe Exterior Volume =	7.07	ft^3/ft	
HDD Installation Properties			
Drilling Mud Density =	12.0	ppg	
=	89.8	lb/ft^3	
Ballast Density =	62.4	lb/ft^3	
Coefficient of Soil Friction =	0.30		
Fluid Drag Coefficient =	0.025	psi	
Ballast Weight =	405.51	lb/ft	
Displaced Mud Weight =	634.48	lb/ft	

Figure 4: Pipe and Installation Properties

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
PIpe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30

Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 135.6 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 14,315 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 4,600 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 6,706 lb
Pulling Load on Exit Tangent = 25,620 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °

Average Tension, T = 77,899 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 8.77 ft
$j = [(E\ I) / T]^{1/2}$ = 2,179
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 2.0E+06
$X = (3\ L) - [\ (j\ /\ 2) \tanh(U/2)\ ]$ = 547.15
$U = (12\ L) / j$ = 2.77
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 125,069 lb
Bending Frictional Drag = $2\ \mu\ N$ = 75,041 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 17,055 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 12,463 lb
Pulling Load on Exit Sag Bend = 104,559 lb
Total Pulling Load = 130,179 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 188.9 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 20,140 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 6,408 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 0 lb
Pulling Load on Bottom Tangent = 26,549 lb
Total Pulling Load = 156,728 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 628.3 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °

Average Tension, T = 206,084 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 13.70 ft
$j = [(E\ I) / T]^{1/2}$ = 1,340
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 5.5E+06
$X = (3\ L) - [\ (j\ /\ 2) \tanh(U/2)\ ]$ = 1219.89
$U = (12\ L) / j$ = 5.63
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 161,431 lb
Bending Frictional Drag = $2\ \mu\ N$ = 96,858 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 21,318 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -19,464 lb

Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 98,712 lb
Total Pulling Load = 255,440 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 30.0 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = 279.0 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 2,473 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 0 lb

Fluidic drag is calculated as zero unless entire segment is submerged in drilling fluid.
Please reference Step 2, Drilled Path Input

Axial Segment Weight = $W_e\ L \sin\theta$ = 1,454 lb
Pulling Load on Entry Tangent = 3,927 lb
Total Pulling Load = 259,367 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	3,160	ok	0	ok	0	ok	0.05	ok	0.00	ok
	3,112	ok	0	ok	0	ok	0.05	ok	0.00	ok
PC										
	3,112	ok	12,083	ok	0	ok	0.31	ok	0.07	ok
	1,909	ok	12,083	ok	816	ok	0.30	ok	0.09	ok
PT										
	1,909	ok	0	ok	816	ok	0.03	ok	0.02	ok
	1,586	ok	0	ok	816	ok	0.03	ok	0.01	ok
PC										
	1,586	ok	12,083	ok	816	ok	0.29	ok	0.08	ok
	312	ok	12,083	ok	286	ok	0.27	ok	0.05	ok
PT										
	312	ok	0	ok	286	ok	0.00	ok	0.00	ok
Exit Point	0	ok	0	ok	0	ok	0.00	ok	0.00	ok

Figure 5: Installation Loading and Stress Analysis (As-Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 441.1 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu \cos\theta$ = 46,574 lb

Fluidic Drag = $12 \pi D L C_d$ = 14,965 lb

Axial Segment Weight = $W_e L \sin\theta$ = 21,818 lb

Pulling Load on Exit Tangent = 83,357 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 120,602 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R [1 - \cos(\alpha/2)]$ = 4.38 ft
$j = [(E I) / T]^{1/2}$ = 1,751

$Y = [18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1}]$ = 2.7E+05
$X = (3 L) - [(j / 2) \tanh(U/2)]$ = 143.83

$U = (12 L) / j$ = 1.72
$N = [(T h) - W_e \cos\theta (Y/144)] / (X / 12)$ = 99,551 lb

Bending Frictional Drag = $2 \mu N$ = 59,730 lb

Fluidic Drag = $12 \pi D L C_d$ = 8,527 lb

Axial Segment Weight = $W_e L \sin\theta$ = 6,231 lb

Pulling Load on Exit Sag Bend = 74,489 lb
Total Pulling Load = 157,846 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 202.6 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu$ = 21,599 lb

Fluidic Drag = $12 \pi D L C_d$ = 6,873 lb

Axial Segment Weight = $W_e L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 28,472 lb
Total Pulling Load = 186,318 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 314.2 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 222,459 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R [1 - \cos(\alpha/2)]$ = 6.85 ft
$j = [(E I) / T]^{1/2}$ = 1,289

$Y = [18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1}]$ = 8.5E+05
$X = (3 L) - [(j / 2) \tanh(U/2)]$ = 363.50

$U = (12 L) / j$ = 2.92
$N = [(T h) - W_e \cos\theta (Y/144)] / (X / 12)$ = 118,926 lb

Bending Frictional Drag = $2 \mu N$ = 71,356 lb

Fluidic Drag = $12 \pi D L C_d$ = 10,659 lb

Axial Segment Weight = $W_e L \sin\theta$ = -9,732 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 72,283 lb
Total Pulling Load = 258,601 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 331.4 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu \cos\theta$ = 34,806 lb

Fluidic Drag = $12 \pi D L C_d$ = 11,246 lb

Axial Segment Weight = $W_e L \sin\theta$ = -20,458 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 25,594 lb
Total Pulling Load = 284,195 lb

Summary of Calculated Stress vs. Allowable Stress

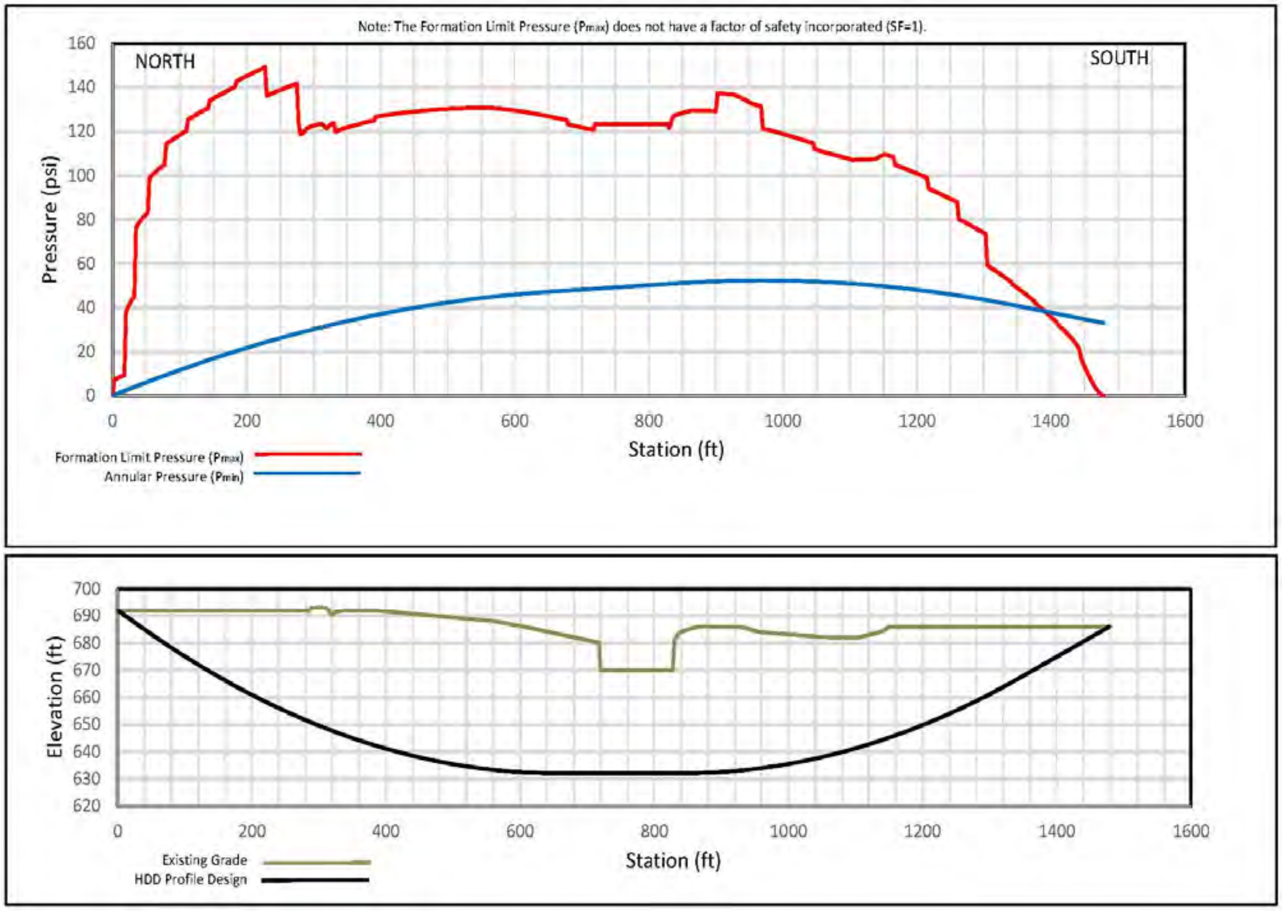
	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	3,462	ok	0	ok	0	ok	0.05	ok	0.00	ok
	3,151	ok	0	ok	781	ok	0.05	ok	0.02	ok
PC										
	3,151	ok	24,167	ok	781	ok	0.58	ok	0.27	ok
	2,270	ok	24,167	ok	1195	ok	0.57	ok	0.29	ok
PT										
	2,270	ok	0	ok	1195	ok	0.04	ok	0.03	ok
	1,923	ok	0	ok	1195	ok	0.03	ok	0.03	ok
PC										
	1,923	ok	24,167	ok	1195	ok	0.56	ok	0.28	ok
	1,016	ok	24,167	ok	929	ok	0.55	ok	0.25	ok
PT										
	1,016	ok	0	ok	929	ok	0.02	ok	0.02	ok
Exit Point	0	ok	0	ok	0	ok	0.00	ok	0.00	ok

Figure 6: Installation Loading and Stress Analysis (Worse-Case)

Hydrofracture Evaluation

The risk of inadvertent drilling fluid returns due to hydrofracture was evaluated using the Delft Method. The Delft Method is described in Section 5 of the report. In summary, the risk of inadvertent drilling fluid returns due to hydrofracture is low over the first 1,000 feet of the crossing. However, after station 12+45, the factor of safety drops below 2.0, indicating a moderate risk of hydrofracture. By station 14+00, the factor of safety falls below 1.0, indicating an increased risk of hydrofracture over the remaining roughly 80 feet of the crossing. Inadvertent drilling fluid returns due to hydrofracture near the exit point, where cover is shallow, is a common occurrence in the HDD industry during pilot hole drilling. These returns typically occur within the temporary workspace and are easily contained. Refer to Figure 7 for results presented in graphical format.

It is important to keep in mind that inadvertent drilling fluid returns may occur due to mechanisms unrelated to hydrofracture. It remains possible that inadvertent drilling fluid returns will occur by flowing to the ground surface through preexisting fractures or porous seams in the soil mass.



Note: The Formation Limit Pressure (Pmax) does not have a factor of safety incorporated (SF=1).

Figure 7: Hydrofracture Evaluation (Formation Limit Pressure - vs - Annular Pressure)

Construction Duration

The estimated duration of construction is 13 days. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated based on information contained within the Pipeline Research Council International's "Installation of Pipelines by Horizontal Directional Drilling", as well as JDH&A's previous experience in similar subsurface conditions. Refer to Figure 8 for details relative to the estimate.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.

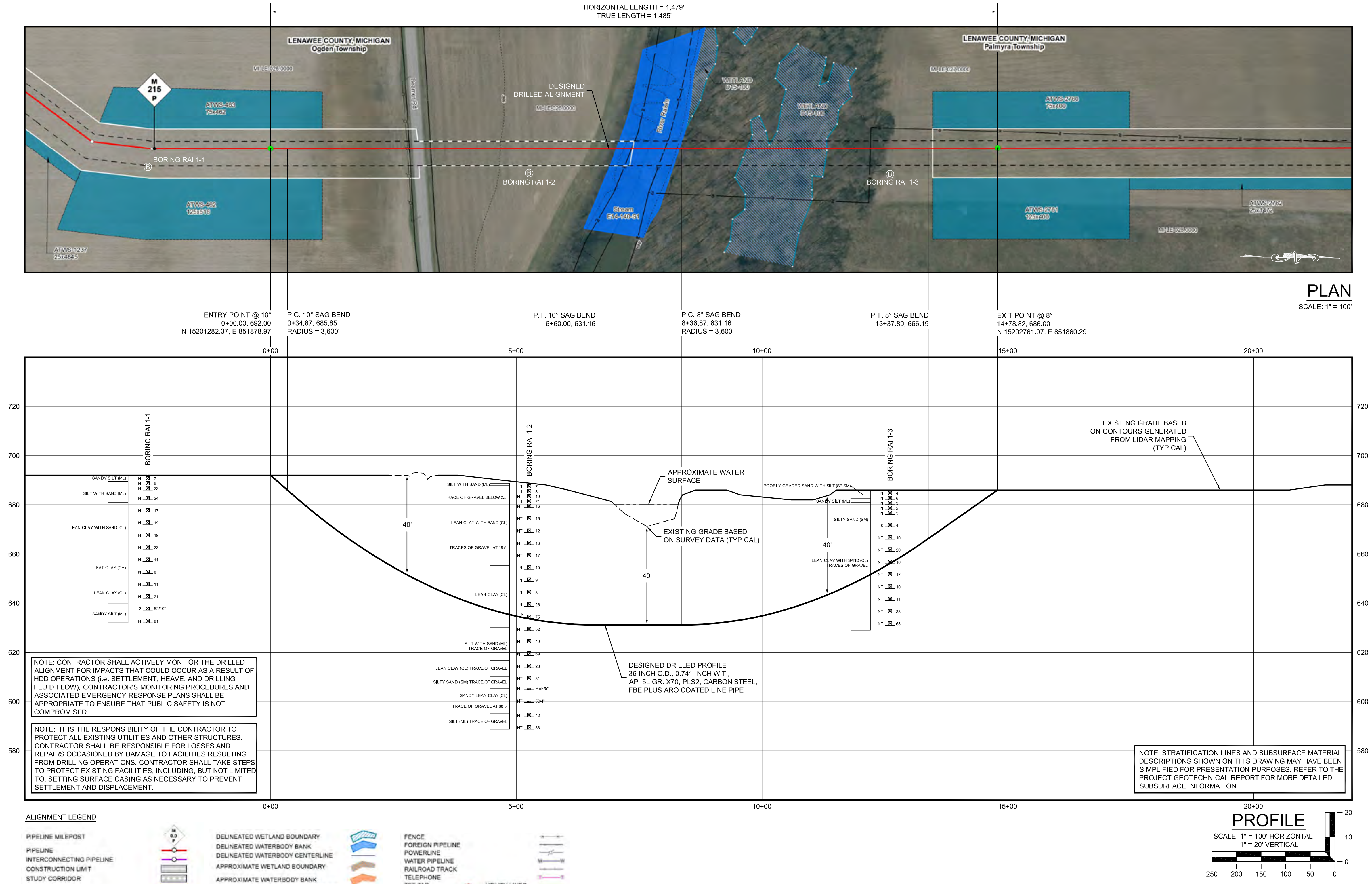
General Data		Comments
Work Schedule, hours/shift =	12.0	36" Raisin River Crossing
days/week =	7.0	
Drilled Length, feet =	1,485	
Pilot Hole		
Production Rate, feet/hour =	50	
shifts/day =	1	
Drilling Duration, hours =	29.7	
shifts =	2.5	
Trips to change tools, shifts =	0.5	
Pilot Hole Duration, days =	3.0	

Ream and Pull Back								
Pass Description =	36-ich	48-inch				Swab	Pull Back	Total
Travel Speed, feet/minute =	2.0	2.0				8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0				15.0	7.0	
shifts/day =	1	1				1	1	
Reaming Duration, hours =	14.0	14.0				4.7	5.7	38.4
shifts =	1.2	1.2				0.4	0.5	3.2
Rig up, shifts =	0.5	0.5				0.5	0.5	2.0
Trips to change tools, shifts =	1.0	1.0				0.0		2.0
Pass Duration, days =	2.7	2.7				0.9	1.0	7.2

Summary	
HDD Duration at Site, days =	12.2

Site Establishment	Move in	Rig Up	Rig Down	Move Out
shifts/day =	1	1	1	1
shifts =	0.5	1.0	1.0	0.5
days =	0.5	1.0	1.0	0.5

Figure 8: Estimated Construction Duration



NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING MAY HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

ALIGNMENT LEGEND

PIPELINE MILEPOST
PIPELINE
INTERCONNECTING PIPELINE
CONSTRUCTION LIMIT
STUDY CORRIDOR
STAGING AREA
WAREYARD
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
METERING & REGULATION STATION (M&R)
COMPRESSOR STATION SITE
FACILITIES TEMPORARY WORKSPACE
FACILITIES PERMANENT WORKSPACE
DELINEATED WETLAND BOUNDARY
DELINEATED WATERBODY BANK
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY BANK
APPROXIMATE WATERBODY CENTERLINE
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
PARCEL TRACT NO OH-CO-011.0000-SC
PROPERTY LINE
CONTOUR
MUNICIPALITY LINE
FENCE
FOREIGN PIPELINE
POWERLINE
WATER PIPELINE
RAILROAD TRACK
TELEPHONE
TEE TAP
BLOW OFF VALVE
TOWER
UTILITY LINES
MAINLINE VALVE (MLV)
MICROWAVE TOWER
HORIZONTAL DIRECTIONAL DRILLING
TANK ● LIGHT POLE ● FIRE HYDRANT ●
WELL: GAS ● WATER ● OIL ● UNKNOWN ●

GENERAL LEGEND

⊕ DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR AND SURVEY DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

GEOTECHNICAL LEGEND

Ⓑ BORING LOCATION

SPLIT SPOON SAMPLE

53 ⊠ 23 ← PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
53 ← PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

PUSH SAMPLE

CORE BARREL SAMPLE

UCS 6,250 ← UNCONFINED COMPRESSIVE STRENGTH (PSI)
TSS 1,350 ← TENSILE SPLITTING STRENGTH (PSI)
6 ← MOHS HARDNESS
53 ← ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY FUGRO CONSULTANTS, INC, BATON ROUGE, LOUISIANA. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED SEPTEMBER 11, 2015 FOR ADDITIONAL INFORMATION.

2. THE LETTER "N" TO THE LEFT OF A SPLIT SPOON SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TESTS WERE PERFORMED.

3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGEMENT IN INTERPRETING THIS DATA.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		2	ACM	JMS	RE–ISSUED FOR FERC
		1	LKB	JMS	ISSUED FOR BID
WATE–A–1236	ALIGNMENT SHEET M.P. 214.93 TO M.P. 215.88	0	LKB	ACM	ISSUED FOR FERC

John D. Hair, P.E.
Consulting Engineer
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS	PRELIMINARY		CONSTRUCTION	
TITLE	SIGNATURE	DATE	SIGNATURE	DATE
DRAWN BY:	LKB	08/07		
PROJECT MANAGER	JMS	08/07		
DESIGN ENGINEER	LKB	08/07		
DESIGN CHECKER	DLB	08/07		

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH RIVER RAISIN CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING
LENAWEE COUNTY, MICHIGAN

NEXUS GAS TRANSMISSION

M.P. 215.0 | W.O. | SCALE: AS SHOWN | DWG. WATE–H–1014 | REV. 1

MP 237.4 Saline River

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- A combination of LiDAR, hydrographic, and traditional survey data covering the proposed crossing location
- A geotechnical data report prepared by Fugro Consultants, Inc. "Geotechnical Data Report, Saline HDD Crossing, Nexus Gas Transmission Project, Washtenaw County, Michigan" and dated September 11, 2015
- A reconnaissance of the proposed crossing location conducted in July of 2015 by a representative of JDH&A

General Site Description

The 36-inch Saline River Crossing is located just northwest of Milan, Michigan near pipeline Mile Post 237.4. The crossing involves passing beneath the channel of Saline River as well as Mooreville Road, which is located just east of the river. The Saline River is roughly 60 feet from bank to bank, and about 7 feet deep based on hydrographic survey data. Both sides of the river are relatively flat and currently in use for agricultural purposes. The topography rises with the northeast bank of the river, and then levels off on the northeast side Mooreville Road. The elevation change is approximately 20 feet. An overview of the crossing location is provided in Figure 1 and Figure 2.

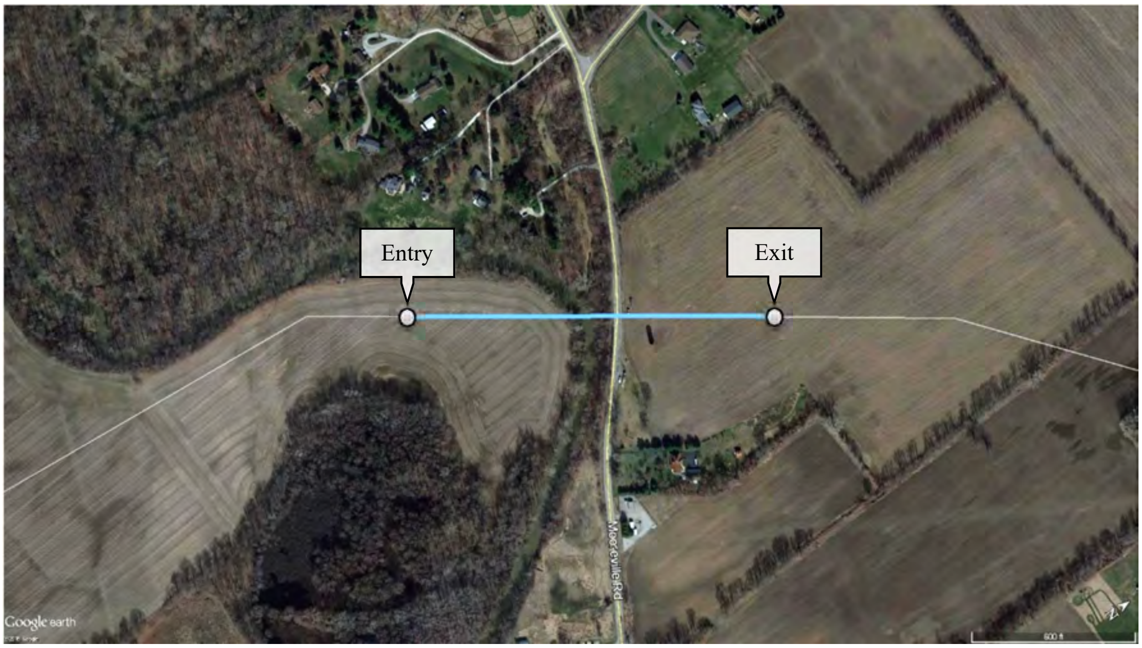


Figure 1: Overview of the Saline River Crossing

Figure 2: Looking south at proposed entry location from treeline near river

Subsurface Conditions

Four geotechnical borings were taken as part of the site investigation conducted by Fugro Consultants, Inc. Two borings were taken on the southwest side of the river and two on the northeast side of the river. The borings generally encountered lean clay, sandy lean clay, and gravelly lean clay overlying shale and limestone bedrock. Two of the borings on the southwest side of the river encountered potential cobbles/bounders at depths ranging from 34 feet to 43 feet. The top of the bedrock surface was encountered near elevation 590 to 600 feet (90 to 110 feet below the ground surface) in Borings SAL-01 through SAL-03. Boring SAL-04 was drilled to a depth of 75 feet without encountering the top of bedrock. Unconfined compressive strength on representative rock samples ranged from 5,420 psi to 11,000 psi for the shale in Boring SAL-03 and from 4,520 psi to 11,200 psi for the limestone encountered in Boring SAL-02.

Refer to the report titled “Geotechnical Data Report, Saline River HDD Crossing, Nexus Gas Transmission Project, Washtenaw County Michigan” and dated September 11, 2015, for additional information.

Design Geometry & Layout

The proposed HDD design for crossing Saline River has a horizontal length of 1,315 feet. The entry point is located in an open field on the southwest side of the river, the topographically lower side. This has benefits from a drilling fluid flow and handling perspective. The entry point is located approximately 600 feet from the southwest bank of the river. The exit point is located on the high side of the crossing, approximately 710 feet northeast of Mooreville Roads. Pull section fabrication will take place along the proposed pipeline right-of-way (ROW), which will allow pulling in a single continuous segment, and thus avoids the requirement for a tie-in weld.

Shallow angles (8-degree entry and exit angles) and a reduced depth of cover beneath the river (30 feet) have been utilized in an attempt reduce the risk of HDD operational problems by minimizing exposure to potentially adverse gravel/cobbles/boulders noted in Borings SAL-01 and SAL-02. A radius of curvature equal to 3,600 feet is used.

Assessment of Feasibility

Based on a review of available geotechnical information, the HDD segment must pass through coarse granular material in the form of gravel, and possibly cobbles and boulders on the southwest side of the crossing. As mentioned previously in this report, coarse granular material such as gravel, and cobbles, and boulders can be problematic to HDD operations. That said, given the relatively short length of the crossing (1,320 feet), skilled HDD contractors should be able to overcome the adverse conditions and successfully install the crossing.

Risk Identification and Assessment

Notable risks associated with pipeline installation by HDD include potential damage to Mooreville Road resulting from drilling fluid flow (inadvertent returns, settlement, or heave).

Although there is risk of HDD operational problems resulting from random gravel, cobbles and boulders, given the short length of the crossing, the overall risk level is considered average.

Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse-case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the loading scenarios described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 212,230 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 270,033 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 3. Detailed calculations for each installation loading scenario are summarized in Figures 4 and 5.

Line Pipe Properties		
Pipe Outside Diameter =	36.000	in
Wall Thickness =	0.741	in
Specified Minimum Yield Strength =	70,000	psi
Young's Modulus =	2.9E+07	psi
Moment of Inertia =	12755.22	in^4
Pipe Face Surface Area =	82.08	in^2
Diameter to Wall Thickness Ratio, D/t =	49	
Poisson's Ratio =	0.3	
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F
Pipe Weight in Air =	279.04	lb/ft
Pipe Interior Volume =	6.50	ft^3/ft
Pipe Exterior Volume =	7.07	ft^3/ft
HDD Installation Properties		
Drilling Mud Density =	12.0	ppg
=	89.8	lb/ft^3
Ballast Density =	62.4	lb/ft^3
Coefficient of Soil Friction =	0.30	
Fluid Drag Coefficient =	0.025	psi
Ballast Weight =	405.51	lb/ft
Displaced Mud Weight =	634.48	lb/ft

Figure 3: Pipe and Installation Properties

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
PIpe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30

Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 180.5 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = 279.0 lb/ft

Frictional Drag = W_e L μ cosθ = 14,959 lb

Fluidic Drag = 12 π D L C_d = 0 lb

Fluidic drag is calculated as zero unless entire segment is submerged in drilling fluid. Please reference Step 2, Drilled Path Input

Axial Segment Weight = W_e L sinθ = -7,008 lb

Negative value indicates axial weight applied in direction of installation

Pulling Load on Exit Tangent = 7,951 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °

Average Tension, T = 59,869 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 8.77 ft

j = [(E I) / T]$^{1/2}$ = 2,486

Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 1.7E+06

X = (3 L) - [(j / 2) tanh(U/2)] = 466.88

U = (12 L) / j = 2.43

N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 123,864 lb

Bending Frictional Drag = 2 μ N = 74,318 lb

Fluidic Drag = 12 π D L C_d = 17,055 lb

Axial Segment Weight = W_e L sinθ = 12,463 lb

Pulling Load on Exit Sag Bend = 103,836 lb
Total Pulling Load = 111,787 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 100.1 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ = 10,670 lb

Fluidic Drag = 12 π D L C_d = 3,395 lb

Axial Segment Weight = W_e L sinθ = 0 lb

Pulling Load on Bottom Tangent = 14,065 lb
Total Pulling Load = 125,852 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = 8.0 °
Deflection Angle, α = 4.0 °

Average Tension, T = 167,486 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 8.77 ft

j = [(E I) / T]$^{1/2}$ = 1,486

Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 2.9E+06

X = (3 L) - [(j / 2) tanh(U/2)] = 790.13

U = (12 L) / j = 4.06

N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 131,128 lb

Bending Frictional Drag = 2 μ N = 78,677 lb

Fluidic Drag = 12 π D L C_d = 17,055 lb

Axial Segment Weight = W_e L sinθ = -12,463 lb

Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 83,269 lb
Total Pulling Load = 209,121 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 34.5 ft
Entry Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 3,646 lb

Fluidic Drag = 12 π D L C_d = 1,171 lb

Axial Segment Weight = W_e L sinθ = -1,708 lb

Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 3,109 lb
Total Pulling Load = 212,230 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	2,586	ok	0	ok	0	ok	0.04	ok	0.00	ok
	2,548	ok	0	ok	73	ok	0.04	ok	0.00	ok
PC										
	2,548	ok	12,083	ok	73	ok	0.31	ok	0.07	ok
	1,533	ok	12,083	ok	603	ok	0.29	ok	0.08	ok
PT										
	1,533	ok	0	ok	603	ok	0.02	ok	0.01	ok
	1,362	ok	0	ok	603	ok	0.02	ok	0.01	ok
PC										
	1,362	ok	12,083	ok	603	ok	0.29	ok	0.07	ok
	97	ok	12,083	ok	73	ok	0.27	ok	0.05	ok
PT										
	97	ok	0	ok	73	ok	0.00	ok	0.00	ok
Exit Point	0	ok	0	ok	0	ok	0.00	ok	0.00	ok

Figure 4: Installation Loading and Stress Analysis (As-Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 486.0 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu \cos\theta$ = 51,315 lb
Fluidic Drag = $12 \pi D L C_d$ = 16,488 lb
Axial Segment Weight = $W_e L \sin\theta$ = 24,039 lb

Pulling Load on Exit Tangent = 91,842 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 129,298 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 4.38 ft
j = [(E I) / T]$^{1/2}$ = 1,691
Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 2.8E+05
X = (3 L) - [(j / 2) tanh(U/2)] = 151.71
U = (12 L) / j = 1.78
N = [(T h) - $W_e \cos\theta$ (Y/144)] / (X / 12) = 100,255 lb
Bending Frictional Drag = 2 μ N = 60,153 lb
Fluidic Drag = $12 \pi D L C_d$ = 8,527 lb
Axial Segment Weight = $W_e L \sin\theta$ = 6,231 lb

Pulling Load on Exit Sag Bend = 74,912 lb
Total Pulling Load = 166,754 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 46.0 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu$ = 4,908 lb
Fluidic Drag = $12 \pi D L C_d$ = 1,562 lb
Axial Segment Weight = $W_e L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 6,470 lb
Total Pulling Load = 173,224 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = 8.0 °
Deflection Angle, α = 4.0 °
Average Tension, T = 206,318 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 4.38 ft
j = [(E I) / T]$^{1/2}$ = 1,339
Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 4.0E+05
X = (3 L) - [(j / 2) tanh(U/2)] = 211.89
U = (12 L) / j = 2.25
N = [(T h) - $W_e \cos\theta$ (Y/144)] / (X / 12) = 106,486 lb
Bending Frictional Drag = 2 μ N = 63,891 lb
Fluidic Drag = $12 \pi D L C_d$ = 8,527 lb
Axial Segment Weight = $W_e L \sin\theta$ = -6,231 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 66,187 lb
Total Pulling Load = 239,411 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 340.0 ft
Entry Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu \cos\theta$ = 35,905 lb
Fluidic Drag = $12 \pi D L C_d$ = 11,537 lb
Axial Segment Weight = $W_e L \sin\theta$ = -16,820 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 30,621 lb
Total Pulling Load = 270,033 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	3,290	ok	0	ok	0	ok	0.05	ok	0.00	ok
	2,917	ok	0	ok	717	ok	0.05	ok	0.01	ok
PC										
	2,917	ok	24,167	ok	717	ok	0.58	ok	0.27	ok
	2,110	ok	24,167	ok	982	ok	0.56	ok	0.27	ok
PT										
	2,110	ok	0	ok	982	ok	0.03	ok	0.02	ok
	2,032	ok	0	ok	982	ok	0.03	ok	0.02	ok
PC										
	2,032	ok	24,167	ok	982	ok	0.56	ok	0.27	ok
	1,119	ok	24,167	ok	717	ok	0.55	ok	0.23	ok
PT										
	1,119	ok	0	ok	717	ok	0.02	ok	0.01	ok
Exit Point	0	ok	0	ok	-308	ok	0.00	ok	0.00	ok

Figure 5: Installation Loading and Stress Analysis (Worse-Case)

Hydrofracture Evaluation

The risk of inadvertent drilling fluid returns due to hydrofracture was evaluated using the Delft Method described previously in Section 5 of the report. In summary, the risk of inadvertent drilling fluid returns due to hydrofracture is low over the majority of the length of the crossing, with the exception of the first and last 50 feet of the installation, near the entry and exit points. Therefore, under normal drilling operations, inadvertent drilling fluid returns due to hydrofracture are not anticipated. Refer to Figure 6 for results presented in graphical format

It is important to keep in mind that inadvertent drilling fluid returns may occur due to mechanisms unrelated to hydrofracture. It remains possible that inadvertent drilling fluid returns will occur by flowing to the ground surface through preexisting fractures or porous seams in the soil mass.

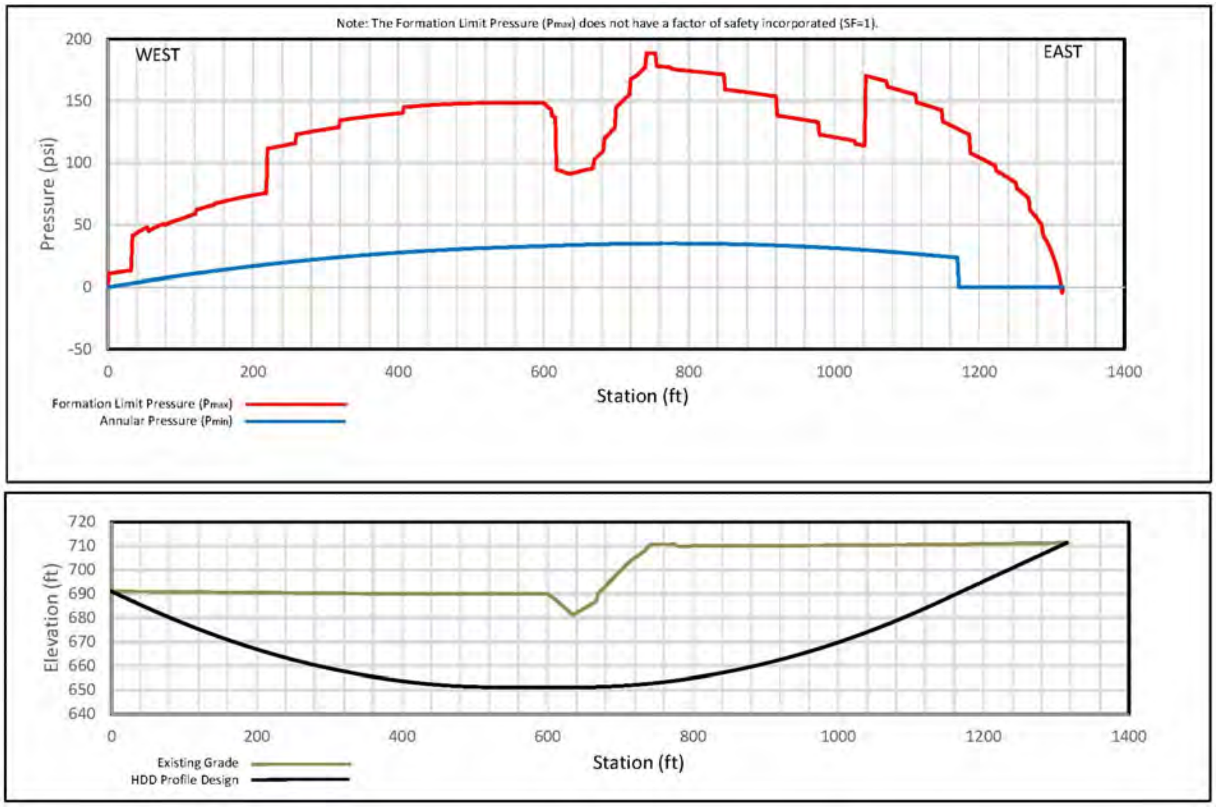


Figure 6: Hydrofracture Evaluation (Formation Limit Pressure –vs-Annular Pressure)

Construction Duration

The estimated duration of construction for the Saline River Crossing is 12 days. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated by JDH&A based on information contained within the Pipeline Research Council International's "*Installation of Pipelines by Horizontal Directional Drilling*"[1], as well as past experience in similar subsurface conditions. Refer to Figure 7 for additional information relative to the estimate.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.

General Data		Comments
Work Schedule, hours/shift =	12.0	36" Saline River Crossing
days/week =	7.0	
Drilled Length, feet =	1,320	
Pilot Hole		
Production Rate, feet/hour =	50	
shifts/day =	1	
Drilling Duration, hours =	26.4	
shifts =	2.2	
Trips to change tools, shifts =	0.5	
Pilot Hole Duration, days =	2.7	

Ream and Pull Back								
Pass Description =	36-inch	48-inch				Swab	Pull Back	Total
Travel Speed, feet/minute =	2.0	2.0				8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0				15.0	15.0	
shifts/day =	1	1				1	1	
Reaming Duration, hours =	12.4	12.4				4.2	5.1	34.1
shifts =	1.0	1.0				0.3	0.4	2.8
Rig up, shifts =	0.5	0.5				0.5	0.5	2.0
Trips to change tools, shifts =	1.0	1.0				0.0		2.0
Pass Duration, days =	2.5	2.5				0.8	0.9	6.8

Summary	
HDD Duration at Site, days =	11.5

Site Establishment	Move in	Rig Up	Rig Down	Move Out
shifts/day =	1	1	1	1
shifts =	0.5	1.0	1.0	0.5
days =	0.5	1.0	1.0	0.5

Figure 7: Estimated Construction Duration

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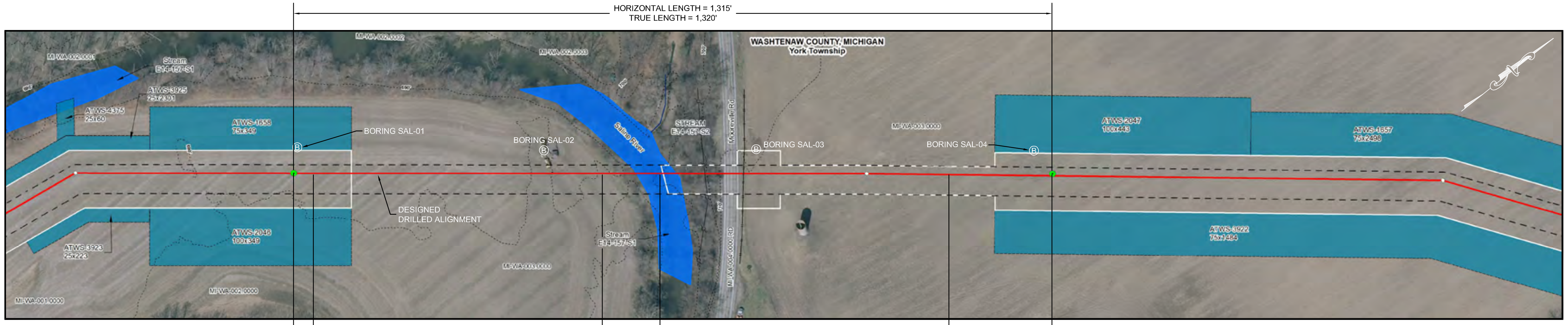
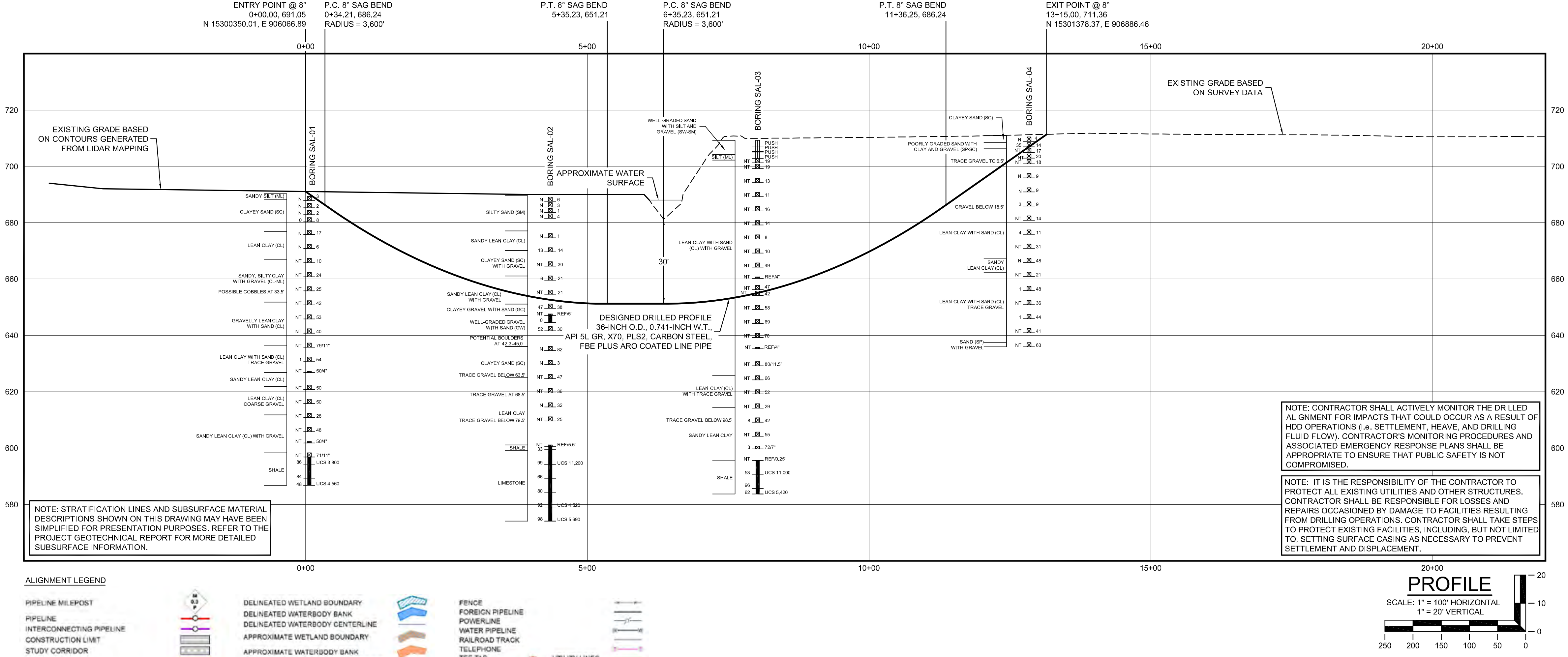
[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.

HORIZONTAL LENGTH = 1,315'
TRUE LENGTH = 1,320'



PLAN

SCALE: 1" = 100'



NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING MAY HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

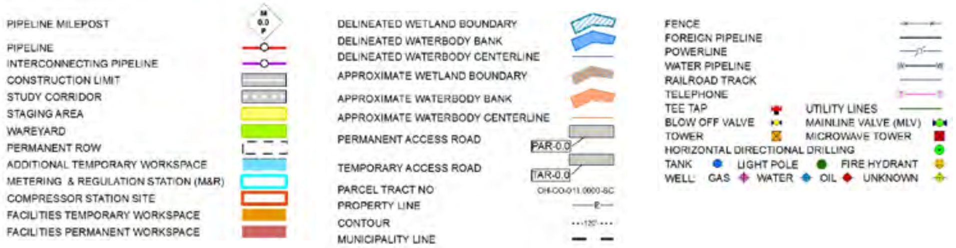
NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

PROFILE

SCALE: 1" = 100' HORIZONTAL
1" = 20' VERTICAL

ALIGNMENT LEGEND



GENERAL LEGEND

⊕ DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR, SURVEY, AND HYDROGRAPHIC DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

GEOTECHNICAL LEGEND

Ⓑ BORING LOCATION

SPLIT SPOON SAMPLE

53 ☒ 23 ← PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

PUSH SAMPLE

CORE BARREL SAMPLE

UCS 6,250 ← UNCONFINED COMPRESSIVE STRENGTH (PSI)
TSS 1,350 ← TENSILE SPLITTING STRENGTH (PSI)
53 6 ← MOHS HARDNESS
ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY FUGRO CONSULTANTS, INC, BATON ROUGE, LOUISIANA. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED SEPTEMBER 11, 2015 FOR ADDITIONAL INFORMATION.

2. THE LETTER "N" TO THE LEFT OF A SPLIT SPOON SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TESTS WERE PERFORMED.

3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGEMENT IN INTERPRETING THIS DATA.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		2	ACM	JMS	RE-ISSUED FOR FERC
WATE-A-1260	ALIGNMENT SHEET M.P. 237.66 TO M.P. 238.60	1	LKB	JMS	ISSUED FOR BID
WATE-A-1259	ALIGNMENT SHEET M.P. 236.71 TO M.P. 237.66	0	LKB	JMS	ISSUED FOR FERC

IG.#

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TITLE	PRELIMINARY SIGNATURE	PRELIMINARY DATE	CONSTRUCTION SIGNATURE	CONSTRUCTION DATE
DRAWN BY:	DMP	08/07		
PROJECT MANAGER	JMS	08/07		
DESIGN ENGINEER	DMP	08/07		
DESIGN CHECKER	ACM	08/07		

ENGINEERING APPROVALS

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH SALINE RIVER CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

WASHTENAW COUNTY, MICHIGAN

NEXUS GAS TRANSMISSION

M.P. 237.4	W.O.	SCALE: AS SHOWN	DWG. WATE-H-1015	REV. 2

MP 250.7 Hydro Park

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- LiDAR and survey data covering the proposed crossing location
- A geotechnical data report prepared by Fugro Consultants, Inc. “Geotechnical and Geophysical Data Report, Hydro Park Ford River HDD Crossing, Nexus Gas Transmission Project, Washtenaw County Michigan” and dated September 11, 2015
- A reconnaissance of the proposed crossing location conducted in July of 2015 by a representative of JDH&A

General Site Description

The 36-inch Hydro Park Crossing is located near pipeline Mile Post 250.7 just south of Ypsilanti, Michigan. The primary obstacles that will be crossed are a meandering river just downstream of Ford Lake Dam, as well as Bridge Road. The river is approximately 175 feet wide at the crossing location and about 5 feet deep. Both sides of the crossing are wooded. The proposed HDD alignment crosses perpendicularly to Bridge Road, extends across the river cut-bank, and onto the point bar within South Hydro Park. An overview of the proposed crossing location is provided in Figure 1. Additional site photos taken during the reconnaissance are provided in Figures 2 and 3.

Figure 1: Overview of the Hydro Park Crossing

Figure 2: View looking east from approximate exit point

Figure 3: View looking south at water body from approximately 150 feet south of entry point

Subsurface Conditions

Four geotechnical borings were drilled at the proposed crossing site as part of the site investigation conducted by Fugro Consultants, Inc. Boring HYD-01, taken near the proposed entry point on the east side of the crossing, encountered layers of silty sand, lean clay with sand, sandy lean clay, sand with clay, and gravel with clay, overlying dolomite and shale bedrock. Top of bedrock was at approximately 99 feet below the ground surface. Grain size curves indicate gravel content as high as 71 percent. Boring HYD-02, taken approximately 614 feet south of the HDD alignment, was drilled to a depth of 79 feet and encountered mixtures of sandy lean clay, silty sand, clayey gravel, sand, with silt and gravel, gravel with silt and gravel with sand. A possible cobble was noted at about 65 feet. Grain size curves indicate gravel as high as 73 percent. Bedrock was not encountered in Boring HYD-02. Boring HYD-03 was located on the west side of the crossing, approximately 400 feet east of Bridge Road. Conditions encountered were consistent with the other borings. Top of bedrock occurred at a depth of 103 feet. Grain size curves indicate up to 41 percent gravel. Boring HYD-04, taken near the proposed HDD exit point, also encountered mixtures of clay, silt, sand, and gravel, but with less gravel after about 35 feet. Grain size curves indicate a gravel content of 72 percent at a depth of about 19 feet.

Design Geometry & Layout

The proposed crossing design involves a horizontal length of 2,300 feet. It utilizes 10-degree entry and exit angles, and a radius of curvature of 3,600 feet. The crossing design is based on offsetting the entry point 60 feet west of the P.I. on the east side of the crossing, obtaining 33 feet of cover beneath the slope on the east end of the crossing, 40 feet of cover at the centerline of Bridge Road, and 40 feet of cover beneath the river.

Due to workspace considerations, the exit point is located on the west side of the crossing to take advantage of open space parallel to Lakeshore Boulevard for pull section fabrication. The entry point is located on the east side of the crossing.

A copy of the preliminary HDD plan and profile drawing is included at the end of this report.

Assessment of Feasibility

Although the feasibility of the Hydro Park crossing cannot be ruled out, adverse subsurface conditions in the form of coarse granular material are present. Passing through significant coarse granular material (gravel) will increase the risk of HDD operational problems.

Risk Identification and Assessment

Notable risks at this location include damage to Bridge Road in the form of heaving or settlement, as well as drilling fluid surfacing with the water body.

The overall risk of constructional operational problems and delays is considered high due to an abundance of coarse granular material over the duration of the crossing.

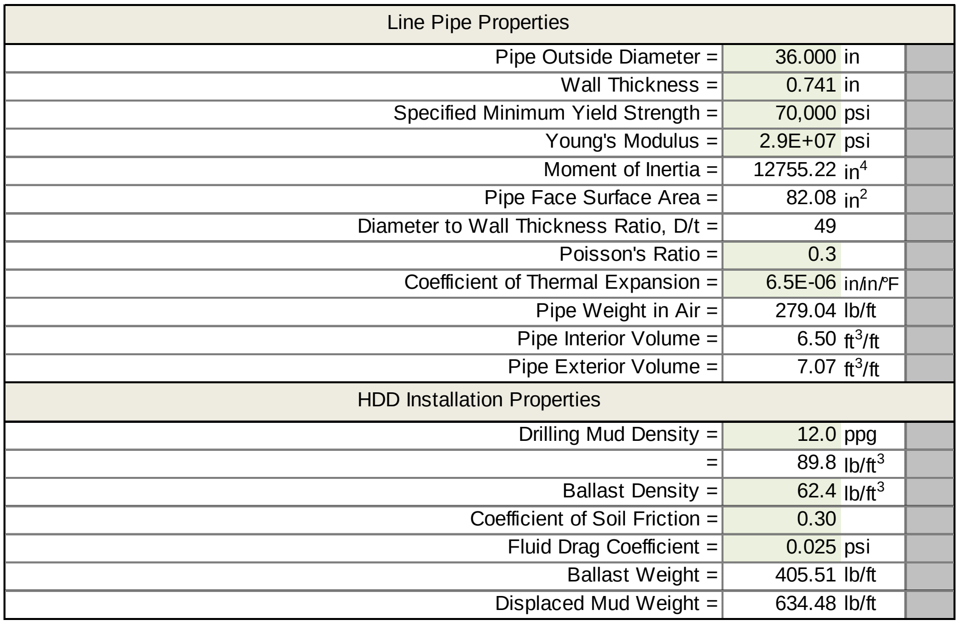
Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse-case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the loading scenarios described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 386,303 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 410,143 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 4. Detailed calculations for each installation loading scenario are summarized in Figures 5 and 6.



Line Pipe Properties		
Pipe Outside Diameter =	36.000	in
Wall Thickness =	0.741	in
Specified Minimum Yield Strength =	70,000	psi
Young's Modulus =	2.9E+07	psi
Moment of Inertia =	12755.22	in^4
Pipe Face Surface Area =	82.08	in^2
Diameter to Wall Thickness Ratio, D/t =	49	
Poisson's Ratio =	0.3	
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F
Pipe Weight in Air =	279.04	lb/ft
Pipe Interior Volume =	6.50	ft^3/ft
Pipe Exterior Volume =	7.07	ft^3/ft
HDD Installation Properties		
Drilling Mud Density =	12.0	ppg
=	89.8	lb/ft^3
Ballast Density =	62.4	lb/ft^3
Coefficient of Soil Friction =	0.30	
Fluid Drag Coefficient =	0.025	psi
Ballast Weight =	405.51	lb/ft
Displaced Mud Weight =	634.48	lb/ft

Figure 4: Pipe and Installation Properties

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 179.2 ft
Exit Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 18,818 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 6,080 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = 11,061 lb

Pulling Load on Exit Tangent = 35,959 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 628.3 ft
Segment Angle with Horizontal, θ = -10.0 °
Deflection Angle, α = -5.0 °
Average Tension, T = 102,344 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 13.70 ft
$j = [(E\ I) / T]^{1/2}$ = 1,901

$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 4.5E+06
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 969.75

$U = (12\ L) / j$ = 3.97
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 153,313 lb

Bending Frictional Drag = $2\ \mu\ N$ = 91,988 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 21,318 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = 19,464 lb

Pulling Load on Exit Sag Bend = 132,770 lb
Total Pulling Load = 168,729 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 719.5 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 76,721 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 24,412 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 101,133 lb
Total Pulling Load = 269,863 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 628.3 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 322,064 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 13.70 ft
$j = [(E\ I) / T]^{1/2}$ = 1,072

$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 6.0E+06
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 1350.05

$U = (12\ L) / j$ = 7.04
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 170,916 lb

Bending Frictional Drag = $2\ \mu\ N$ = 102,550 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 21,318 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = -19,464 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 104,404 lb
Total Pulling Load = 374,266 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 155.9 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 16,369 lb

Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 5,289 lb

Axial Segment Weight = $W_e\ L \sin\theta$ = -9,621 lb
Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 12,037 lb
Total Pulling Load = 386,303 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	4,706	ok	0	ok	0	ok	0.07	ok	0.01	ok
	4,560	ok	0	ok	395	ok	0.07	ok	0.01	ok
PC										
	4,560	ok	12,083	ok	395	ok	0.34	ok	0.10	ok
	3,288	ok	12,083	ok	1224	ok	0.32	ok	0.13	ok
PT										
	3,288	ok	0	ok	1224	ok	0.05	ok	0.04	ok
	2,056	ok	0	ok	1224	ok	0.03	ok	0.03	ok
PC										
	2,056	ok	12,083	ok	1224	ok	0.30	ok	0.11	ok
	438	ok	12,083	ok	395	ok	0.27	ok	0.06	ok
PT										
	438	ok	0	ok	395	ok	0.01	ok	0.00	ok
Exit Point	0	ok	0	ok	-76	ok	0.00	ok	0.00	ok

Figure 5: Installation Loading and Stress Analysis (As-Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Plpe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 480.6 ft
Exit Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 50,474 lb
Fluidic Drag = 12 π D L C_d = 16,308 lb
Axial Segment Weight = W_e L sinθ = 29,666 lb
Pulling Load on Exit Tangent = 96,449 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 314.2 ft
Segment Angle with Horizontal, θ = -10.0 °
Deflection Angle, α = -5.0 °
Average Tension, T = 139,862 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 6.85 ft
j = [(E I) / T]$^{1/2}$ = 1,626
Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 6.4E+05
X = (3 L) - [(j / 2) tanh(U/2)] = 275.11
U = (12 L) / j = 2.32
N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 110,726 lb
Bending Frictional Drag = 2 μ N = 66,435 lb
Fluidic Drag = 12 π D L C_d = 10,659 lb
Axial Segment Weight = W_e L sinθ = 9,732 lb
Pulling Load on Exit Sag Bend = 86,827 lb
Total Pulling Load = 183,275 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 800.9 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ = 85,401 lb
Fluidic Drag = 12 π D L C_d = 27,174 lb
Axial Segment Weight = W_e L sinθ = 0 lb
Pulling Load on Bottom Tangent = 112,574 lb
Total Pulling Load = 295,850 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 314.2 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 335,339 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = R [1 - cos(α/2)] = 6.85 ft
j = [(E I) / T]$^{1/2}$ = 1,050
Y = [18 (L)^2] - [(j)^2 (1 - cosh(U/2)$^{-1}$] = 1.0E+06
X = (3 L) - [(j / 2) tanh(U/2)] = 445.56
U = (12 L) / j = 3.59
N = [(T h) - W_e cosθ (Y/144)] / (X / 12) = 130,086 lb
Bending Frictional Drag = 2 μ N = 78,052 lb
Fluidic Drag = 12 π D L C_d = 10,659 lb
Axial Segment Weight = W_e L sinθ = -9,732 lb Negative value indicates axial weight applied in direction of installation
Pulling Load on Entry Sag Bend = 78,979 lb
Total Pulling Load = 374,828 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 457.3 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = W_e L μ cosθ = 48,025 lb
Fluidic Drag = 12 π D L C_d = 15,517 lb
Axial Segment Weight = W_e L sinθ = -28,227 lb Negative value indicates axial weight applied in direction of installation
Pulling Load on Entry Tangent = 35,315 lb
Total Pulling Load = 410,143 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	4,997	ok	0	ok	0	ok	0.08	ok	0.01	ok
	4,567	ok	0	ok	1188	ok	0.07	ok	0.04	ok
PC										
	4,567	ok	24,167	ok	1188	ok	0.60	ok	0.33	ok
	3,604	ok	24,167	ok	1602	ok	0.59	ok	0.35	ok
PT										
	3,604	ok	0	ok	1602	ok	0.06	ok	0.06	ok
	2,233	ok	0	ok	1602	ok	0.04	ok	0.05	ok
PC										
	2,233	ok	24,167	ok	1602	ok	0.56	ok	0.32	ok
	1,175	ok	24,167	ok	1188	ok	0.55	ok	0.27	ok
PT										
	1,175	ok	0	ok	1188	ok	0.02	ok	0.03	ok
Exit Point	0	ok	0	ok	-76	ok	0.00	ok	0.00	ok

Figure 6: Installation Loading and Stress Analysis (Worse-Case)

Hydrofracture Evaluation

The risk of inadvertent drilling fluid returns due to hydrofracture was reviewed using the Delft Method. The Delft Method is described in Section 5 of the report. In summary, under normal drilling operations, the risk of inadvertent drilling fluid returns due to hydrofracture is low over the majority of the length of the crossing with the exception of the last 60 feet of the drill where cover is shallow as the bit begins to make its way to the surface. The factor of safety remains above 2.0 until station 22+12 indicating a low risk of hydrofracture. After station 22+12, the factor of safety begins dropping until reaching 1.0 at station 22+22, approximately 58 feet from the exit point, indicating an increased risk inadvertent drilling fluid returns. Inadvertent drilling fluid returns due to hydrofracture near the exit point, where cover is shallow, is a common occurrence in the HDD industry during pilot hole drilling. These returns typically occur within the project right-of-way and are easily contained and collected. Refer to Figure 7 for results presented in graphical format.

It is important to keep in mind that inadvertent drilling fluid returns may occur due to mechanisms unrelated to hydrofracture. It remains possible that inadvertent drilling fluid returns will occur by flowing to the ground surface through preexisting fractures or porous seams in the soil mass.

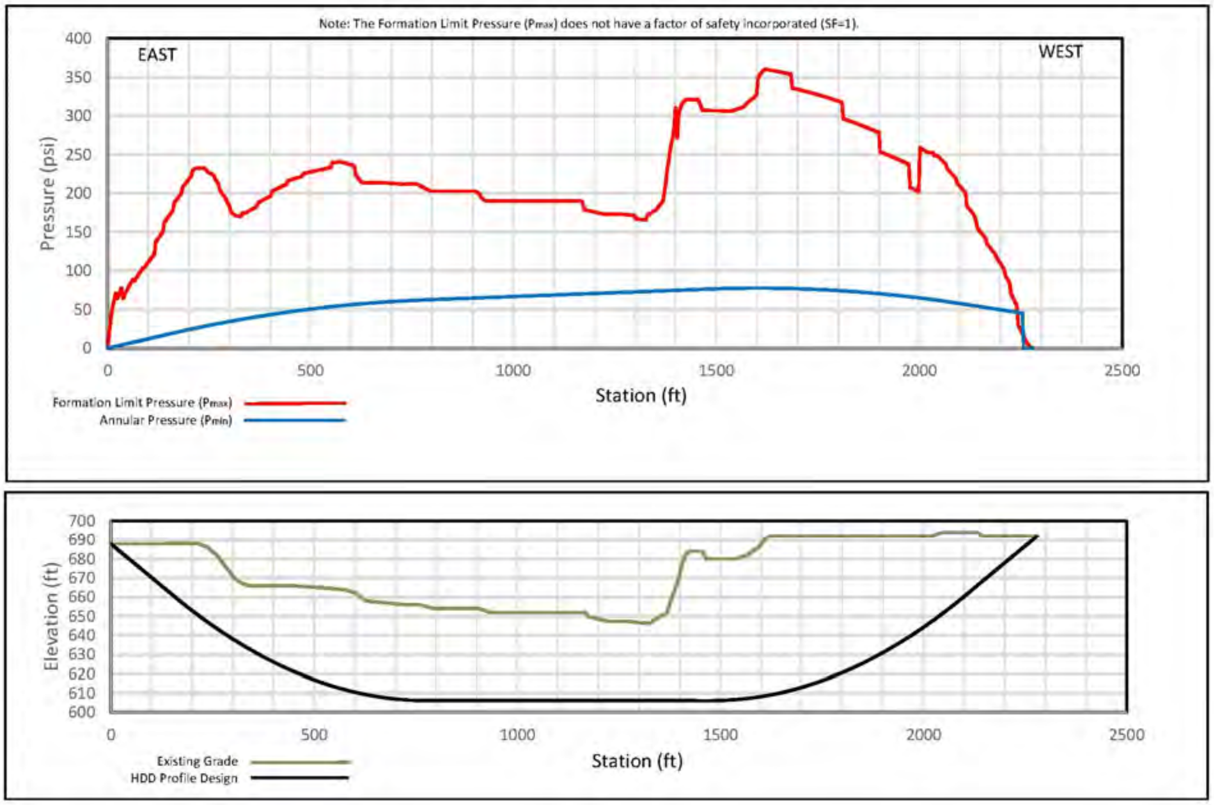

Note: The Formation Limit Pressure (Pmax) does not have a factor of safety incorporated (SF=1).

Figure 7: Hydrofracture Evaluation (Formation Limit Pressure –vs-Annular Pressure)

Construction Duration

The estimated duration of construction for the proposed crossing is 26 days. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated by JDH&A based on information contained within the Pipeline Research Council International's "*Installation of Pipelines by Horizontal Directional Drilling*"[1], as well as past experience in similar subsurface conditions. Refer to Figure 8 for additional information relative to the estimate.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.

General Data		Comments
Work Schedule, hours/shift =	12.0	36" Hydro Park Crossing
days/week =	7.0	
Drilled Length, feet =	2,311	
Pilot Hole		
Production Rate, feet/hour =	30	
shifts/day =	1	
Drilling Duration, hours =	77.0	
shifts =	6.4	
Trips to change tools, shifts =	0.5	
Pilot Hole Duration, days =	6.9	

Ream and Pull Back								
Pass Description =	24-inch	36-inch	48-inch			Swab	Pull Back	Total
Travel Speed, feet/minute =	1.0	1.0	1.0			8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0	15.0			15.0	15.0	
shifts/day =	1	1	1			1	1	
Reaming Duration, hours =	41.0	41.0	41.0			7.3	8.9	139.2
shifts =	3.4	3.4	3.4			0.6	0.7	11.6
Rig up, shifts =	0.5	0.5	0.5			0.5	0.5	2.5
Trips to change tools, shifts =	1.0	1.0	1.0			0.0		3.0
Pass Duration, days =	4.9	4.9	4.9			1.1	1.2	17.1

Summary	
HDD Duration at Site, days =	26.0

Site Establishment	Move in	Rig Up	Rig Down	Move Out
shifts/day =	1	1	1	1
shifts =	0.5	1.0	1.0	0.5
days =	0.5	1.0	1.0	0.5

Figure 8: Estimated Construction Duration

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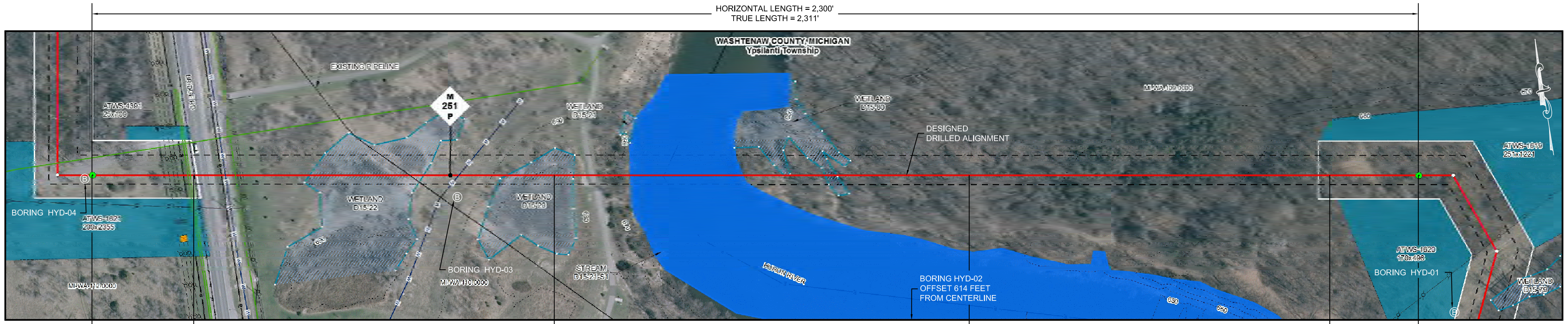
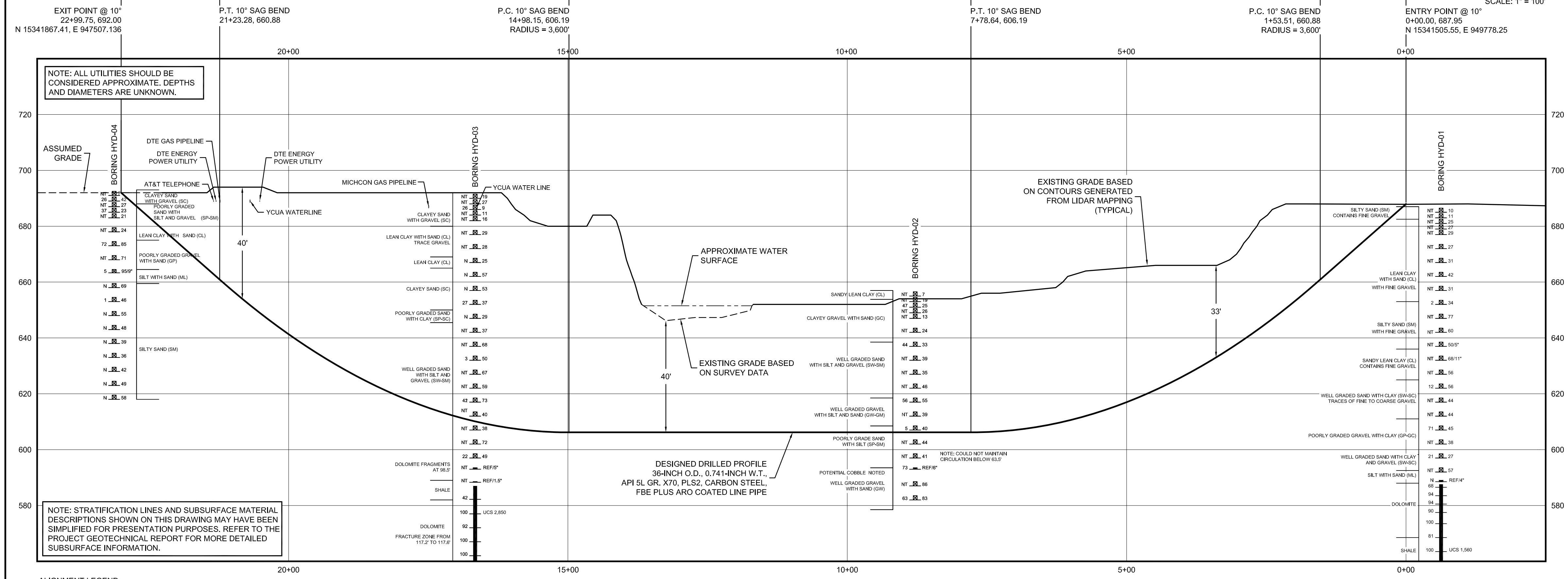
[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.



PLAN

SCALE: 1" = 100'

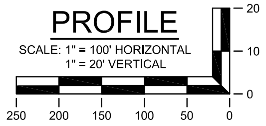


NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

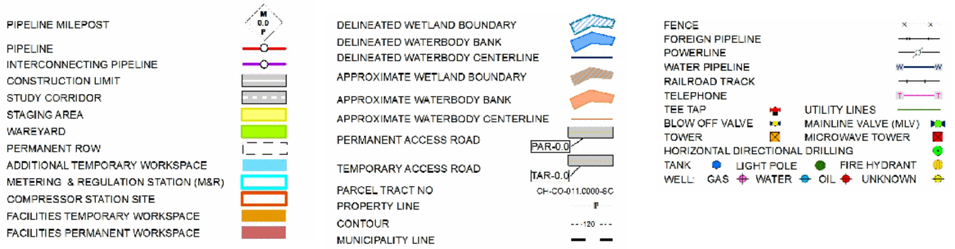
NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

PROFILE

SCALE: 1" = 100' HORIZONTAL
1" = 20' VERTICAL



ALIGNMENT LEGEND



GENERAL LEGEND

◒ DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR, SURVEY, AND HYDROGRAPHIC DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

GEOTECHNICAL LEGEND

Ⓑ BORING LOCATION

SPLIT SPOON SAMPLE

53 ☒ 23 ← PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

PUSH SAMPLE

CORE BARREL SAMPLE

UCS 6,250 ← UNCONFINED COMPRESSIVE STRENGTH (PSI)
53 ▮ 6 ← MOHS HARDNESS
ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY FUGRO CONSULTANTS, INC, BATON ROUGE, LOUISIANA. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED SEPTEMBER 11, 2015 FOR ADDITIONAL INFORMATION.

2. THE LETTER "N" TO THE LEFT OF A SPLIT SPOON SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TESTS WERE PERFORMED.

3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGEMENT IN INTERPRETING THIS DATA.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE.

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		3	ACM	JMS	RE-ISSUED FOR FERC
		2	LKB	JMS	REVISE HDD ENTRY POINT LOCATION AND UPDATE CENTERLINE
WATE-A-1274	ALIGNMENT SHEET M.P. 250.89 TO M.P. 251.84	1	LKB	JMS	ISSUED FOR BID
WATE-A-1273	ALIGNMENT SHEET M.P. 249.49 TO M.P. 250.89	0	LKB	JMS	ISSUED FOR FERC

IG.#

John D. Hair, P.E.
Consulting Engineer
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS

TITLE	PRELIMINARY SIGNATURE	PRELIMINARY DATE	CONSTRUCTION SIGNATURE	CONSTRUCTION DATE
DRAWN BY:	LKB	08/07		
PROJECT MANAGER	JMS	08/07		
DESIGN ENGINEER	LKB	08/07		
DESIGN CHECKER	DLB	08/07		

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH HYDRO PARK CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

WASHTENAW COUNTY, MICHIGAN

NEXUS℠ GAS TRANSMISSION

M.P. 250.7	W.O.	SCALE: AS SHOWN	DWG. WATE-H-1016	REV. 3

MP 251.5 Interstate 94

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- A combination of LiDAR and traditional survey data covering the proposed crossing location
- A geotechnical data report prepared by Fugro Consultants, Inc. titled “Geotechnical Data Report, Interstate 94 HDD Crossing, Nexus Gas Transmission Project, Washtenaw County Michigan” and dated September 11, 2015
- A reconnaissance of the proposed crossing location conducted in July of 2015 by a representative of JDH&A

General Site Description

The 36-inch Interstate 94 Crossing is located in Rawsonville, Michigan. It involves passing beneath the eastbound and westbound lanes of Interstate 94, as well as the northbound and southbound lanes of the access roads (Ward Road and Lakeview Avenue). The proposed HDD alignment is located within an existing power line easement, which also contains an existing water line and an existing gas pipeline. An overview of the proposed crossing location is provided in Figures 1 through 3.

Figure 1 – Overview of the Interstate 94 Crossing

Figure 2: View looking west toward entry location

Figure 3: View looking east along power line ROW toward exit point

Subsurface Conditions

Four geotechnical borings were taken as part of the site investigation conducted by Fugro Consultants, Inc. Two of the borings were taken on the north side of the interstate and two of the borings were taken on the south side of the interstate. The borings generally encountered sand with some gravel to depths of approximately 15 to 20 feet below the ground surface, overlying mixtures of lean clay and sand to the termination depths of the borings.

Refer to the report titled “Geotechnical Data Report, Interstate 94 HDD Crossing, Nexus Gas Transmission Project, Washtenaw County Michigan” and dated September 11, 2015, for additional information.

Design Geometry & Layout

The proposed Interstate 94 Crossing has a horizontal length of 1,359 feet. It has been designed to achieve a minimum of 40 feet of cover beneath Interstate 94 and the associated access roads. The design employs a 10-degree entry angle, an 8-degree exit angle, and a radius of curvature equal to 3,600 feet. The exit point is located on the north side of the interstate to take advantage of greater available workspace for pull section fabrication. The exit point on the north side of the crossing was positioned to be as far south as possible while still maintaining adequate cover beneath the access road. This provides the HDD contractor with approximately 1,000 feet of workspace for pull section fabrication. A copy of the proposed HDD design for Interstate 94 is included at the end of this section.

Workspace on both sides of the crossing runs along the existing power line easement and extends from just east of the existing gas pipeline for a distance of approximately 180 feet, providing ample working area for HDD rig side and pipe side activities. The power line easement crosses a residential street to the north approximately 1,150 feet from the point of exit. Therefore, the 36-inch pull section segment will have to be fabricated in two segments and welded during pullback.

The proposed HDD design, as well as available workspace for HDD operations, is shown on the HDD plan and profile drawing included in this site-specific report.

Assessment of Feasibility

Based on a review of available geotechnical information, subsurface conditions are conducive to the HDD process. Given the length, the proposed 36-inch diameter Interstate 94 Crossing is feasible.

Risk Identification and Assessment

Notable risks and potential construction impact associated with installation by HDD include impact to Interstate 94, Ward Road, and Lakeview Avenue in the form of heave, settlement, or inadvertent drilling fluid returns. In addition, because the crossing involves a tie-in weld during pullback, there is a chance the pull section could become silted or sanded in place while down for the weld, making it difficult to get the pipe moving again.

Overall, the level of risk associated with the proposed Interstate 94 Crossing is considered low.

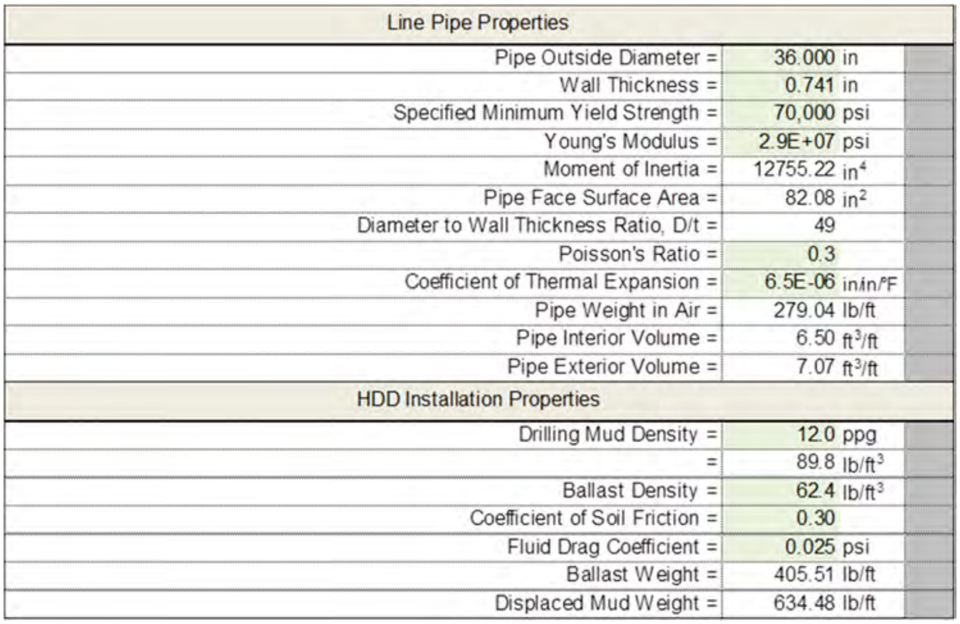
Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

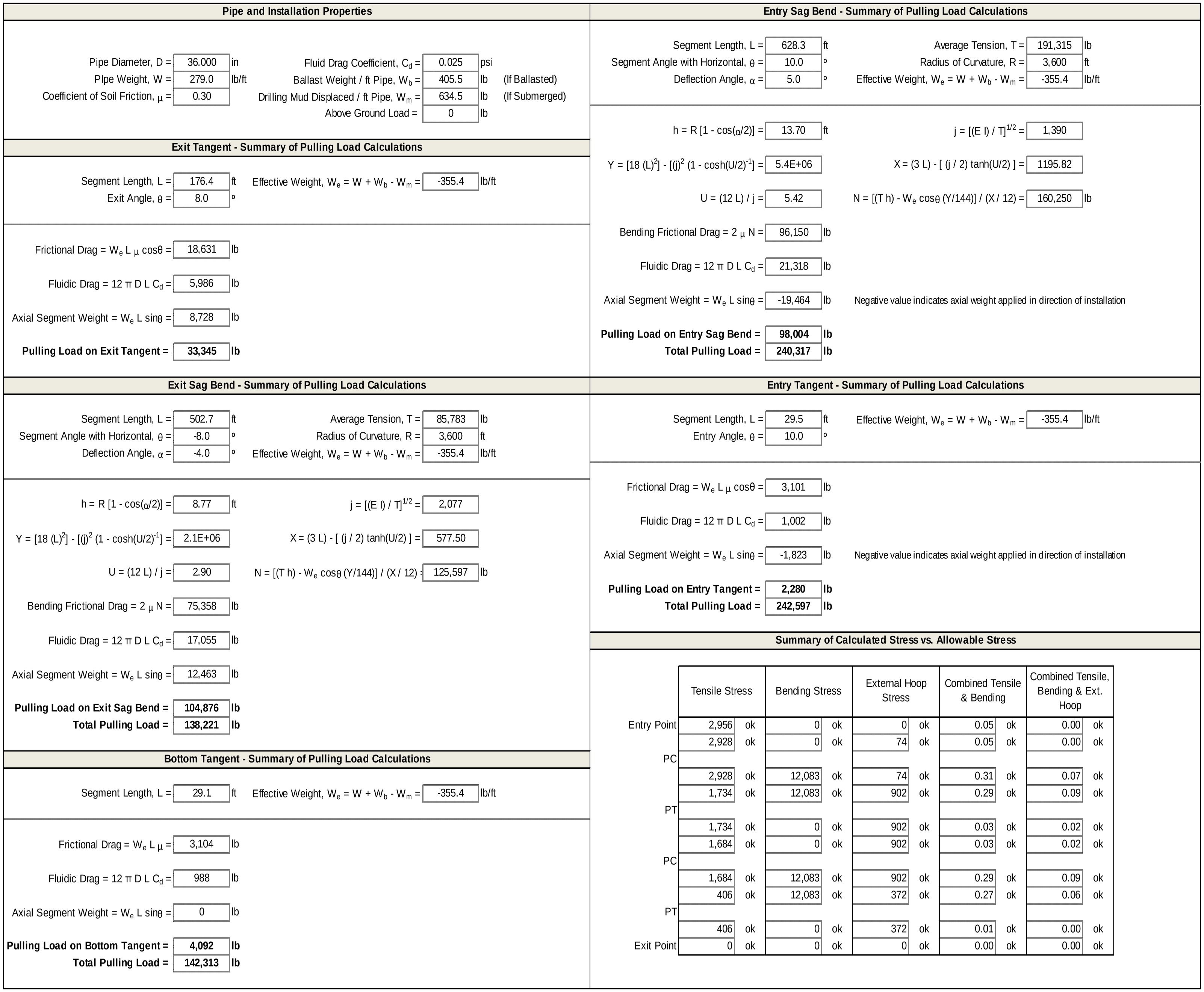
Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the loading scenarios described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 242,597 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 268,806 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 4. Detailed calculations for each scenario are summarized in Figures 5 and 6.



Line Pipe Properties	
Pipe Outside Diameter =	36.000 in
Wall Thickness =	0.741 in
Specified Minimum Yield Strength =	70,000 psi
Young's Modulus =	2.9E+07 psi
Moment of Inertia =	12755.22 in^4
Pipe Face Surface Area =	82.08 in^2
Diameter to Wall Thickness Ratio, D/t =	49
Poisson's Ratio =	0.3
Coefficient of Thermal Expansion =	6.5E-06 in/in/°F
Pipe Weight in Air =	279.04 lb/ft
Pipe Interior Volume =	6.50 ft^3/ft
Pipe Exterior Volume =	7.07 ft^3/ft
HDD Installation Properties	
Drilling Mud Density =	12.0 ppg
=	89.8 lb/ft^3
Ballast Density =	62.4 lb/ft^3
Coefficient of Soil Friction =	0.30
Fluid Drag Coefficient =	0.025 psi
Ballast Weight =	405.51 lb/ft
Displaced Mud Weight =	634.48 lb/ft

Figure 4: Pipe and Installation Properties



Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 176.4 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 18,631 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 5,986 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 8,728 lb

Pulling Load on Exit Tangent = 33,345 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 502.7 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 85,783 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 8.77 ft
$j = [(E\ I)\ /\ T]^{1/2}$ = 2,077
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 2.1E+06
$X = (3\ L) - [\ (j\ /\ 2) \tanh(U/2)\ ]$ = 577.50
$U = (12\ L)\ /\ j$ = 2.90
$N = [(T\ h) - W_e \cos\theta\ (Y/144)]\ /\ (X\ /\ 12)$ = 125,597 lb
Bending Frictional Drag = $2\ \mu\ N$ = 75,358 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 17,055 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 12,463 lb

Pulling Load on Exit Sag Bend = 104,876 lb
Total Pulling Load = 138,221 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 29.1 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 3,104 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 988 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 4,092 lb
Total Pulling Load = 142,313 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 628.3 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 191,315 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 13.70 ft
$j = [(E\ I)\ /\ T]^{1/2}$ = 1,390
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 5.4E+06
$X = (3\ L) - [\ (j\ /\ 2) \tanh(U/2)\ ]$ = 1195.82
$U = (12\ L)\ /\ j$ = 5.42
$N = [(T\ h) - W_e \cos\theta\ (Y/144)]\ /\ (X\ /\ 12)$ = 160,250 lb
Bending Frictional Drag = $2\ \mu\ N$ = 96,150 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 21,318 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -19,464 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 98,004 lb
Total Pulling Load = 240,317 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 29.5 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 3,101 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 1,002 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -1,823 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 2,280 lb
Total Pulling Load = 242,597 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	2,956	ok	0	ok	0	ok	0.05	ok	0.00	ok
	2,928	ok	0	ok	74	ok	0.05	ok	0.00	ok
PC										
	2,928	ok	12,083	ok	74	ok	0.31	ok	0.07	ok
	1,734	ok	12,083	ok	902	ok	0.29	ok	0.09	ok
PT										
	1,734	ok	0	ok	902	ok	0.03	ok	0.02	ok
	1,684	ok	0	ok	902	ok	0.03	ok	0.02	ok
PC										
	1,684	ok	12,083	ok	902	ok	0.29	ok	0.09	ok
	406	ok	12,083	ok	372	ok	0.27	ok	0.06	ok
PT										
	406	ok	0	ok	372	ok	0.01	ok	0.00	ok
Exit Point	0	ok	0	ok	0	ok	0.00	ok	0.00	ok

Figure 5: Installation Loading and Stress Analysis (As-Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 480.4 ft
Exit Angle, θ = 8.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu\ \cos\theta$ = 50,730 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 16,301 lb
Axial Segment Weight = $W_e\ L\ \sin\theta$ = 23,766 lb
Pulling Load on Exit Tangent = 90,797 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 251.3 ft
Segment Angle with Horizontal, θ = -8.0 °
Deflection Angle, α = -4.0 °
Average Tension, T = 128,227 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = $R\ [1 - \cos(\alpha/2)]$ = 4.38 ft
j = $[(E\ I) / T]^{1/2}$ = 1,698
Y = $[18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 2.8E+05
X = $(3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 150.75
U = $(12\ L) / j$ = 1.78
N = $[(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 100,168 lb
Bending Frictional Drag = $2\ \mu\ N$ = 60,101 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 8,527 lb
Axial Segment Weight = $W_e\ L\ \sin\theta$ = 6,231 lb
Pulling Load on Exit Sag Bend = 74,860 lb
Total Pulling Load = 165,656 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 43.8 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 4,674 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 1,487 lb
Axial Segment Weight = $W_e\ L\ \sin\theta$ = 0 lb
Pulling Load on Bottom Tangent = 6,162 lb
Total Pulling Load = 171,818 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 314.2 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 207,515 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

h = $R\ [1 - \cos(\alpha/2)]$ = 6.85 ft
j = $[(E\ I) / T]^{1/2}$ = 1,335
Y = $[18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 8.1E+05
X = $(3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 349.77
U = $(12\ L) / j$ = 2.82
N = $[(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 117,445 lb
Bending Frictional Drag = $2\ \mu\ N$ = 70,467 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 10,659 lb
Axial Segment Weight = $W_e\ L\ \sin\theta$ = -9,732 lb Negative value indicates axial weight applied in direction of installation
Pulling Load on Entry Sag Bend = 71,394 lb
Total Pulling Load = 243,212 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 331.4 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu\ \cos\theta$ = 34,805 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 11,245 lb
Axial Segment Weight = $W_e\ L\ \sin\theta$ = -20,457 lb Negative value indicates axial weight applied in direction of installation
Pulling Load on Entry Tangent = 25,594 lb
Total Pulling Load = 268,806 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	3,275	ok	0	ok	0	ok	0.05	ok	0.00	ok
	2,963	ok	0	ok	864	ok	0.05	ok	0.02	ok
PC										
	2,963	ok	24,167	ok	864	ok	0.58	ok	0.28	ok
	2,093	ok	24,167	ok	1278	ok	0.56	ok	0.29	ok
PT										
	2,093	ok	0	ok	1278	ok	0.03	ok	0.03	ok
	2,018	ok	0	ok	1278	ok	0.03	ok	0.03	ok
PC										
	2,018	ok	24,167	ok	1278	ok	0.56	ok	0.29	ok
	1,106	ok	24,167	ok	1012	ok	0.55	ok	0.25	ok
PT										
	1,106	ok	0	ok	1012	ok	0.02	ok	0.02	ok
Exit Point	0	ok	0	ok	0	ok	0.00	ok	0.00	ok

Figure 6: Installation Loading (Worse-Case)

Hydrofracture Evaluation

The risk of inadvertent drilling fluid returns due to hydrofracture was evaluated using the Delft Method. The Delft Method is described in Section 5 of the report. In summary, the risk of inadvertent drilling fluid returns due to hydrofracture is low over the majority of the length of the crossing. The factor of safety remains above 2.0 until the last 60 feet of the crossing where cover is shallow as the bit begins to make its way to the surface. Therefore, inadvertent drilling fluid returns due to hydrofracture are not anticipated under normal drilling operations at this location. Refer to Figure 7 for results presented in graphical format.

It is important to keep in mind that inadvertent drilling fluid returns may occur due to mechanisms unrelated to hydrofracture. It remains possible that inadvertent drilling fluid returns will occur by flowing to the ground surface through preexisting fractures or porous seams in the soil mass.

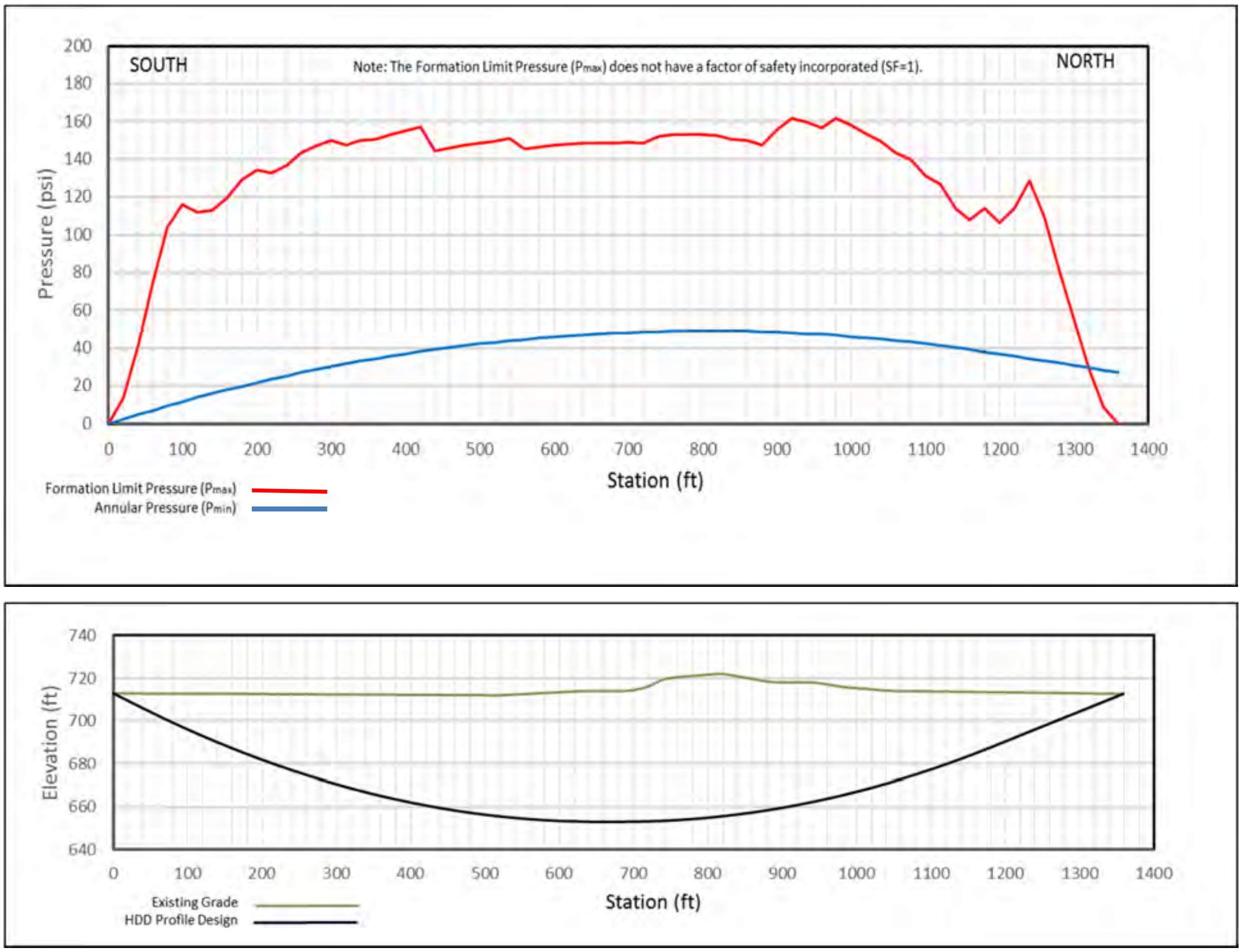


Figure 7: Hydrofracture Evaluation (Formation Limit Pressure - vs - Annular Pressure)

Construction Duration

The estimated duration of construction for the I-94 Crossing is 12 days. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated by JDH&A based on information contained within the Pipeline Research Council International's "*Installation of Pipelines by Horizontal Directional Drilling*"[1], as well as past experience in similar subsurface conditions. Refer to Figure 8 for additional information relative to the estimate.

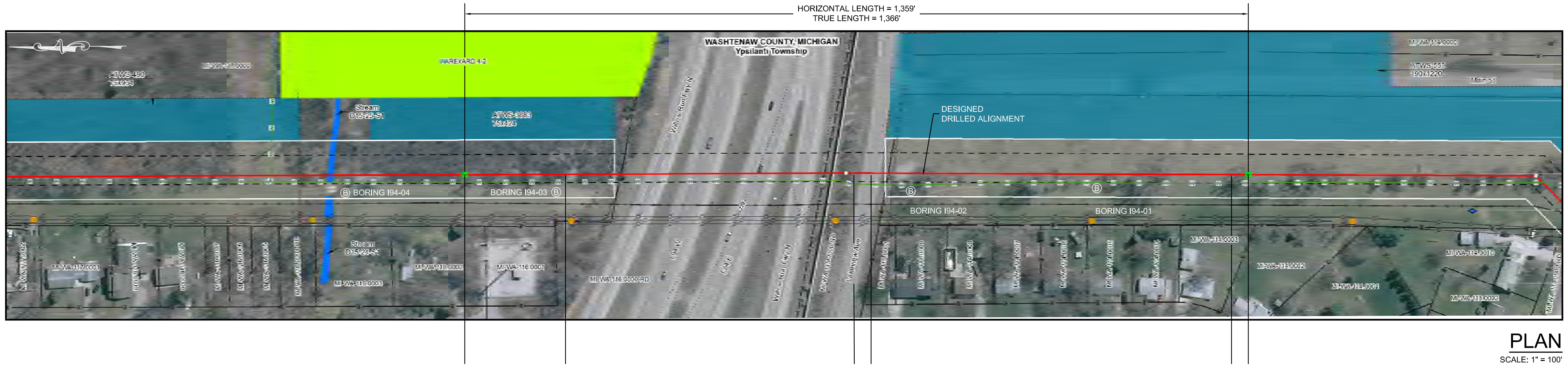
Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.

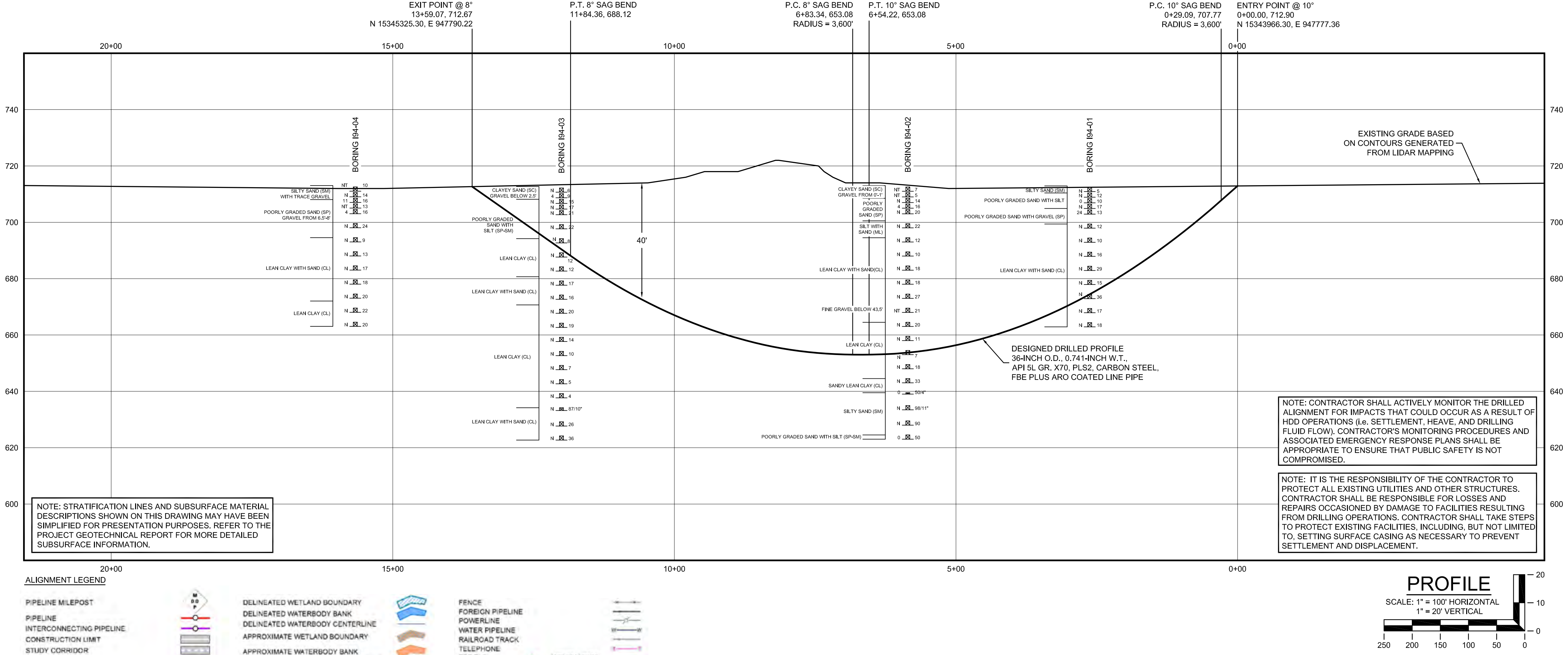
General Data		Comments						
Work Schedule, hours/shift =	12.0	36" Interstate 94 Crossing						
days/week =	7.0							
Drilled Length, feet =	1,366							
Pilot Hole								
Production Rate, feet/hour =	50							
shifts/day =	1							
Drilling Duration, hours =	27.3							
shifts =	2.3							
Trips to change tools, shifts =	0.5							
Pilot Hole Duration, days =	2.8							
Ream and Pull Back								
Pass Description =	36-inch	48-inch				Swab	Pull Back	Total
Travel Speed, feet/minute =	2.0	2.0				8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0				15.0	15.0	
shifts/day =	1	1				1	1	
Reaming Duration, hours =	12.9	12.9				4.3	5.3	35.3
shifts =	1.1	1.1				0.4	0.4	2.9
Rig up, shifts =	0.5	0.5				0.5	0.5	2.0
Trips to change tools, shifts =	1.0	1.0				0.0		2.0
Pass Duration, days =	2.6	2.6				0.9	0.9	6.9
Summary								
HDD Duration at Site, days =	11.7							
Site Establishment	Move in	Rig Up	Rig Down	Move Out				
shifts/day =	1	1	1	1				
shifts =	0.5	1.0	1.0	0.5				
days =	0.5	1.0	1.0	0.5				

Figure 8: Estimated Construction Duration

---

[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.





NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING MAY HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

ALIGNMENT LEGEND

PIPELINE MILEPOST
PIPELINE
INTERCONNECTING PIPELINE
CONSTRUCTION LIMIT
STUDY CORRIDOR
STAGING AREA
WAREYARD
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
METERING & REGULATION STATION (M&R)
COMPRESSOR STATION SITE
FACILITIES TEMPORARY WORKSPACE
FACILITIES PERMANENT WORKSPACE

DELINEATED WETLAND BOUNDARY
DELINEATED WATERBODY BANK
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY BANK
APPROXIMATE WATERBODY CENTERLINE
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
PARCEL TRACT NO OH-CO-011.0000-SC
PROPERTY LINE
CONTOUR
MUNICIPALITY LINE

FENCE
FOREIGN PIPELINE
POWERLINE
WATER PIPELINE
RAILROAD TRACK
TELEPHONE
TEE TAP
UTILITY LINES
BLOW OFF VALVE
MAINLINE VALVE (MLV)
TOWER
MICROWAVE TOWER
HORIZONTAL DIRECTIONAL DRILLING
TANK ● LIGHT POLE ● FIRE HYDRANT
WELL: GAS ◆ WATER ◆ OIL ● UNKNOWN

GENERAL LEGEND

DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR AND SURVEY DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

GEOTECHNICAL LEGEND

Ⓑ BORING LOCATION

SPLIT SPOON SAMPLE

53 ⊠ 23 ← PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL

PUSH SAMPLE

CORE BARREL SAMPLE

UCS 6,250 ← UNCONFINED COMPRESSIVE STRENGTH (PSI)
TSS 1,350 ← TENSILE SPLITTING STRENGTH (PSI)
53 6 ← MOHS HARDNESS
ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY FUGRO CONSULTANTS, INC, BATON ROUGE, LOUISIANA. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED SEPTEMBER 11, 2015 FOR ADDITIONAL INFORMATION.

2. THE LETTER "N" TO THE LEFT OF A SPLIT SPOON SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TESTS WERE PERFORMED.

3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGEMENT IN INTERPRETING THIS DATA.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		3	ACM	JMS	RE–ISSUED FOR FERC
		2	DLB	JMS	ADD DEPTH CRITERIA
WATE–A–1275	ALIGNMENT SHEET M.P. 251.84 TO M.P. 252.78	1	LKB	JMS	ISSUED FOR BID
WATE–A–1274	ALIGNMENT SHEET M.P. 250.89 TO M.P. 251.84	0	LKB	JMS	ISSUED FOR FERC

IG.#

John D. Hair, P.E.
Consulting Engineer
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS				
	PRELIMINARY		CONSTRUCTION	
DRAWN BY:	LKB	08/07		
PROJECT MANAGER	JMS	08/07		
DESIGN ENGINEER	LKB	08/07		
DESIGN CHECKER	ACM	08/07		
TITLE	SIGNATURE	DATE	SIGNATURE	DATE

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH INTERSTATE 94 CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

WASHTENAW COUNTY, MICHIGAN

NEXUS GAS TRANSMISSION SM

M.P. 251.5	W.O.	SCALE: AS SHOWN	DWG. WATE–H–1017	REV. 3

MP 254.4R US-12

Base Data

In performing the HDD design and engineering analysis presented in this report, we have relied upon the following information:

- A combination of LiDAR and traditional hydrographic survey data covering the proposed crossing location

General Site Description

The 36-inch US-12 Crossing is located in East Ypsilanti, Michigan. It involves passing beneath a railway loop, the eastbound and westbound lanes of State Highway 12, as well as several access ramps to the highway. The proposed HDD alignment deviates slightly from the existing power line easement and crosses beneath easement at an angle. The topography in the area is generally flat with the only exceptions being the raised subgrade for the highway and access roads.

An overview of the proposed crossing location is provided in Figures 1 through 3.

Figure 1 – Overview of the US-12 Crossing

Subsurface Conditions

At the time of this writing, site-specific subsurface information is not available.

Design Geometry & Layout

The proposed US-12 Crossing has a horizontal length of 1,739 feet. It has been designed to achieve a minimum of 40 feet of cover at the northern edge of the railroad loop as well as 40 feet beneath the exit ramp at the south end of the crossing. The design employs a 10-degree entry/exit angles and a radius of curvature equal to 3,600 feet. In addition to allowing a shorter horizontal length, a 10-degree exit angle was employed to achieve the desired cover criteria. The exit point is located on the south side of the highway. Here it can take advantage of derelict parking lots for pull section fabrication. In an effort to minimize the total length of the crossing, the entry point on the north side was positioned in front of the nearest PI and within a wooded area, giving the design adequate cover beneath the railroad loop. A clearing exists further to the north of the designed entry point which also could serve as an option for the entry if impact on the existing vegetation/trees is a concern.

Workspace at the south end of the crossing exists within a clearing near the eastbound exit ramp of US-12 and could extend into nearby former parking lots and derelict roads which exist further south. The unoccupied areas could serve well for pull section fabrication and layout. Workspace on the north side exists in a wooded area north of the railway loop. The proposed pipeline centerline reveals a hard PI roughly 185 feet from the exit point. Clearing of vegetation and some medium/large trees for workspace would be necessary at the entry point. The proposed HDD design as well as available workspace for HDD operations is shown on the HDD plan and profile drawing included in this site-specific report.

Assessment of Feasibility

Overall, given the length the proposed 36-inch installation, it is easily within the range of what has been successfully installed using HDD. It is anticipated the subsurface will consist of mixtures of sand, silt, and clay, similar to those encountered at the Interstate 94 crossing, which are conducive to the HDD process. However, the feasibility will need to be confirmed when site-specific geotechnical data is available.

Risk Identification and Assessment

Notable risks and potential construction impact associated with installation by HDD include impact to US-12 and the railway loop in the form of heave, settlement, or inadvertent drilling fluid returns.

Overall, the level of risk associated with the proposed US-12 crossing is considered low. However, risk should be re-evaluated after site-specific geotechnical information is available.

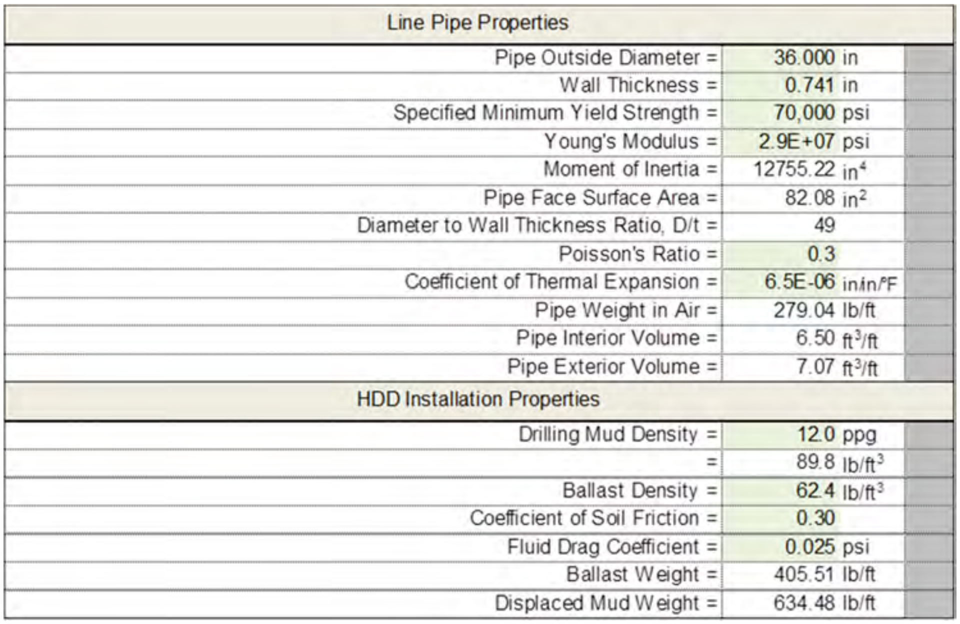
Installation Loading Analysis

Two installation scenarios were evaluated for the proposed crossing. The first scenario assumed the pilot hole would be drilled to the exact design centerline shown on the plan and profile drawing. The second scenario assumed a worse case model in which the pilot hole is drilled 25 feet deeper than the design profile with a radius of curvature reduced to 50 percent of the design radius. A summary of the assumptions used in each loading scenario is provided in Table 1.

Table 1: Loading Scenarios

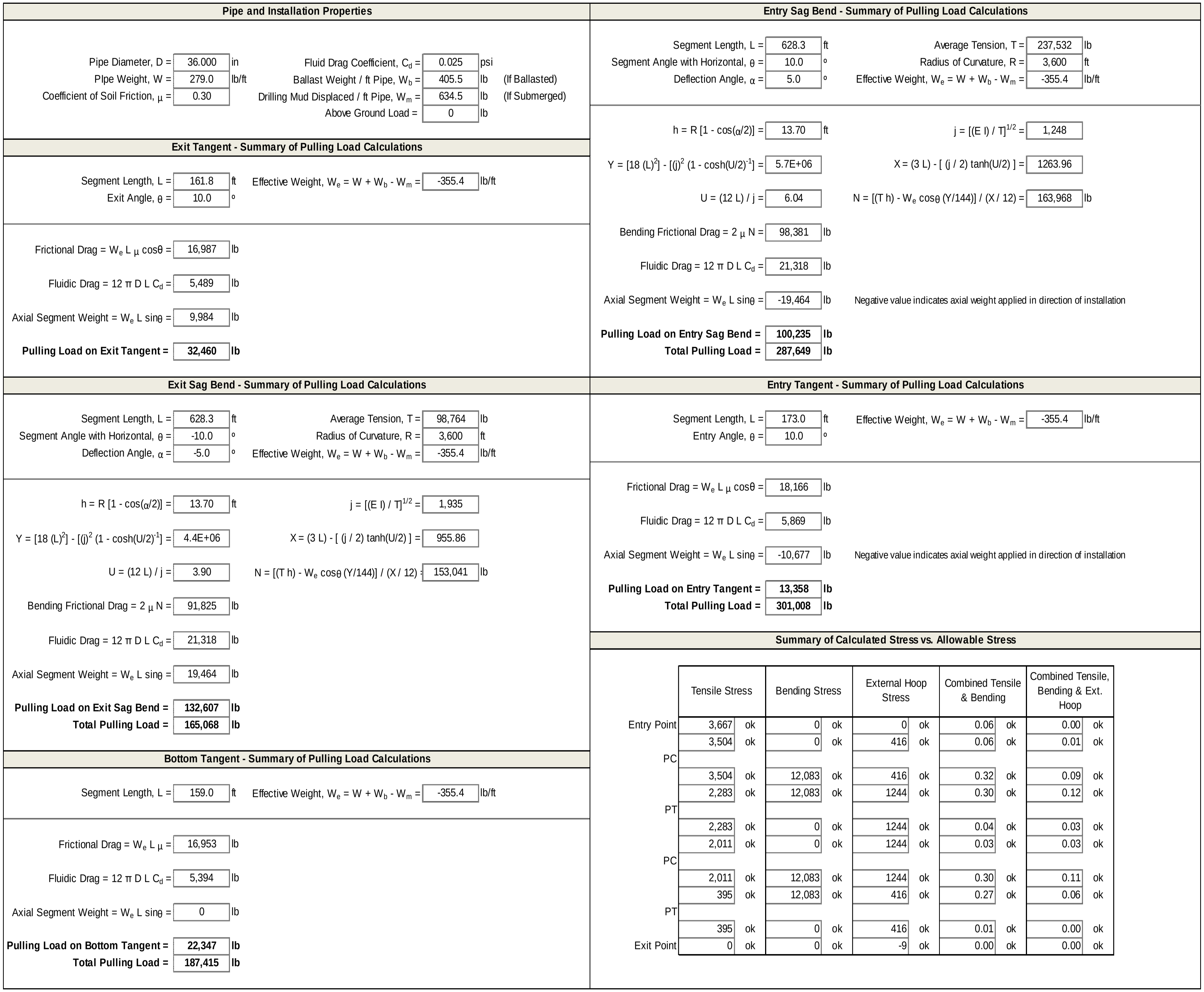
Loading Scenario	Path Geometry	Drilling Fluid Weight	Buoyancy Condition	Above Ground Load
Number 1 As-Designed	Length: As designed Depth: As designed Radius: 3,600’	12 ppg	Empty	Assumed Negligible
Number 2 Worse-Case	Length: Increased by 50’ Depth: Increased by 25’ Radius: 1,800’	12 ppg	Empty	Assumed Negligible

Based on the loading scenarios described above, the estimated pulling load for the “as-designed” crossing, without ballast, is 301,008 pounds. In the “worse-case” installation scenario, the anticipated pulling load without ballast is 323,924 pounds. In both cases, loads and stresses fall within acceptable limits as defined by the PRCI method. Pipe parameters and other installation properties are provided in Figure 4. Detailed calculations for each scenario are summarized in Figures 5 and 7.



Line Pipe Properties		
Pipe Outside Diameter =	36.000	in
Wall Thickness =	0.741	in
Specified Minimum Yield Strength =	70,000	psi
Young's Modulus =	2.9E+07	psi
Moment of Inertia =	12755.22	in^4
Pipe Face Surface Area =	82.08	in^2
Diameter to Wall Thickness Ratio, D/t =	49	
Poisson's Ratio =	0.3	
Coefficient of Thermal Expansion =	6.5E-06	in/in/°F
Pipe Weight in Air =	279.04	lb/ft
Pipe Interior Volume =	6.50	ft^3/ft
Pipe Exterior Volume =	7.07	ft^3/ft
HDD Installation Properties		
Drilling Mud Density =	12.0	ppg
=	89.8	lb/ft^3
Ballast Density =	62.4	lb/ft^3
Coefficient of Soil Friction =	0.30	
Fluid Drag Coefficient =	0.025	psi
Ballast Weight =	405.51	lb/ft
Displaced Mud Weight =	634.48	lb/ft

Figure 4: Pipe and Installation Properties



Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 161.8 ft
Exit Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 16,987 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 5,489 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 9,984 lb

Pulling Load on Exit Tangent = 32,460 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 628.3 ft
Segment Angle with Horizontal, θ = -10.0 °
Deflection Angle, α = -5.0 °
Average Tension, T = 98,764 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 13.70 ft
$j = [(E\ I) / T]^{1/2}$ = 1,935
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 4.4E+06
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 955.86
$U = (12\ L) / j$ = 3.90
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 153,041 lb

Bending Frictional Drag = $2\ \mu\ N$ = 91,825 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 21,318 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 19,464 lb

Pulling Load on Exit Sag Bend = 132,607 lb
Total Pulling Load = 165,068 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 159.0 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu$ = 16,953 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 5,394 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 22,347 lb
Total Pulling Load = 187,415 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 628.3 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 237,532 lb
Radius of Curvature, R = 3,600 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R\ [1 - \cos(\alpha/2)]$ = 13.70 ft
$j = [(E\ I) / T]^{1/2}$ = 1,248
$Y = [18\ (L)^2] - [(j)^2\ (1 - \cosh(U/2)^{-1}]$ = 5.7E+06
$X = (3\ L) - [\ (j / 2) \tanh(U/2)\ ]$ = 1263.96
$U = (12\ L) / j$ = 6.04
$N = [(T\ h) - W_e \cos\theta\ (Y/144)] / (X / 12)$ = 163,968 lb

Bending Frictional Drag = $2\ \mu\ N$ = 98,381 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 21,318 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -19,464 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 100,235 lb
Total Pulling Load = 287,649 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 173.0 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e\ L\ \mu \cos\theta$ = 18,166 lb
Fluidic Drag = $12\ \pi\ D\ L\ C_d$ = 5,869 lb
Axial Segment Weight = $W_e\ L \sin\theta$ = -10,677 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 13,358 lb
Total Pulling Load = 301,008 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	3,667	ok	0	ok	0	ok	0.06	ok	0.00	ok
	3,504	ok	0	ok	416	ok	0.06	ok	0.01	ok
PC										
	3,504	ok	12,083	ok	416	ok	0.32	ok	0.09	ok
	2,283	ok	12,083	ok	1244	ok	0.30	ok	0.12	ok
PT										
	2,283	ok	0	ok	1244	ok	0.04	ok	0.03	ok
	2,011	ok	0	ok	1244	ok	0.03	ok	0.03	ok
PC										
	2,011	ok	12,083	ok	1244	ok	0.30	ok	0.11	ok
	395	ok	12,083	ok	416	ok	0.27	ok	0.06	ok
PT										
	395	ok	0	ok	416	ok	0.01	ok	0.00	ok
Exit Point	0	ok	0	ok	-9	ok	0.00	ok	0.00	ok

Figure 5: Installation Loading and Stress Analysis (As-Designed)

Pipe and Installation Properties

Pipe Diameter, D = 36.000 in
Pipe Weight, W = 279.0 lb/ft
Coefficient of Soil Friction, μ = 0.30
Fluid Drag Coefficient, C_d = 0.025 psi
Ballast Weight / ft Pipe, W_b = 405.5 lb (If Ballasted)
Drilling Mud Displaced / ft Pipe, W_m = 634.5 lb (If Submerged)
Above Ground Load = 0 lb

Exit Tangent - Summary of Pulling Load Calculations

Segment Length, L = 463.2 ft
Exit Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu \cos\theta$ = 48,643 lb

Fluidic Drag = $12 \pi D L C_d$ = 15,716 lb

Axial Segment Weight = $W_e L \sin\theta$ = 28,590 lb

Pulling Load on Exit Tangent = 92,950 lb

Exit Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 314.2 ft
Segment Angle with Horizontal, θ = -10.0 °
Deflection Angle, α = -5.0 °
Average Tension, T = 136,256 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R [1 - \cos(\alpha/2)]$ = 6.85 ft
$j = [(E I) / T]^{1/2}$ = 1,648

$Y = [18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1}]$ = 6.3E+05
$X = (3 L) - [(j / 2) \tanh(U/2)]$ = 270.43

$U = (12 L) / j$ = 2.29
$N = [(T h) - W_e \cos\theta (Y/144)] / (X / 12)$ = 110,367 lb

Bending Frictional Drag = $2 \mu N$ = 66,220 lb

Fluidic Drag = $12 \pi D L C_d$ = 10,659 lb

Axial Segment Weight = $W_e L \sin\theta$ = 9,732 lb

Pulling Load on Exit Sag Bend = 86,611 lb
Total Pulling Load = 179,561 lb

Bottom Tangent - Summary of Pulling Load Calculations

Segment Length, L = 240.4 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu$ = 25,632 lb

Fluidic Drag = $12 \pi D L C_d$ = 8,156 lb

Axial Segment Weight = $W_e L \sin\theta$ = 0 lb

Pulling Load on Bottom Tangent = 33,788 lb
Total Pulling Load = 213,349 lb

Entry Sag Bend - Summary of Pulling Load Calculations

Segment Length, L = 314.2 ft
Segment Angle with Horizontal, θ = 10.0 °
Deflection Angle, α = 5.0 °
Average Tension, T = 250,319 lb
Radius of Curvature, R = 1,800 ft
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

$h = R [1 - \cos(\alpha/2)]$ = 6.85 ft
$j = [(E I) / T]^{1/2}$ = 1,216

$Y = [18 (L)^2] - [(j)^2 (1 - \cosh(U/2)^{-1}]$ = 9.0E+05
$X = (3 L) - [(j / 2) \tanh(U/2)]$ = 387.01

$U = (12 L) / j$ = 3.10
$N = [(T h) - W_e \cos\theta (Y/144)] / (X / 12)$ = 121,686 lb

Bending Frictional Drag = $2 \mu N$ = 73,011 lb

Fluidic Drag = $12 \pi D L C_d$ = 10,659 lb

Axial Segment Weight = $W_e L \sin\theta$ = -9,732 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Sag Bend = 73,938 lb
Total Pulling Load = 287,288 lb

Entry Tangent - Summary of Pulling Load Calculations

Segment Length, L = 474.4 ft
Entry Angle, θ = 10.0 °
Effective Weight, $W_e = W + W_b - W_m$ = -355.4 lb/ft

Frictional Drag = $W_e L \mu \cos\theta$ = 49,822 lb

Fluidic Drag = $12 \pi D L C_d$ = 16,097 lb

Axial Segment Weight = $W_e L \sin\theta$ = -29,283 lb Negative value indicates axial weight applied in direction of installation

Pulling Load on Entry Tangent = 36,636 lb
Total Pulling Load = 323,924 lb

Summary of Calculated Stress vs. Allowable Stress

	Tensile Stress		Bending Stress		External Hoop Stress		Combined Tensile & Bending		Combined Tensile, Bending & Ext. Hoop	
Entry Point	3,946	ok	0	ok	0	ok	0.06	ok	0.00	ok
	3,500	ok	0	ok	1208	ok	0.06	ok	0.04	ok
PC										
	3,500	ok	24,167	ok	1208	ok	0.59	ok	0.31	ok
	2,599	ok	24,167	ok	1623	ok	0.57	ok	0.33	ok
PT										
	2,599	ok	0	ok	1623	ok	0.04	ok	0.06	ok
	2,188	ok	0	ok	1623	ok	0.03	ok	0.05	ok
PC										
	2,188	ok	24,167	ok	1623	ok	0.56	ok	0.32	ok
	1,132	ok	24,167	ok	1208	ok	0.55	ok	0.27	ok
PT										
	1,132	ok	0	ok	1208	ok	0.02	ok	0.03	ok
Exit Point	0	ok	0	ok	-9	ok	0.00	ok	0.00	ok

Figure 6: Installation Loading (Worse-Case)

Hydrofracture Evaluation

At the time of this writing, site-specific geotechnical data is not available; therefore, a hydrofracture evaluation could not be completed.

Construction Duration

The estimated duration of construction for the US-12 Crossing is 14 days. The estimate assumes single 12-hour shifts during pilot hole, reaming, and pullback operations. The pilot hole production rate and reaming travel speed were estimated by JDH&A based on information contained within the Pipeline Research Council International's "*Installation of Pipelines by Horizontal Directional Drilling*"[1], as well as past experience in similar subsurface conditions. Refer to Figure 8 for additional information relative to the estimate.

Please note that the estimated duration is based on operations proceeding according to plan and does not include contingency. The occurrence of unanticipated operational problems could increase the duration of operations by 50 to 100 percent.

General Data		Comments						
Work Schedule, hours/shift =	12.0	36" US-12 Crossing						
days/week =	7.0							
Drilled Length, feet =	1,750							
Pilot Hole								
Production Rate, feet/hour =	50							
shifts/day =	1							
Drilling Duration, hours =	35.0							
shifts =	2.9							
Trips to change tools, shifts =	0.5							
Pilot Hole Duration, days =	3.4							
Ream and Pull Back								
Pass Description =	36-inch	48-inch				Swab	Pull Back	Total
Travel Speed, feet/minute =	2.0	2.0				8.0	6.0	
Mud Flow Rate, barrels/minute =	15.0	15.0				15.0	15.0	
shifts/day =	1	1				1	1	
Reaming Duration, hours =	16.5	16.5				5.5	6.7	45.2
shifts =	1.4	1.4				0.5	0.6	3.8
Rig up, shifts =	0.5	0.5				0.5	0.5	2.0
Trips to change tools, shifts =	1.0	1.0				0.0		2.0
Pass Duration, days =	2.9	2.9				1.0	1.1	7.8
Summary								
HDD Duration at Site, days =	13.2							
Site Establishment	Move in	Rig Up	Rig Down	Move Out				
shifts/day =	1	1	1	1				
shifts =	0.5	1.0	1.0	0.5				
days =	0.5	1.0	1.0	0.5				

Figure 8: Estimated Construction Duration

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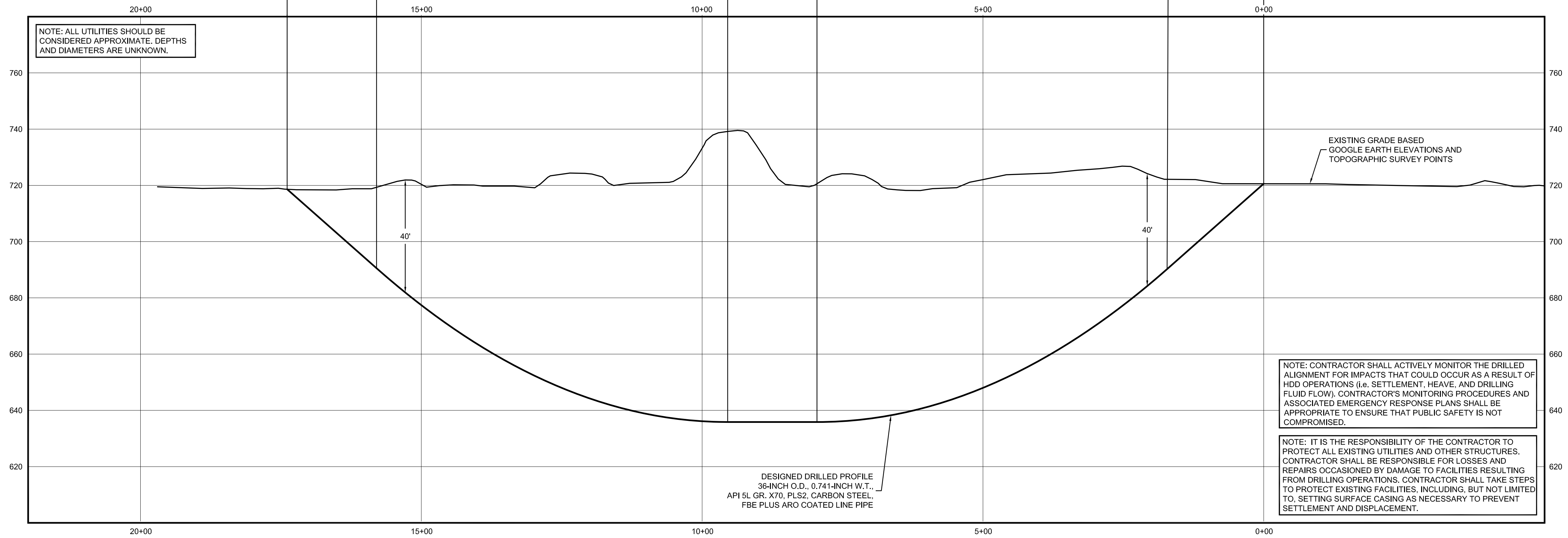
[1] *Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide*, prepared under the sponsorship of the Pipeline Research Committee at the American Gas Association, April 15, 1995, Revised under the sponsorship of the Pipeline Research Council International, Inc., 2008.

PLAN

SCALE: 1" = 100'



NOTE: ALL UTILITIES SHOULD BE CONSIDERED APPROXIMATE. DEPTHS AND DIAMETERS ARE UNKNOWN.

NOTE: CONTRACTOR SHALL ACTIVELY MONITOR THE DRILLED ALIGNMENT FOR IMPACTS THAT COULD OCCUR AS A RESULT OF HDD OPERATIONS (i.e. SETTLEMENT, HEAVE, AND DRILLING FLUID FLOW). CONTRACTOR'S MONITORING PROCEDURES AND ASSOCIATED EMERGENCY RESPONSE PLANS SHALL BE APPROPRIATE TO ENSURE THAT PUBLIC SAFETY IS NOT COMPROMISED.

NOTE: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITIES AND OTHER STRUCTURES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO FACILITIES RESULTING FROM DRILLING OPERATIONS. CONTRACTOR SHALL TAKE STEPS TO PROTECT EXISTING FACILITIES, INCLUDING, BUT NOT LIMITED TO, SETTING SURFACE CASING AS NECESSARY TO PREVENT SETTLEMENT AND DISPLACEMENT.

PROFILE

SCALE: 1" = 100' HORIZONTAL
1" = 20' VERTICAL

ALIGNMENT LEGEND

PIPELINE MILEPOST
PIPELINE
INTERCONNECTING PIPELINE
CONSTRUCTION LIMIT
STUDY CORRIDOR
STAGING AREA
WAREYARD
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
METERING & REGULATION STATION (M&R)
COMPRESSOR STATION SITE
FACILITIES TEMPORARY WORKSPACE
FACILITIES PERMANENT WORKSPACE

DELINEATED WETLAND BOUNDARY
DELINEATED WATERBODY BANK
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY BANK
APPROXIMATE WATERBODY CENTERLINE
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
PARCEL TRACT NO OH-CO-011.0000-SC
PROPERTY LINE
CONTOUR
MUNICIPALITY LINE

FENCE
FOREIGN PIPELINE
POWERLINE
WATER PIPELINE
RAILROAD TRACK
TELEPHONE
TEE TAP
UTILITY LINES
BLOW OFF VALVE
MAINLINE VALVE (MLV)
TOWER
MICROWAVE TOWER
HORIZONTAL DIRECTIONAL DRILLING
TANK
LIGHT POLE
FIRE HYDRANT
WELL: GAS ● WATER ● OIL ● UNKNOWN

GENERAL LEGEND

◐ DRILLED PATH ENTRY/EXIT POINT

TOPOGRAPHIC SURVEY NOTES

1. LIDAR, SURVEY, AND HYDROGRAPHIC DATA PROVIDED BY FLUOR ENTERPRISES, INC., SUGARLAND, TEXAS.

2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO UTM ZONE 17N, NAD83.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.

2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PIPE.

PILOT HOLE TOLERANCES

THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.

1. ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 1 FOOT RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

2. EXIT POINT: UP TO 5 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

3. ELEVATION: UP TO 5 FEET ABOVE AND 15 FEET BELOW THE DESIGNED PROFILE.

4. ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT.

5. CURVE RADIUS: NO LESS THAN 1,800 FEET BASED ON A 3-JOINT AVERAGE.

PROTECTION OF UNDERGROUND FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.

2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.

3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

DWG. NO.	REFERENCE DWG.	REV	DSN	CK	DESCRIPTION
		2	ACM	JMS	RE-ISSUED FOR FERC
		1	LKB	JMS	UPDATE CENTERLINE
		0	LKB	JMS	ISSUED FOR BID

IG.#

John D. Hair, P.E.
Consulting Engineer
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

ENGINEERING APPROVALS	PRELIMINARY		CONSTRUCTION	
TITLE	SIGNATURE	DATE	SIGNATURE	DATE
DRAWN BY:	LKB	12/15		
PROJECT MANAGER	JMS	01/16		
DESIGN ENGINEER	LKB	01/16		
DESIGN CHECKER	LKB	08/16		

PLAN AND PROFILE
NEXUS PROPOSED MAINLINE PIPELINE
36-INCH US-12 MICHIGAN AVE CROSSING
BY HORIZONTAL DIRECTIONAL DRILLING

WASHTENAW COUNTY, MICHIGAN

NEXUS℠
GAS TRANSMISSION

M.P. 254	W.O.	SCALE: AS SHOWN	DWG.	REV. 2

NEXUS Gas Transmission, LLC

NEXUS Project

FERC Docket No. CP16-__-000

HDD Monitoring and Inadvertent Return Contingency Plan

November 2015

NEXUS Project HDD Monitoring and Inadvertent Return Contingency Plan

TABLE OF CONTENTS

1 INTRODUCTION

NEXUS proposes to install multiple pipeline crossings on the proposed 36-inch NEXUS Gas Transmission Project by horizontal directional drilling (HDD). HDD is a widely used trenchless construction method which accomplishes the installation of pipelines and buried utilities with minimal impact to the obstacle being crossed. However, HDD is not totally without impact. The primary impact associated with HDD revolves around the use of drilling fluids. Additionally, the HDD installation method involves the risk of failure when certain adverse subsurface conditions are encountered. The purpose of this document is to present contingency plans that may be implemented, in the event that problems develop during HDD operations, in order to complete the crossings successfully while minimizing potential associated impact.

1.1 Background

The tools and techniques used in the HDD process are an outgrowth of the oil well drilling industry. The components of a horizontal drilling rig used for pipeline construction are similar to those of an oil well drilling rig with the major exception being that a horizontal drilling rig is equipped with an inclined ramp as opposed to a vertical mast. HDD pilot hole operations are not unlike those involved in drilling a directional oil well. Drill pipe and downhole tools are generally interchangeable and drilling fluid is used throughout the operation to transport drilled spoil, reduce friction, stabilize the hole, etc. Because of these similarities, the process is generally referred to as drilling as opposed to boring.

Installation of a pipeline by HDD is generally accomplished in three stages. The first stage consists of directionally drilling a small diameter pilot hole along a designed directional path. The second stage involves enlarging this pilot hole to a diameter suitable for installation of the pipeline. The third stage consists of pulling a prefabricated pipeline segment into the enlarged hole.

The major component of drilling fluid used in HDD pipeline installation is fresh water obtained at the crossing location. In order for water to perform the required functions, it is generally necessary to modify its properties by adding a viscosifier. The viscosifier used almost exclusively in HDD drilling fluids is a naturally occurring bentonite clay typically mined by “open pit” methods from locations in Wyoming and South Dakota. Bentonite is a soft clay, formed by the weathering of volcanic ash, with the unique characteristic of swelling to several times its original volume when in contact with water. It is not a hazardous material as defined by the U.S. Environmental Protection Agency's characteristics of ignitability, corrosivity, reactivity, or commercial chemicals. It is also used to seal earth structures such as ponds or dams and as a suspending component in livestock feeds.

1.2 Technical Team

In order to ensure the highest probability of success on the proposed HDD installation, NEXUS has assembled a technical team which includes consultants having expertise in HDD design and construction and environmental issues specific to the proposed HDD crossing locations. This approach enhances the prospect of a successful HDD installation by bringing together more resources than those available to any single team member working independently.

1.3 Anticipated Subsurface Conditions

An extensive geotechnical exploration program was undertaken to aid in assessing the feasibility of HDD crossings on the NEXUS Project. Between the beginning of March and the end of August, 2015, exploratory borings were performed at those HDD crossing locations where access was available. In addition, geophysical techniques were used at select HDD crossing locations to supplement the exploratory borings. Based on the subsurface data collected to date, none of the sites have subsurface conditions that are expected to prevent installation by HDD.

2 FAILURE SCENARIOS

It is difficult to define a set of circumstances in advance that define “failure” of the HDD method as the decision to abandon HDD should take into account the conditions encountered on a given crossing. Following is a discussion of serious operational problems that might ultimately lead to abandoning the HDD installation method.

2.1 Problems During Pilot Hole Drilling

Problems during pilot hole drilling generally occur in the form of high compressive or torsional loads on the drill string. Loads such as these typically result from unconsolidated or coarse-grained material packing around the drill pipe as it is advanced. As friction on the drill string increases, the rig must apply greater torque and thrust. If the torque applied by the rig exceeds the strength of the drill pipe, the pipe will be sheared into two pieces, commonly referred to as “twisting off”. Ultimately, friction can increase to the point that the drill string cannot be advanced or retracted, at which point it may be abandoned in place or parted by some means including intentionally twisting it off with the rig.

A skilled contractor will not continue drilling the pilot hole until it becomes stuck. As loads on the drill string increase, the contractor will adjust drilling fluid properties and work the hole by tripping the drill string out and back in. These measures are generally successful and abandonment of an HDD crossing due to excessive loads during pilot hole drilling is very rare.

Another problem that can occur during pilot hole drilling is a lack of directional control resulting in either a violation of pilot hole position tolerances or an unacceptable angular change. This can occur when the drill bit is deflected off a boulder or cobble lens or when attempting to penetrate a hard bedrock formation at depth. If left uncorrected, an unacceptable angular change can result in failure of the drill pipe due to a combination of excessive bending stress and rotation. However, redrilling efforts are usually successful and abandonment of an HDD crossing due to a lack of directional control is very rare.

Solution cavities, occasionally present in limestone and dolomite formations, can cause serious problems on an HDD installation, especially during pilot hole drilling when the drill string is in compression. While the wall of a competent borehole serves to limit the deflection of the drill string, penetration of a void leaves the drill string unconstrained, potentially allowing it to deflect substantially. Continued rotation of a drill string subjected to such a deflection often results in failure of the drill pipe due to low-cycle fatigue. If efforts to avoid extensive solution cavities are unsuccessful, the HDD installation method is typically abandoned. Limestone and dolomite are present on some of the proposed vertical alignments. However, the size of the cavities encountered in the exploratory borings is not expected to prevent installation by HDD.

2.2 Problems During Prereaming

Problems during prereaming generally involve excessive tensile or torsional loads when enlarging a hole through either hard rock or discontinuous materials such as fractured rock or glacial till. In this situation, application of excessive torque from the rig can easily result in the drill pipe being twisted off downhole. Accumulation of cuttings in the hole can cause tensile loads to become excessive, ultimately resulting in the reamer becoming stuck. If the reamer cannot be freed, the drill pipe is generally twisted off, either intentionally or unintentionally, and both the reamer and some amount of drill pipe are abandoned downhole.

A skilled contractor can typically avoid getting the reamer stuck downhole. As loads increase, the contractor will adjust drilling fluid properties and trip the reamer out of the hole to mechanically displace material. A stuck reamer is more difficult to free up than a pilot hole drill bit. Reamers are generally designed to move forward, not backward.

Prereaming through hard or unusually abrasive rock can lead to failure of reaming tools downhole due to excessive wear. This often results in roller cones or other portions of the reaming tool being lost downhole where they can present an obstacle to subsequent reaming passes or installation of the pipeline. Fishing operations to retrieve pieces of a reaming tool lost downhole are time consuming and often unsuccessful.

Penetration of an artesian aquifer on an HDD installation can cause significant problems, especially during prereaming operations when attempting to move a large volume of material out of the hole. A steady flow of groundwater into the hole from an aquifer tends to bring in fine soils, which eventually accumulate in the hole and can cause the reamer or drill pipe to bind. Additionally, a significant flow of water into the reamed hole can have a negative effect on drilling fluid properties. If drilling fluid returns to the HDD endpoints are maintained, the additional water returning to the surface can become overwhelming, resulting in drilling fluid storage and disposal issues.

2.3 Problems During Pullback

As with prereaming, problems during pullback generally involve excessive tensile or torsional loads which can ultimately result in the pull section becoming stuck. Excessive torque and pulling forces applied in an attempt to free the pipe can result in twisting off downhole. Removal of the pull section from the hole can be difficult and is sometimes impossible. If a partially installed pull section cannot not be withdrawn, the contractor’s only option is to start over, offsetting to one side and drilling a new pilot hole. Pipe left in the hole has to be replaced and a new pull section has to be fabricated.

Stuck pipe can also occur due to the relative stiffness of the pull section. During prereaming operations, it is possible for the reaming tool to "walk" around a boulder since it is being pulled and followed by a slender 5-inch drill pipe. However, when the same boulder is encountered during pullback, the reamer is forced to cut through it by the relatively rigid pull section.

Another issue that may occur during pullback, specific to installations through bedrock, is difficulties associated with transitioning from the overburden soil into the rock hole. Misalignment of the pull section as it moved into the reamed rock hole can result in the product line becoming lodged.

3 CONTINGENCY PLANS

Courses of action to consider if serious operational problems occur are outlined below. These contingency plans are meant to serve as guidelines and tools for advanced planning. The actual course of action to be employed will be based on an analysis of the conditions encountered during construction. In the event that a re-drill is necessary, the horizontal offset distance will be based on an analysis of the cause of failure and the as-built position of existing drilled hole. In most cases, the horizontal offset will be within 10 feet to 20 feet of the original alignment.

3.1 Twist Off During Pilot Hole

If there is a reasonable chance that the bottom hole assembly and/or drill pipe lost downhole can be retrieved using fishing tools, commence fishing operations. Otherwise, offset and redrill the pilot hole around the twisted off segment.

3.2 Solution Cavity Encountered During Pilot Hole

If the solution cavity is not extensive (i.e. extending no more than a few feet along the drilled path) and the bit successfully reenters the formation after passing through the void, proceed with the pilot hole at the contractor's discretion. If the solution cavity is extensive, offset and begin a new pilot hole in an effort to avoid the solution cavity.

3.3 Twist Off During Prereaming

If the failure is to the pipe side of the reamer, trip the reamer out with the rig, trip out the failed drill pipe with pipe side equipment, and trip back through the partially reamed pilot hole with a directional drilling assembly. If the failure is to the rig side of the reamer, trip out the failed pipe on the rig side. Attempt to separate the drill pipe on the pipe side of the reamer from the reamer and recover the drill pipe using pipe side equipment. If it is possible to redrill around the reamer and reenter the completed pilot hole without violating pilot hole tolerances, do so. If not, offset and drill a new pilot hole.

3.4 Twist Off During Pullback

If possible, recover the pull section using pipe side equipment or other means as available. Trip out the failed drill pipe and trip back through the reamed hole with a directional drilling assembly. Otherwise, salvage as much pipe as possible, offset, and begin a new pilot hole.

3.5 Failed Installation

A single occurrence of the problem scenarios described previously would not constitute a failure. Typically, there would have to be at least two occurrences resulting in stuck or twisted off drill pipe before an HDD contractor would consider abandoning the crossing. If it is ultimately determined that an HDD installation cannot be completed at any of the proposed crossing locations, NEXUS's contingency plan will be to install the crossing on the current alignment using a method other than HDD or, where this is not possible, install the crossing on a new alignment using HDD or another method, with the selected method being dependent on the topographic, hydrographic and geotechnical conditions on the new alignment. Any drilled or reamed hole which is abandoned will be filled with a mixture of drilling fluid and drilled spoil.

4 DRILLING FLUID IMPACT

All stages of HDD involve circulating drilling fluid from equipment on the surface, through a drill pipe to a downhole bit or reamer, and back to the surface through the annular space between the pipe and the wall of the hole. Drilling fluid returns collected at the entry and exit points are stored in steel tanks and processed through a solids control system which removes spoil from the drilling fluid allowing the fluid to be reused. The basic method used by the solids control system is mechanical separation using shakers, desanders, and desilters. Excess spoil and drilling fluid are transported to, and disposed of, at an approved disposal site.

Under ideal circumstances, drilling fluid exhausted at the bit or reamer will flow back to the entry or exit point through the drilled annulus. Under actual conditions, this happens inconsistently. Drilling fluid expended downhole will flow in the path of least resistance. In the drilled annulus, this path may be an existing fracture or fissure in the soil. This can result in dispersal of drilling fluid into the surrounding soils (lost circulation) or discharge to the surface at some random location (inadvertent returns). Lost circulation and inadvertent returns are common occurrences in pipeline installation by HDD and do not prevent completion. However, the environment may be temporarily impacted if drilling fluid inadvertently returns to the surface at a location on a waterway’s banks or within a waterway. Drilling parameters may be adjusted to maximize circulation and minimize the risk of inadvertent returns. However, the possibility of lost circulation and inadvertent returns cannot be eliminated.

4.1 The Principal Functions of Drilling Fluid in HDD Pipeline Installation are Listed Below:

- **Hydraulic Excavation.** On crossings through soft soils, soil is excavated by erosion from high velocity fluid streams through jet nozzles on bits or reaming tools.

- **Transmission of Hydraulic Power**. On crossings through harder soils or rock, power required to turn a bit and mechanically drill a hole is transmitted to a downhole motor by the drilling fluid.

- **Transportation of Spoil**. Drilled spoil, consisting of excavated soil or rock cuttings, is suspended in the fluid and carried to the surface by the fluid stream flowing in the annulus between the pipe and the wall of the hole.

- **Hole Stabilization.** Stabilization of the drilled hole is accomplished by the drilling fluid building up a "wall cake" which seals pores and holds soil particles in place. This is critical in HDD pipeline installation as holes are often in unconsolidated formations and are uncased.

- **Cooling and Cleaning of Cutters.** Drilled spoil build-up on bit or reamer cutters is removed by high velocity fluid streams directed at the cutters. Cutters are also cooled by the fluid.

- **Reduction of Friction**. Friction between the pipe and the wall of the hole is reduced by the lubricating properties of the drilling fluid.

- **Modification of Soil Properties.** Mixing of the drilling fluid with the soil along the drilled path facilitates installation of a pipeline by reducing the shear strength of the soil to a near fluid condition. The resulting soil mixture can then be displaced as a pipeline is pulled into it.

4.2 Drilling Fluid Composition

The major component of drilling fluid used in HDD pipeline installation is fresh water. In order for water to perform the required functions, it is generally necessary to modify its properties by adding a viscosifier. The viscosifier used almost exclusively in HDD drilling fluids is a naturally occurring bentonite clay typically mined by “open pit” methods from locations in Wyoming and South Dakota. Bentonite is a soft clay, formed by the weathering of volcanic ash, with the unique characteristic of swelling to several times its original volume when in contact with water. It is not a hazardous material as defined by the U.S. Environmental Protection Agency's characteristics of ignitability, corrosivity, reactivity, or commercial chemicals. It is also used to seal earth structures such as ponds or dams and as a suspending component in livestock feeds.

The properties of bentonite used in drilling fluids are often enhanced by the addition of polymers. This enhancement typically involves increasing the yield. That is, reducing the amount of dry bentonite required to produce a given amount of drilling fluid. Untreated bentonite yields in excess of 85 barrels (3,570 gallons) of drilling fluid per ton of material. Addition of polymers to produce high yield bentonite can increase the yield to more than 200 barrels (8,400 gallons) per ton of material. Typical HDD drilling fluids are made with high yield bentonite and are composed of less than 4% viscosifier by volume, with the remaining components being water and drilled spoil.

4.3 Disposal Of Excess Drilling Fluid

Disposal of excess drilling fluid will be the responsibility of the selected HDD contractor. Prior to beginning HDD operations, the contractor will be required to submit their proposed drilling fluid disposal procedures to NEXUS for approval. NEXUS will review these procedures and verify that they comply with all environmental regulations, right-of-way and workspace agreements, and permit requirements.

The method of disposal applied to each crossing will be dependent upon applicable regulations. Potential disposal methods include transportation to a remote disposal site and land farming on the construction right-of-way or an adjacent property. Land farming involves distributing the excess drilling fluid evenly over an open area and mechanically incorporating it into the soil. Where land farming is employed, the condition of the land farming site will be governed by NEXUS’s standard clean up and site restoration specifications.

4.4 Minimization Of Environmental Impact

The most effective way to minimize environmental impact associated with HDD drilling fluids is to maintain drilling fluid circulation to the extent practical. However, resources spent in an effort to maintain circulation should be weighed against the potential benefits achieved through full circulation. It should be recognized that in subsurface conditions which are not conducive to annular flow, restoration of circulation may not be practical or possible. In such cases, environmental impact can often be minimized most effectively by completing HDD operations in the shortest possible amount of time.

Steps which may be taken by the contractor to either prevent lost circulation or regain circulation include, but are not limited to, the following:

- Size the hole frequently by advancing and retracting the drill string in order to keep the annulus clean and unobstructed.

- When drilling fluid flow has been suspended, establish circulation slowly and before advancing.

- Minimize annular pressures by minimizing density and flow losses. Viscosity should be minimized, consistent with hole cleaning and stabilization requirements.

- Minimize gel strength.

- Control balling of material on bits, reaming tools, and pipe in order to prevent a plunger effect from occurring.

- Control penetration rates and travel speeds in order to prevent a plunger effect from occurring.

- Seal a zone of lost circulation using a high viscosity bentonite plug.

- Seal a zone of lost circulation using lost circulation materials. Note that any lost circulation materials proposed for use must be approved by NEXUS prior to utilization.

- Suspend drilling activities for a period of six to eight hours.

If inadvertent surface returns occur on dry land, it will be the responsibility of the HDD contractor to contain, collect, and restore the disturbed area in accordance with the requirements of NEXUS's construction specifications. Should inadvertent returns occur within a waterway, NEXUS will notify appropriate parties and evaluate the potential impact of the returns in order to determine an appropriate course of action. In general, NEXUS does not believe that it is environmentally beneficial to try to contain and collect drilling fluid returns in a waterway. HDD drilling fluids are nontoxic and discharge of the amounts normally associated with inadvertent returns, in most cases, do not pose a threat to the environment or public health and safety. Placement of containment structures and attempts to collect drilling fluid within a waterway often result in greater environmental impact than simply allowing the drilling fluid returns to dissipate naturally.

4.5 Requirements of HDD Contractor

The requirements that will be placed on the HDD contractor with respect to drilling fluid related issues are included in NEXUS's construction specifications. Excerpts from the HDD technical specification defining the contractor's responsibilities are presented below.

- **Instrumentation.** CONTRACTOR shall at all times provide and maintain instrumentation which will accurately locate the pilot hole, measure drill string axial and torsional loads, and measure drilling fluid discharge rate and pressure. NEXUS will have access to these instruments and their readings at all times. A log of all recorded readings shall be maintained and will become a part of the "As-Built" information to be supplied by CONTRACTOR.

- **Composition.** The composition of all drilling fluids proposed for use shall be submitted to NEXUS for approval. No fluid will be approved or utilized that does not comply with permit requirements and environmental regulations.

- **Recirculation.** CONTRACTOR shall maximize recirculation of drilling fluid surface returns. CONTRACTOR shall provide solids control and fluid cleaning equipment of a configuration and capacity that can process surface returns and produce drilling fluid suitable for reuse. NEXUS may specify standards for solids control and cleaning equipment performance or for treatment of excess drilling fluid and drilled spoil. NEXUS specified standards, if any, are listed in the General Requirements.

- **Loss of Circulation.** CONTRACTOR shall employ his best efforts to maintain full annular circulation of drilling fluids. Drilling fluid returns at locations other than the entry and exit points shall be minimized. In the event that annular circulation is lost, CONTRACTOR shall take steps to restore circulation.

- **Inadvertent Returns.** If inadvertent surface returns of drilling fluids occur, they shall be immediately contained with hand placed barriers (i.e. hay bales, sand bags, silt fences, etc.) and collected using pumps as practical. If the amount of the surface return is not great enough to allow practical collection, the affected area shall be diluted with fresh water and the fluid will be allowed to dry and dissipate naturally. If the amount of the surface return exceeds that which can be contained with hand placed barriers, small collection sumps (less than 5 cubic yards) may be used. If the amount of the surface return exceeds that which can be contained and collected using small sumps, drilling operations shall be suspended until surface return volumes can be brought under control.

- **Disposal.** Disposal of excess drilling fluids is the responsibility of the CONTRACTOR and shall be conducted in compliance with all environmental regulations, right-of-way and workspace agreements, and permit requirements. Drilling fluid disposal procedures proposed for use shall be submitted to NEXUS for approval. No procedure may be used which has not been approved by NEXUS. NEXUS, at its option, may secure an excess drilling fluid disposal site for CONTRACTOR. Excess drilling fluid disposal sites secured by NEXUS are listed in the General Requirements.

5 MONITORING

In order to ensure that HDD operations are conducted in accordance with established requirements and standard HDD industry practice, NEXUS will provide an inspector experienced in HDD construction to monitor the HDD contractor's performance at the jobsite. The primary functions of NEXUS’s environmental inspector will be to document construction activities, report on the HDD contractor’s performance, and notify the NEXUS Environmental Project Manager if the HDD contractor fails to conform to established requirements. Established requirements to which the HDD contractor must conform include, but are not limited to, the construction drawings, technical specifications, permits, easement agreements, and contractor submittals. The monitoring protocol which will be applied by NEXUS’s environmental inspector relative to drilling fluid related issues is described in detail on the following pages.

5.1 Drilling Fluid Monitoring Protocol

The drilling fluid monitoring protocol to be applied will vary depending upon the following operational conditions.

Condition 1: Full Circulation

Condition 2: Loss of Circulation

Condition 3: Inadvertent Returns

5.1.1 Monitoring Protocol for Condition 1 – Full Circulation

When HDD operations are in progress and full drilling fluid circulation is being maintained at one or both of the HDD endpoints, the following monitoring protocol will be implemented.

- The presence of drilling fluid returns at one or both of the HDD endpoints will be periodically documented.
- Land-based portions of the drilled alignment will be periodically walked and visually inspected for signs of inadvertent drilling fluid returns as well as surface heaving and settlement. Waterways will be visually inspected from the banks for a visible drilling fluid plume.
- Drilling fluid products present at the jobsite will be documented.

If an inadvertent drilling fluid return is detected during routine monitoring, the monitoring protocol associated with Condition 3 will immediately be implemented.

5.1.2 Monitoring Protocol for Condition 2 – Loss of Circulation

When HDD operations are in progress and drilling fluid circulation to the HDD endpoints is lost or severely diminished, the following monitoring protocol will be implemented. It should be noted that lost circulation is common and anticipated during HDD installation and does not necessarily indicate that drilling fluid is inadvertently returning to a point on the surface.

- NEXUS's environmental inspector will notify the Environmental Project Manager that drilling fluid circulation to the HDD endpoints has been lost or severely diminished.
- NEXUS's environmental inspector will document steps taken by the HDD contractor to restore circulation. Should the contractor fail to comply with the requirements of the HDD Specification, NEXUS's environmental inspector will notify the Environmental Project Manager so that appropriate actions can be taken.
- If circulation is regained, NEXUS's environmental inspector will inform the Environmental Project Manager and resume the monitoring protocol associated with Condition 1.

- If circulation is not re-established, NEXUS's environmental inspector will increase the frequency of visual inspection along the drilled path alignment as appropriate. Additionally, NEXUS's environmental inspector will document periods of contractor downtime (during which no drilling fluid is pumped) and the contractor's drilling fluid pumping rate in case it should become necessary to estimate lost circulation volumes.

5.1.3 Monitoring Protocol for Condition 3 – Inadvertent Returns

If an inadvertent return of drilling fluids is detected, the following monitoring protocol will be implemented.

- NEXUS's environmental inspector will inform the Environmental Project Manager that an inadvertent drilling fluid return has occurred and provide documentation with respect to the location, magnitude, and potential impact of the return.

- If the inadvertent return occurs on land, NEXUS's environmental inspector will document steps taken by the HDD contractor to contain and collect the return. Should the contractor fail to comply with the requirements of the HDD Specification, NEXUS's environmental inspector will notify the Environmental Project Manager so that appropriate actions can be taken.

- If the inadvertent return occurs in a waterway, NEXUS, in consultation with appropriate parties, will determine if the return poses a threat to the environment or public health and safety.

- If it is determined that the return does not pose a threat to the environment or public health and safety, HDD operations will continue. NEXUS's environmental inspector will monitor and document the inadvertent return as well as periods of contractor downtime and the contractor's drilling fluid pumping rate in case it should become necessary to estimate inadvertent return volumes.

- If it is determined that the return does pose a threat to the environment or public health and safety, drilling operations will be suspended until containment measures can be implemented by the contractor. Documentation of any containment measures employed will be provided by NEXUS's environmental inspector. Once adequate containment measures are in place, the contractor will be permitted to resume drilling operations subject to the condition that drilling operations will again be suspended immediately should the containment measures fail. NEXUS's environmental inspector will periodically monitor and document both the inadvertent return and the effectiveness of the containment measures. Periods of contractor downtime and the contractor's drilling fluid pumping rate will also be documented in case it should become necessary to estimate inadvertent return volumes. Upon completion of the HDD installation, NEXUS will ensure that the inadvertent drilling fluid returns are cleaned up to the satisfaction of governing agencies and any affected parties.

6 NOTIFICATION

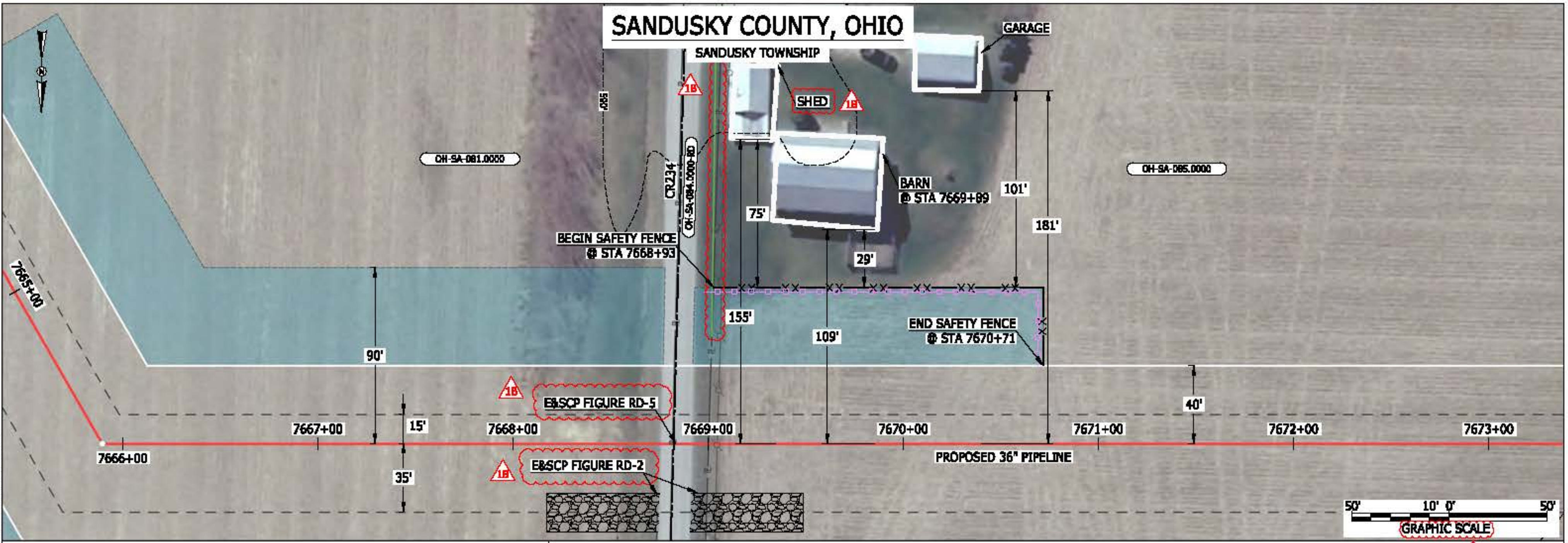
In the event of an inadvertent drilling fluid return within a waterway, NEXUS will immediately contact applicable agencies by telephone and/or e-mail detailing:

- the location and nature of the inadvertent return,
- corrective actions being taken, and
- whether the inadvertent return poses any threat to the environment or public health and safety.

APPENDIX E-5

NGT RESIDENTIAL CONSTRUCTION PLAN

BEL24588 March 14, 2016 10:13am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\CLYD\CLYD-P-8001.DWG



LEGEND

PROPOSED NEXUS PIPELINE	POWERLINES
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	CONTOUR LINE
INTERCONNECTING PIPELINE	SILT FENCE
PIPELINE MILEPOST	STRAW BALE
CONSTRUCTION LIMIT	FOREIGN PIPELINES
PERMANENT ROW	TELEPHONE
ADDITIONAL TEMPORARY WORKSPACE	FENCE
STAGING AREA	RAILROAD TRACK
WAREYARD	ROAD CL
ROCK ACCESS PAD	WATER PIPELINE
PERMANENT ACCESS ROAD (PAR-0.0)	UTILITY LINE
TEMPORARY ACCESS ROAD (TAR-0.0)	PROPERTY LINE
DELINEATED WATERBODY BANK	SAFETY FENCE
DELINEATED WETLAND BOUNDARY	TRACT NUMBER (00-XX-000.0000)
AGRICULTURAL PEM WETLAND BOUNDARY	MUNICIPALITY LINE
DELINEATED WATERBODY CENTERLINE	WELL: GAS, WATER, OIL, UNKNOWN
APPROXIMATE WATERBODY BANK	MAINLINE VALVE (MLV)
APPROXIMATE WETLAND BOUNDARY	BLOW OFF VALVE
APPROXIMATE WATERBODY CENTERLINE	HORIZONTAL DIRECTIONAL DRILLING
STRUCTURES	LIGHT POLE, FIRE HYDRANT
	MICROWAVE TOWER, TOWER
	TANK

1B

DESCRIPTION:

AT SURVEY STATION 7669+89 THERE IS A BARN LOCATED 29' TO THE LEFT OF THE CWS AND 109' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1B:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND UTILITY LINE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

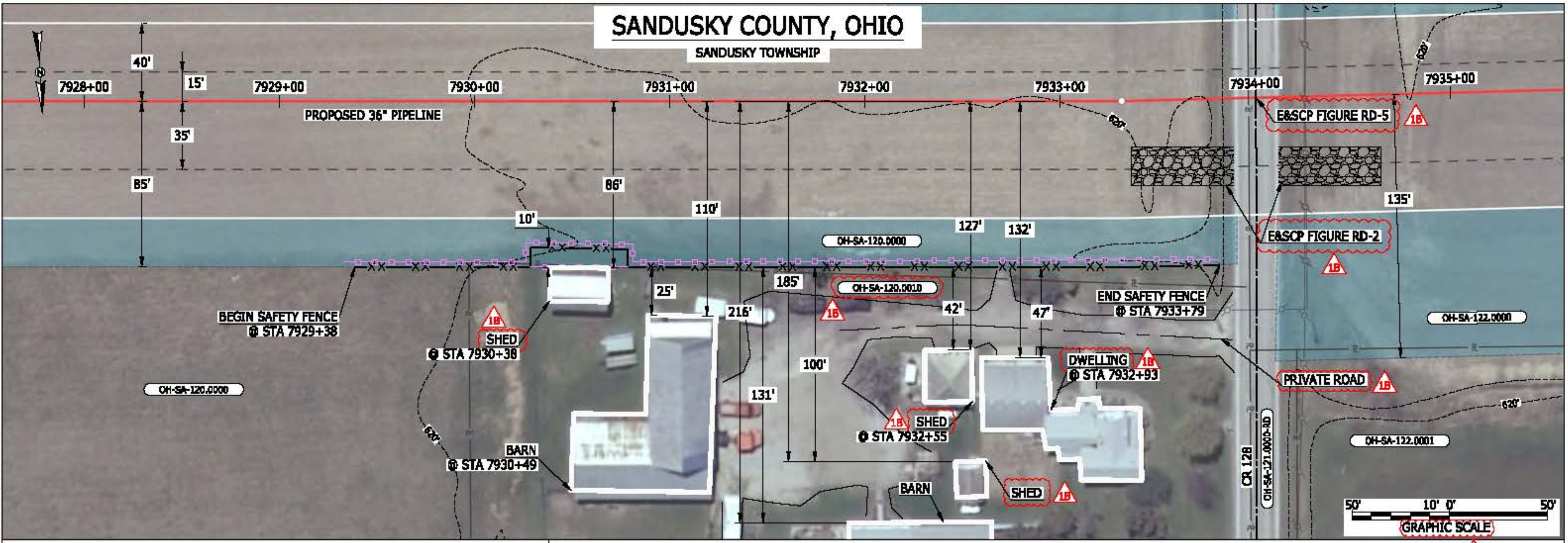
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 145.17 TO MP 145.33

LOC.: SANDUSKY COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. CLYD-P-8001

NEXUS GAS TRANSMISSION

SANDUSKY COUNTY, OHIO

SANDUSKY TOWNSHIP



LEGEND

PROPOSED NEXUS PIPELINE	▬
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	▬
PIPELINE MILEPOST	◇ M 00 P
CONSTRUCTION LIMIT	═
PERMANENT ROW	[- - - -]
ADDITIONAL TEMPORARY WORKSPACE	▭
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	
STRUCTURES	
POWERLINES	
CONTOUR LINE	- - - 1200 - - -
SILT FENCE	—□—□—
STRAW BALE	—▥—▥—
FOREIGN PIPELINES	—ǁ—ǁ—
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	—+—+—
ROAD CL	—— - ——
WATER PIPELINE	—W—W—
UTILITY LINE	——
PROPERTY LINE	—— ℞ ——
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
WELL: WATER	⊕
WELL: OIL	⊕
WELL: UNKNOWN	⊕
MAINLINE VALVE (MLV)	⋈
BLOW OFF VALVE	⋈
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1B

DESCRIPTION:

AT SURVEY STATION 7930+38 THERE IS A SHED LOCATED ON EDGE OF THE CWS AND 86' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 7930+49 THERE IS A BARN LOCATED 25' TO THE RIGHT OF THE CWS AND 110' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 7932+55 THERE IS A SHED LOCATED 42' TO THE RIGHT OF THE CWS AND 127' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 7932+93 THERE IS A DWELLING LOCATED 47' TO THE RIGHT OF THE CWS AND 132' RIGHT OF THE PROPOSED 36" PIPELINE.

1B

REVISION 1B:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
ADDED PRIVATE ROAD CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1B

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588 March 14, 2016 10:28am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\CLYD\CLYD-P-8003.DWG

REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

IG#

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 150.15 TO MP 150.29

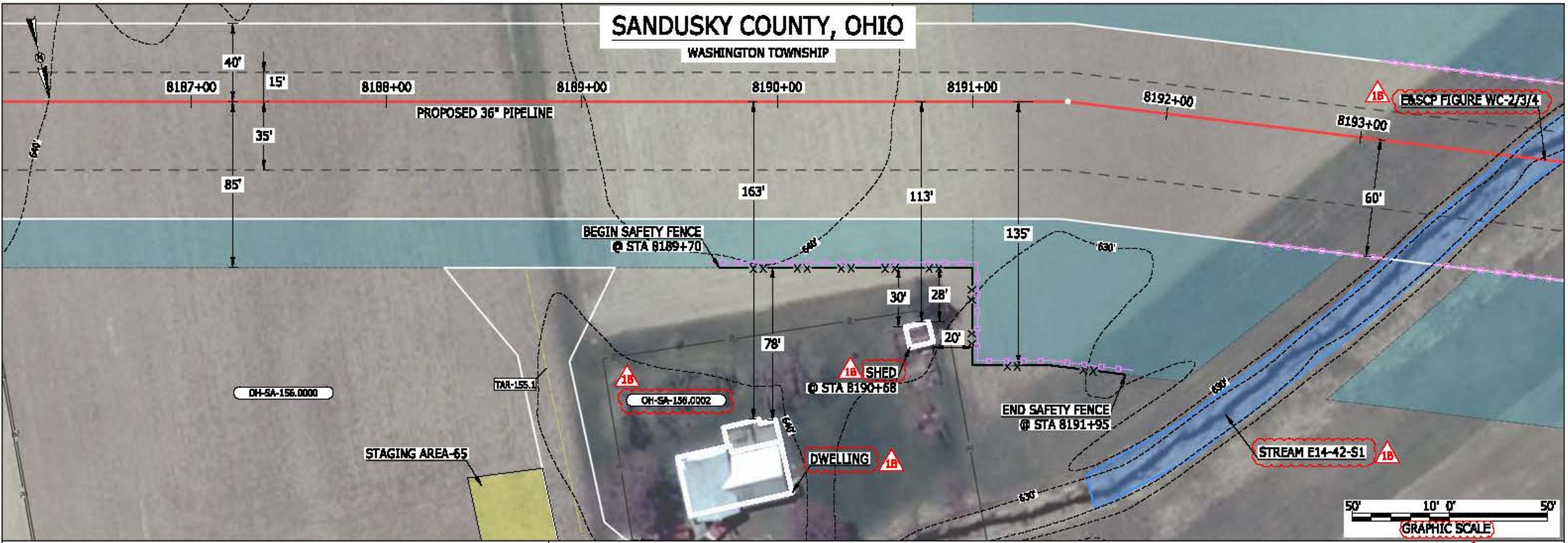
LOC.: SANDUSKY COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. CLYD-P-8003

NEXUS
GAS TRANSMISSION

BEL24588 March 14, 2016 10:32am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\CLYD\CLYD-P-8004.DWG

SANDUSKY COUNTY, OHIO

WASHINGTON TOWNSHIP



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD PAR-0.0
- TEMPORARY ACCESS ROAD TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER 00-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1B

DESCRIPTION:

AT SURVEY STATION 8190+68 THERE IS A SHED LOCATED 20' TO THE RIGHT OF THE CWS AND 113' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1B:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

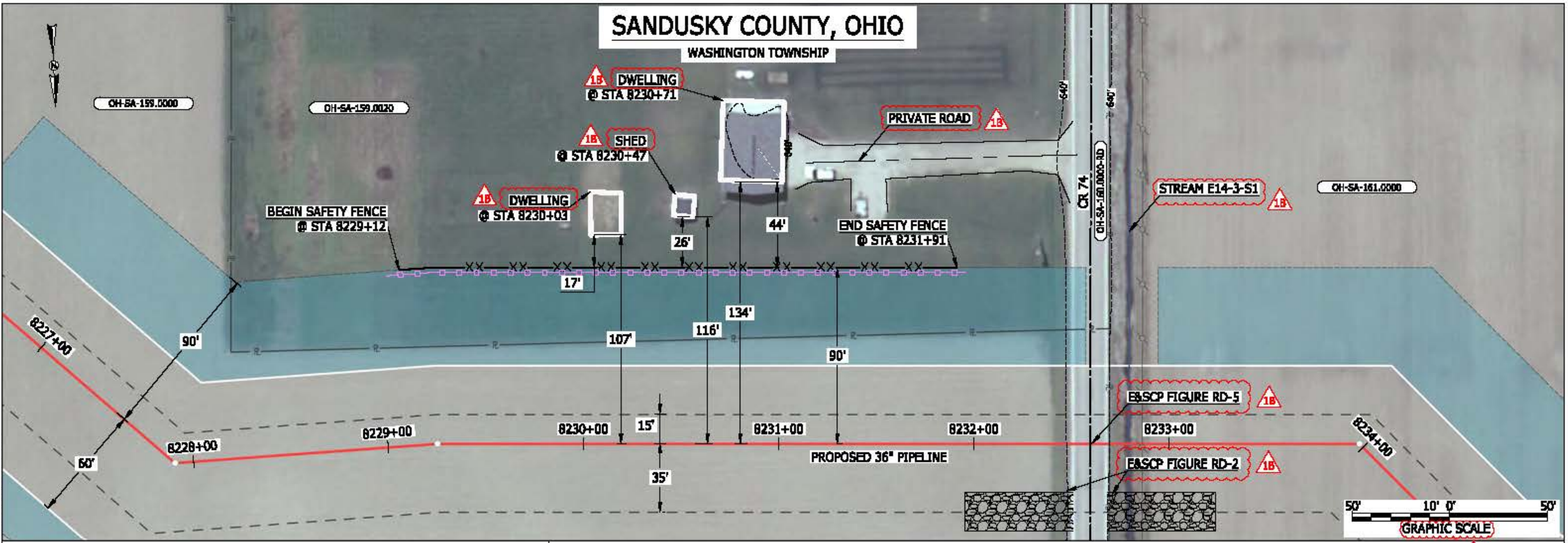
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE: NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 155.04 TO MP 155.19

LOC.: SANDUSKY COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. CLYD-P-8004

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE 1B
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD PAR-0.0
- TEMPORARY ACCESS ROAD TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE 1B
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER 00-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK 1B

DESCRIPTION:

1B

AT SURVEY STATION 8230+03 THERE IS A DWELLING LOCATED 17' TO THE LEFT OF THE CWS AND 107' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 8230+47 THERE IS A SHED LOCATED 26' TO THE LEFT OF THE CWS AND 116' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 8230+71 THERE IS A DWELLING LOCATED 44' TO THE LEFT OF THE CWS AND 134' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTE:

1. SEE DWG CLYD-P-8006 FOR THE CONTINUATION OF THE RESIDENTIAL AREA. 1B

REVISION 1B:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
ADDED PRIVATE ROAD CALL OUT. UPDATED TYPE OF STRUCTUE CALL OUTS.

NOTES: 1B

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588
March 14, 2016 10:34am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\CLYD\CLYD-P-8005.DWG

REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1B
SCALE: AS SHOWN
DATE

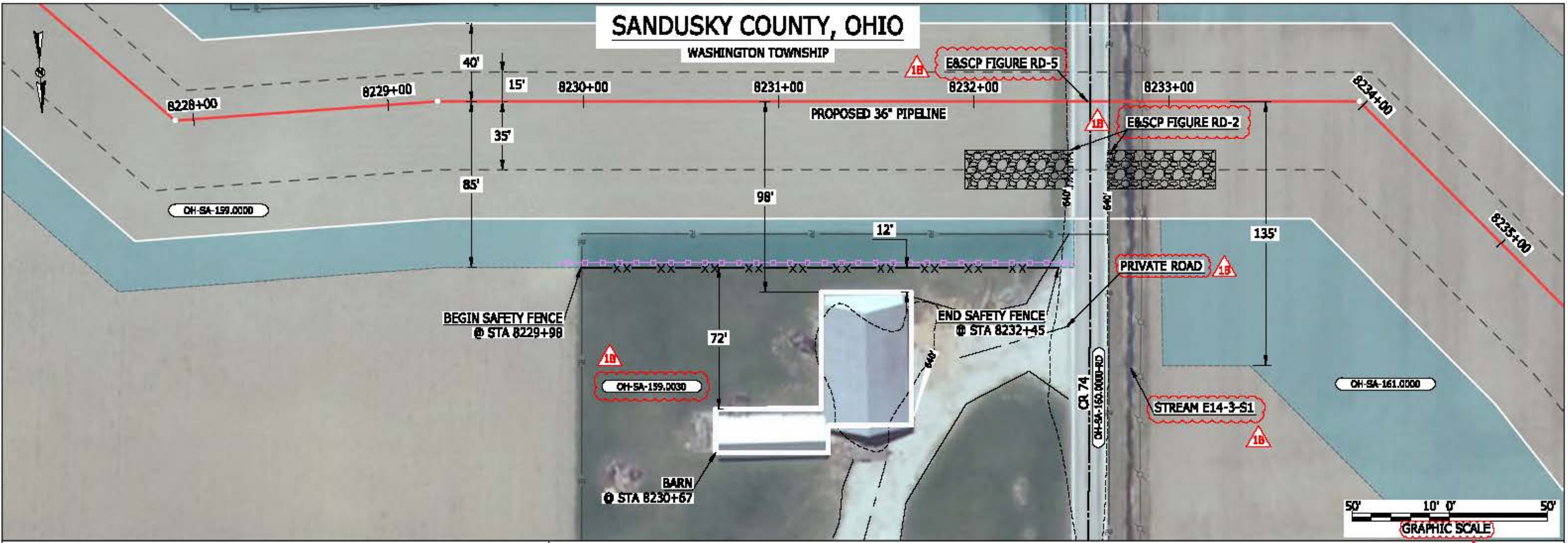
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 155.81 TO MP 155.96

LOC.: SANDUSKY COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. CLYD-P-8005

NEXUS GAS TRANSMISSION

SANDUSKY COUNTY, OHIO

WASHINGTON TOWNSHIP



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ● WATER ●
OIL ● UNKNOWN ●
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT ●
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

1B

DESCRIPTION:

AT SURVEY STATION 8230+67 THERE IS A BARN LOCATED 12' TO THE RIGHT OF THE CWS AND 98' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTE:

1. SEE DWG CLYD-P-8005 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1B:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
ADDED PRIVATE ROAD CALL OUT.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588 March 14, 2016 10:36am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\CLYD\CLYD-P-8006.DWG

REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

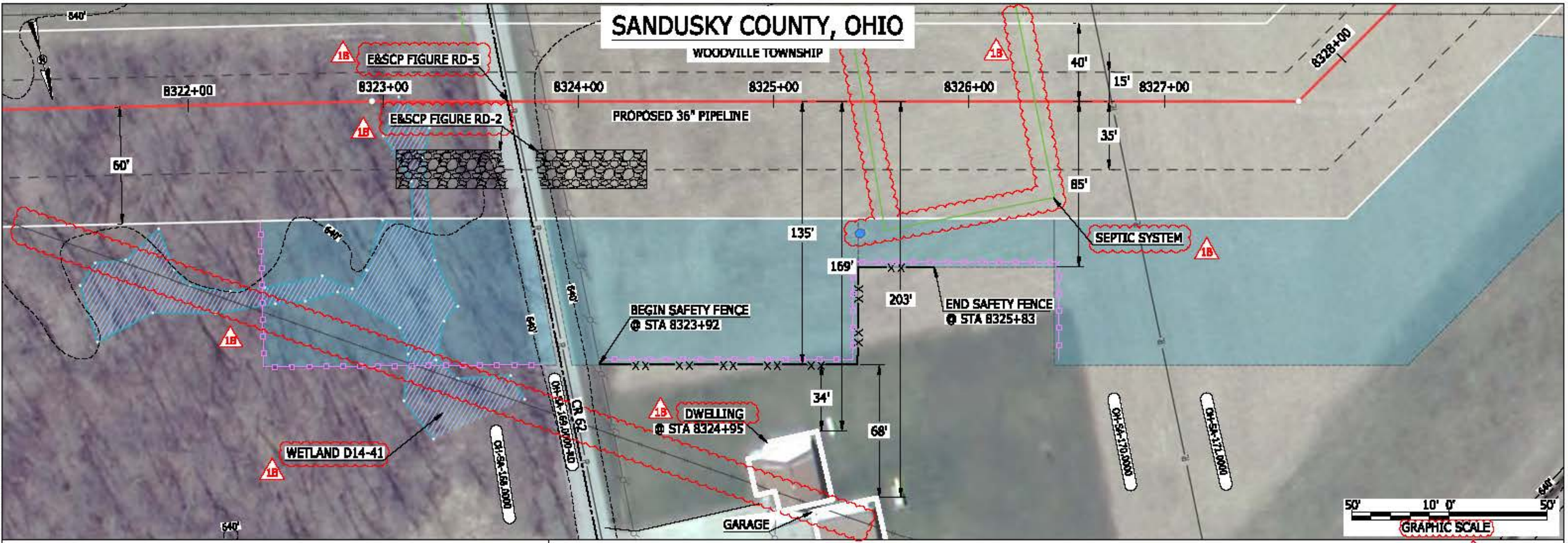
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 155.81 TO MP 155.97

LOC.: SANDUSKY COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. CLYD-P-8006

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	◇ M 00 P
CONSTRUCTION LIMIT	═
PERMANENT ROW	[- - -]
ADDITIONAL TEMPORARY WORKSPACE	🟦
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	🟦
DELINEATED WETLAND BOUNDARY	🟦
AGRICULTURAL PEM WETLAND BOUNDARY	🟦
DELINEATED WATERBODY CENTERLINE	—
APPROXIMATE WATERBODY BANK	🟧
APPROXIMATE WETLAND BOUNDARY	🟧
APPROXIMATE WATERBODY CENTERLINE	—
STRUCTURES	▨

POWERLINES	—ϕ—ϕ—
CONTOUR LINE	- - - 1200' - - -
SILT FENCE	—□—□—□—□—
STRAW BALE	—▯—▯—▯—▯—
FOREIGN PIPELINES	—+—+—+—+—
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	—+—+—+—+—
ROAD CL	——-——
WATER PIPELINE	—W—W—
UTILITY LINE	——
PROPERTY LINE	—— PL ——
SAFETY FENCE	—XX—XX—
TRACT NUMBER	(00-XX-000.0000)
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
WELL: OIL	⊕
WELL: WATER	⊕
WELL: UNKNOWN	⊕
MAINLINE VALVE (MLV)	⋈
BLOW OFF VALVE	⋈
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1B

DESCRIPTION:

AT SURVEY STATION 8324+95 THERE IS A DWELLING LOCATED 34' TO THE RIGHT OF THE CWS AND 169' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1B:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES, FOREIGN PIPELINE AND SEWER LINE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND RESOURCE IDENTIFICATION NUMBER AND SEPTIC SYSTEM CALLOUT ADDED FOR REFERENCE.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588
March 14, 2016 10:39am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\CLYD\CLYD-P-8008.DWG

REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

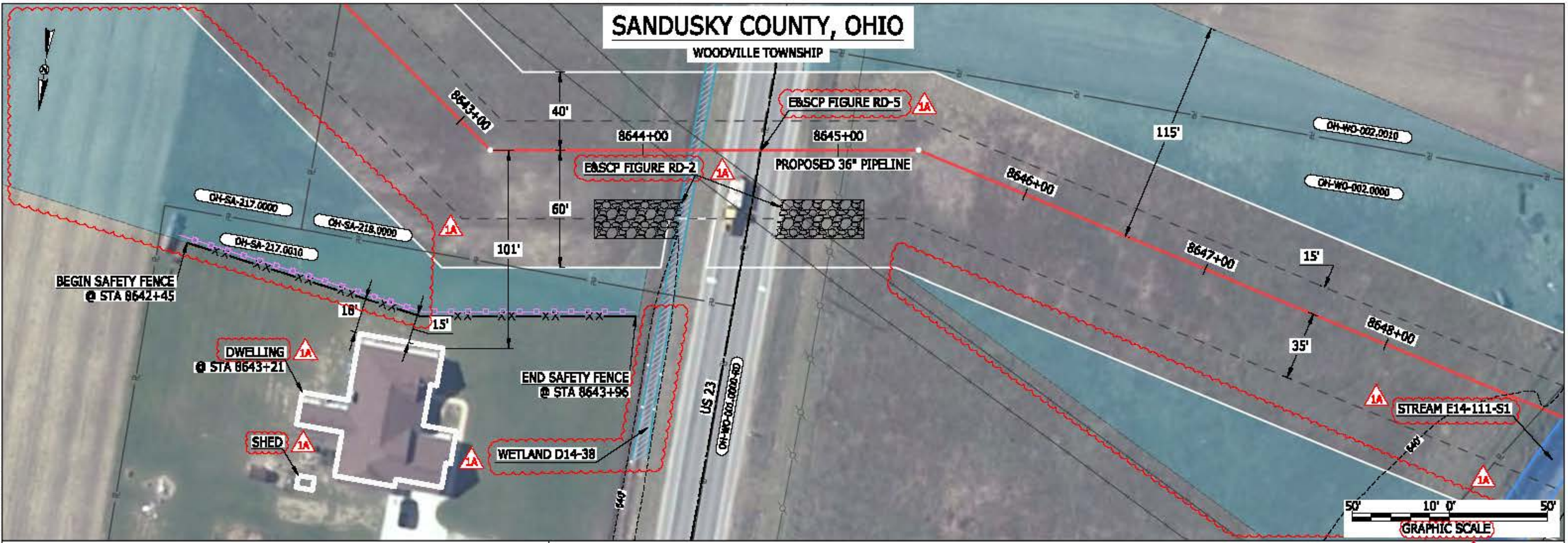
IG #:

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 157.6 TO MP 157.73

LOC.: SANDUSKY COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. CLYD-P-8008

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
1A
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
1A
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS WATER
OIL UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE FIRE HYDRANT
MICROWAVE TOWER TOWER
TANK
1A

DESCRIPTION:

1A

AT SURVEY STATION 8643+21 THERE IS A DWELLING LOCATED 15' TO THE RIGHT OF THE CWS AND 101' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES AND UPDATED FIGURE CALL OUT TO MATCH E&SCP.
RESOURCE UPDATED BASED ON FIELD SURVEY WETLAND DATA. WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588
March 14, 2016 10:43am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\CLYD\CLYD-P-8009.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

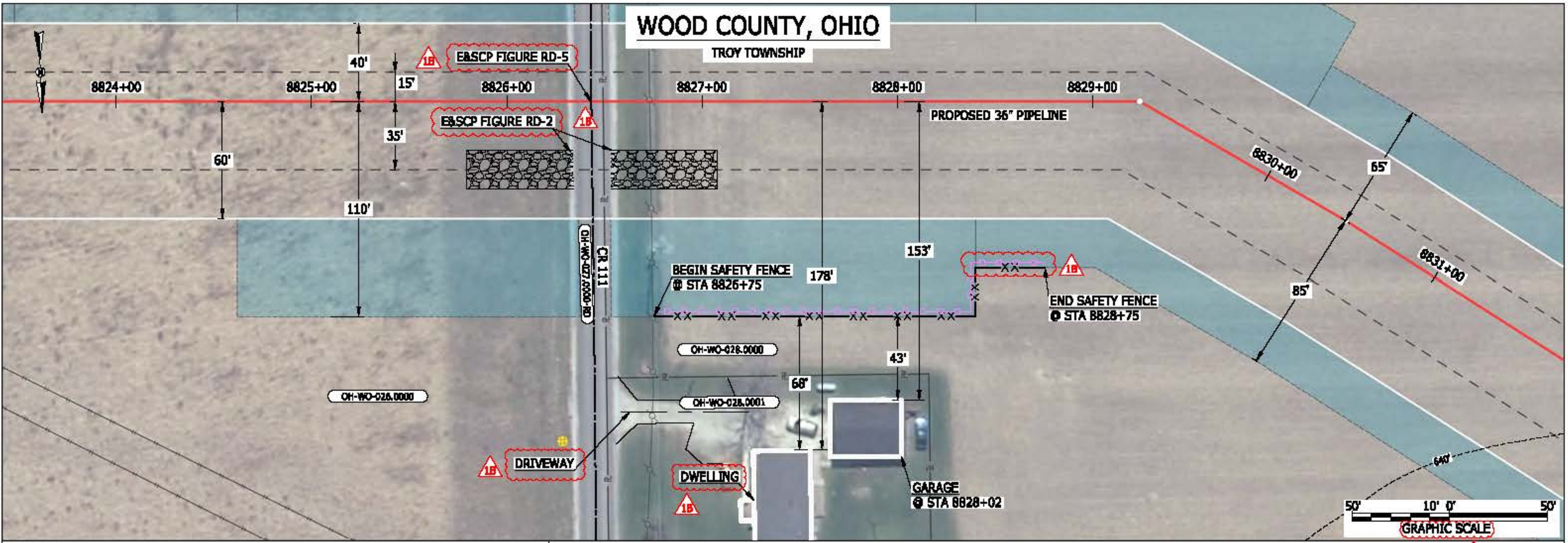
IG #

PROJ. ENG. VP		
CHECKED BY: DOB		
DRAWN BY: RSM 1A		
SCALE: AS SHOWN	DATE	

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 163.68 TO MP 163.81

LOC.: SANDUSKY COUNTY, OHIO REV.: 1A
YR.: 2017 W.O. **DWG.NO.** CLYD-P-8009

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	🟨
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	◇
CONSTRUCTION LIMIT	▬
PERMANENT ROW	[- - - -]
ADDITIONAL TEMPORARY WORKSPACE	🟦
STAGING AREA	🟩
WAREYARD	🟨
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	🟦
DELINEATED WETLAND BOUNDARY	🟦
AGRICULTURAL PEM WETLAND BOUNDARY	🟪
DELINEATED WATERBODY CENTERLINE	—
APPROXIMATE WATERBODY BANK	🟧
APPROXIMATE WETLAND BOUNDARY	🟧
APPROXIMATE WATERBODY CENTERLINE	—
STRUCTURES	⬜
POWERLINES	—ዖ—ዖ—
CONTOUR LINE	- - - - 1280 - - - -
SILT FENCE	—□—□—□—
STRAW BALE	—▥—▥—
FOREIGN PIPELINES	—+—+—+—
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	+++++
ROAD CL	—— - ——
WATER PIPELINE	—W—W—
UTILITY LINE	——
PROPERTY LINE	—PL—
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
OIL	⊕
WATER	⊕
UNKNOWN	⊕
MAINLINE VALVE (MLV)	⋈
BLOW OFF VALVE	⋈
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1B

DESCRIPTION:

AT SURVEY STATION 8828+02 THERE IS A GARAGE LOCATED 43' TO THE RIGHT OF THE CWS AND 153' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1B:
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND SILT FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA. SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES: 1B

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 2:40pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\CLYD\CLYD-P-8010.DWG

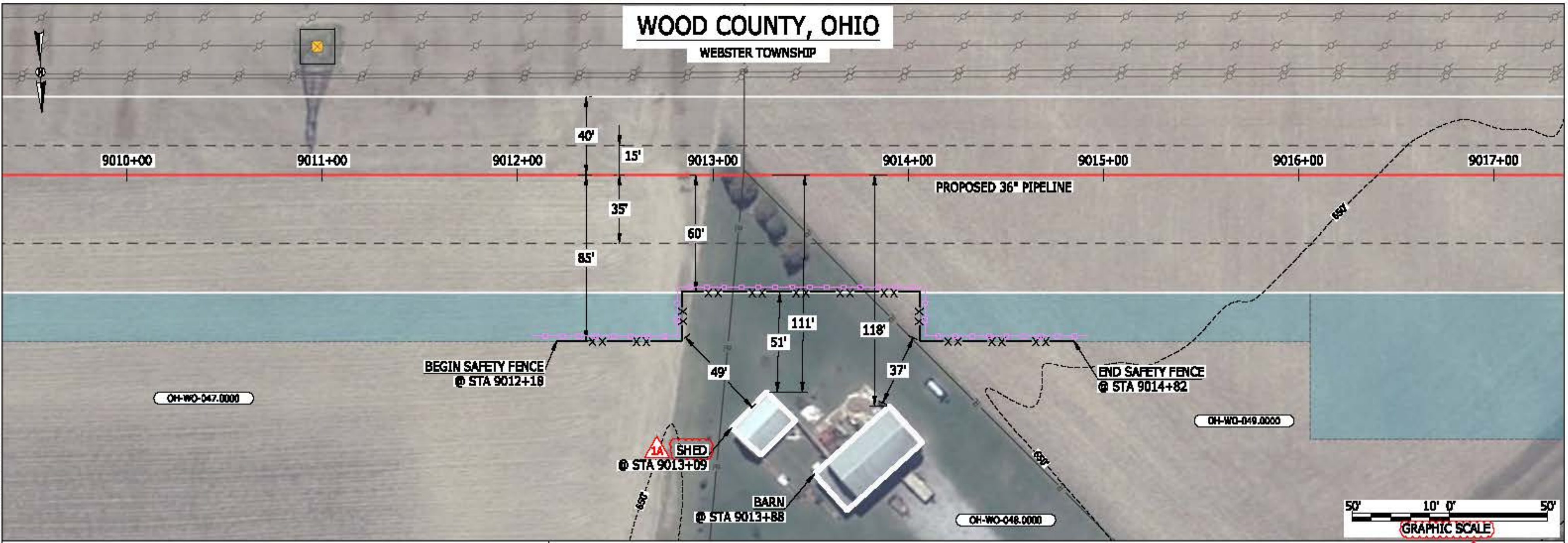
REV.#	DESCRIPTION	DATE		
1B	ISSUED FOR FERC	15MAR16		
1A	ISSUED FOR FERC	26FEB16	PROJ. ENG. VP	
1	ISSUED FOR FERC	23FEB16	CHECKED BY: DOB	
0	ISSUED FOR FERC FILING	23OCT15	DRAWN BY: RSM 1B	
			SCALE: AS SHOWN	DATE

IG #

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 167.11 TO MP 167.27

LOC.: WOOD COUNTY, OHIO		REV.: 1B
YR.: 2017	W.O.	DWG.NO. CLYD-P-8010

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	
INTERCONNECTING PIPELINE	
PIPELINE MILEPOST	M 00 P
CONSTRUCTION LIMIT	
PERMANENT ROW	
ADDITIONAL TEMPORARY WORKSPACE	
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	
STRUCTURES	

1A

POWERLINES	
CONTOUR LINE	1200
SILT FENCE	
STRAW BALE	
FOREIGN PIPELINES	
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	
ROAD CL	
WATER PIPELINE	—W—W—
UTILITY LINE	
PROPERTY LINE	PL
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	
WELL: GAS	⊕
WATER	⊕
OIL	⊕
UNKNOWN	⊕
MAINLINE VALVE (MLV)	
BLOW OFF VALVE	
HORIZONTAL DIRECTIONAL DRILLING	●
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A

DESCRIPTION:

AT SURVEY STATION 9013+88 THERE IS A BARN LOCATED 37' TO THE RIGHT OF THE CWS AND 118' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 9013+09 THERE IS A SHED LOCATED 49' TO THE RIGHT OF THE CWS AND 111' RIGHT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

LEGEND SYMBOLOGY AND PARCELS UPDATED TO REFLECT NEW UPDATES.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588
March 14, 2016 10:48am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\CLYD\CLYD-P-8011.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

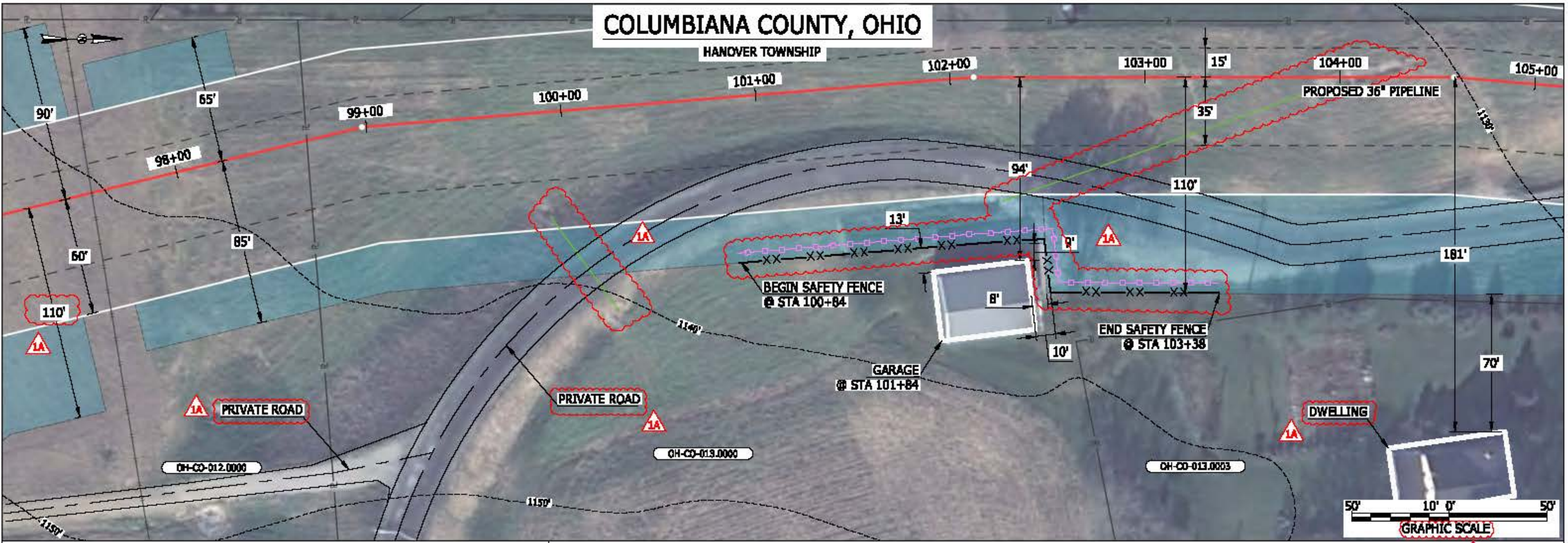
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 170.63 TO MP 170.78

LOC.: WOOD COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. CLYD-P-8011

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER OO-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ● WATER ●
OIL ● UNKNOWN ●
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING ●
LIGHT POLE ● FIRE HYDRANT ●
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 101+84 THERE IS A GARAGE LOCATED 8' TO THE RIGHT OF THE CWS AND 94' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES.
UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
ADDED PRIVATE ROAD CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858
March 14, 2016 4:43pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8001.DWG

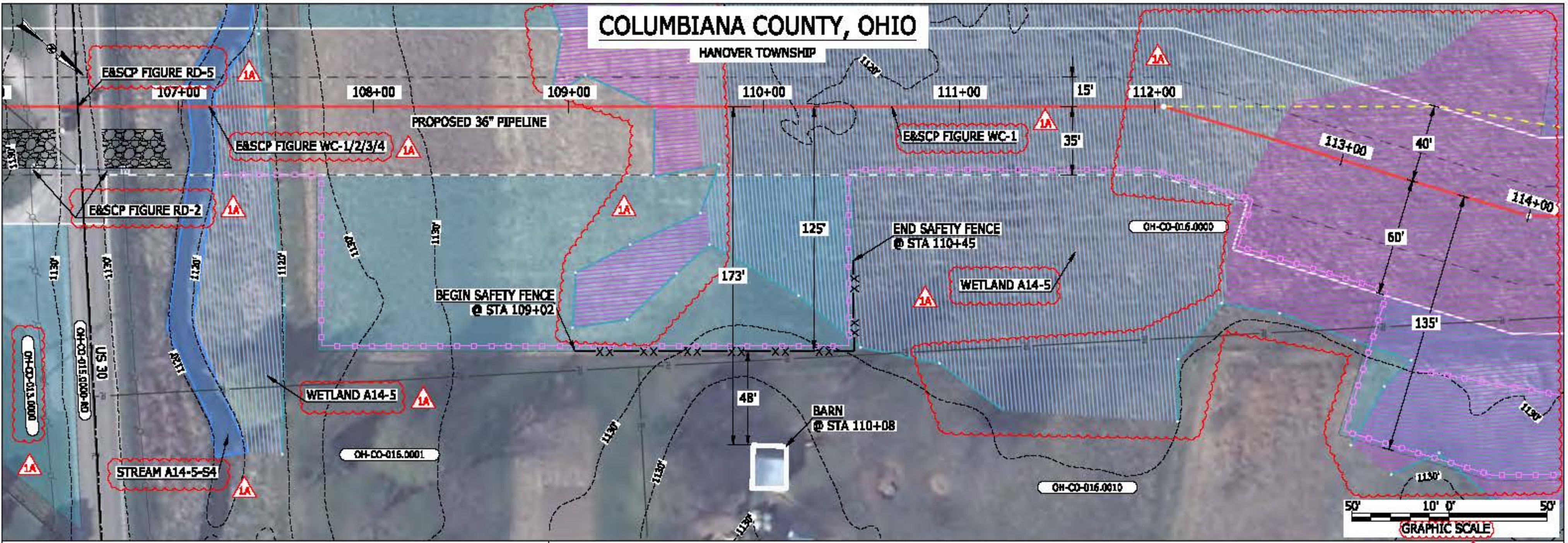
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15
REV.#	DESCRIPTION	DATE

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 1.84 TO MP 1.99

LOC.: COLUMBIANA COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8001

IG #



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST MP 00
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES
1A

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE —T—T—
FENCE —X—X—
RAILROAD TRACK
ROAD CL
WATER PIPELINE —W—W—
UTILITY LINE
PROPERTY LINE
SAFETY FENCE —XX—XX—
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT ⊕
MICROWAVE TOWER ☒ TOWER ☒
TANK ●
1A

DESCRIPTION:

AT SURVEY STATION 110+08 THERE IS A BARN LOCATED 48' TO THE RIGHT OF THE CWS AND 173' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

CENTERLINE REROUTED TO REDUCE WETLAND IMPACTS. ATWS/TWS ADJUSTED ACCORDINGLY.
RESOURCES UPDATED AND PARTIALLY RECLASSIFIED AS AG-PEM WETLAND BASED ON UPDATED FIELD SURVEYED WETLAND DATA.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE. APPROXIMATED RESOURCES UPDATED.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY CIVIL DATA.
SILT AND SAFETY FENCE ADDED FOR EROSION CONTROL MEASURE.

NOTES: 1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

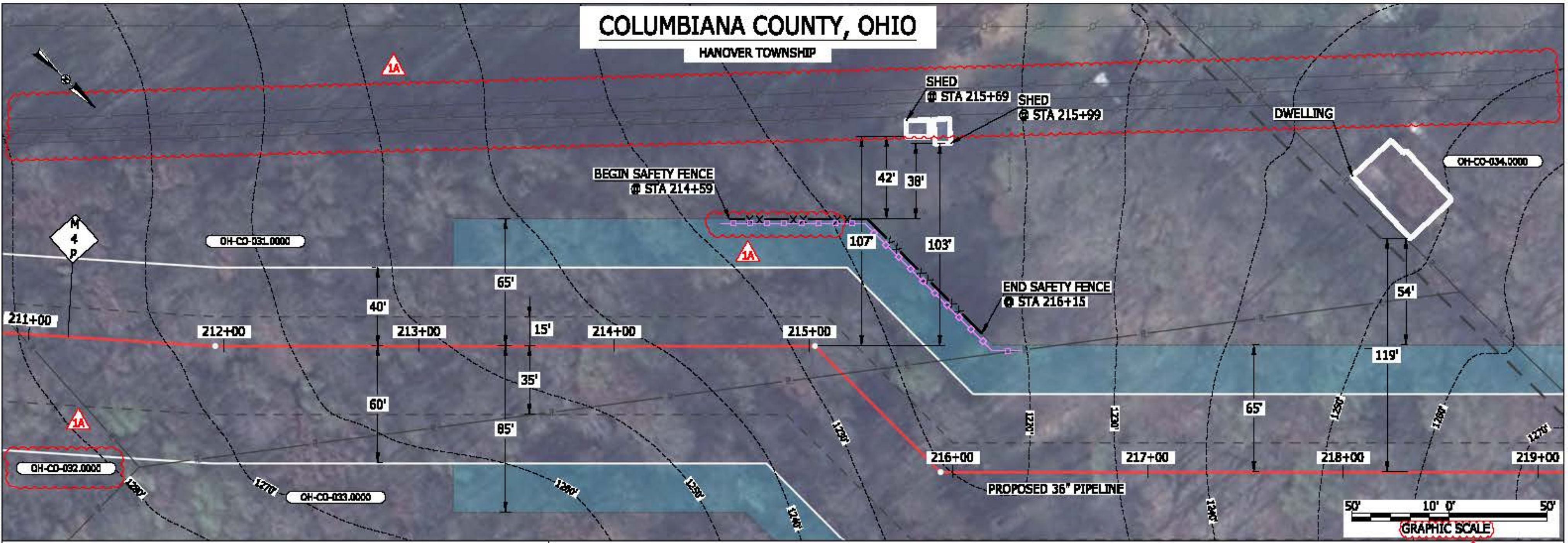
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 2.01 TO MP 2.16R 1A

LOC.: COLUMBIANA COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8002

NEXUS GAS TRANSMISSION

IG #

MES13858
March 14, 2016 4:09pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8002.DWG



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD PAR-0.0
- TEMPORARY ACCESS ROAD TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER 00-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS ⊕ WATER ⊕
- OIL ⊕ UNKNOWN ⊕
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING ⊙
- LIGHT POLE ● FIRE HYDRANT ⊕
- MICROWAVE TOWER ☒ TOWER ☒
- TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 215+99 THERE IS A SHED LOCATED 38' TO THE LEFT OF THE CWS AND 103' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 215+69 THERE IS A SHED LOCATED 42' TO THE LEFT OF THE CWS AND 107' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES.
POWERLINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	18FEB16
0	ISSUED FOR FERC FILING	23OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

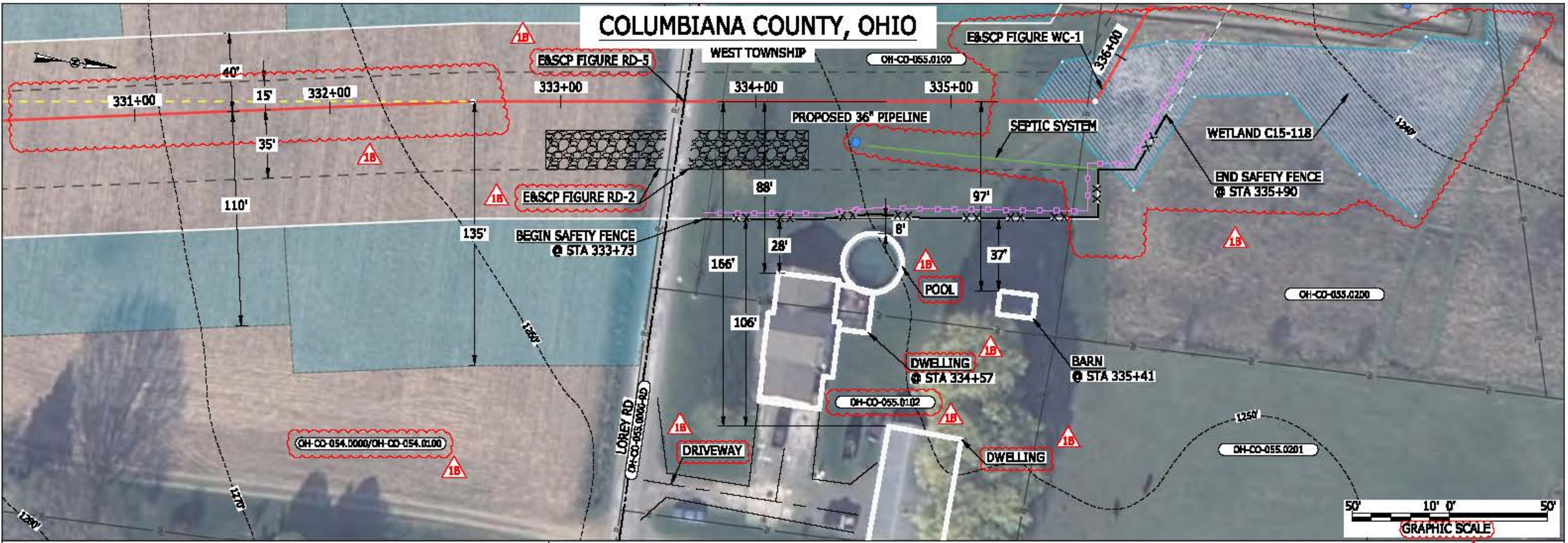
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 3.99 TO MP 4.15

LOC.: COLUMBIANA COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8003

NEXUS GAS TRANSMISSION

IG#

BEL24588
March 14, 2016 11:22am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8003.DWG



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST — M 00 P
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD — PAR-0.0
TEMPORARY ACCESS ROAD — TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

1B

POWERLINES
CONTOUR LINE — 1200'
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE — T — T —
FENCE — x — x —
RAILROAD TRACK
ROAD CL
WATER PIPELINE — W — W —
UTILITY LINE
PROPERTY LINE — PL —
SAFETY FENCE —XX—XX—
TRACT NUMBER — 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

1B

DESCRIPTION:

AT SURVEY STATION 334+57 THERE IS A DWELLING LOCATED 28' TO THE RIGHT OF THE CWS AND 88' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 335+41 THERE IS A BARN LOCATED 37' TO THE RIGHT OF THE CWS AND 97' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG HANO-P-8005 FOR THE CONTINUATION OF THE RESIDENTIAL AREA. 1B

REVISION 1B:

CENTERLINE REROUTED TO AVOID OVERLAP WITH EXISTING UTILITY EASEMENT BASED ON UPDATED CIVIL SURVEY. TWS/ATWS ADJUSTED ACCORDINGLY.
RESOURCES UPDATED BASED ON UPDATED FIELD SURVEY WETLAND DATA.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WETLAND RESOURCE IDENTIFICATION NUMBER AND SEPTIC SYSTEM CALLOUT ADDED FOR REFERENCE.
UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA. SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED POOL AND DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES: 1B

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

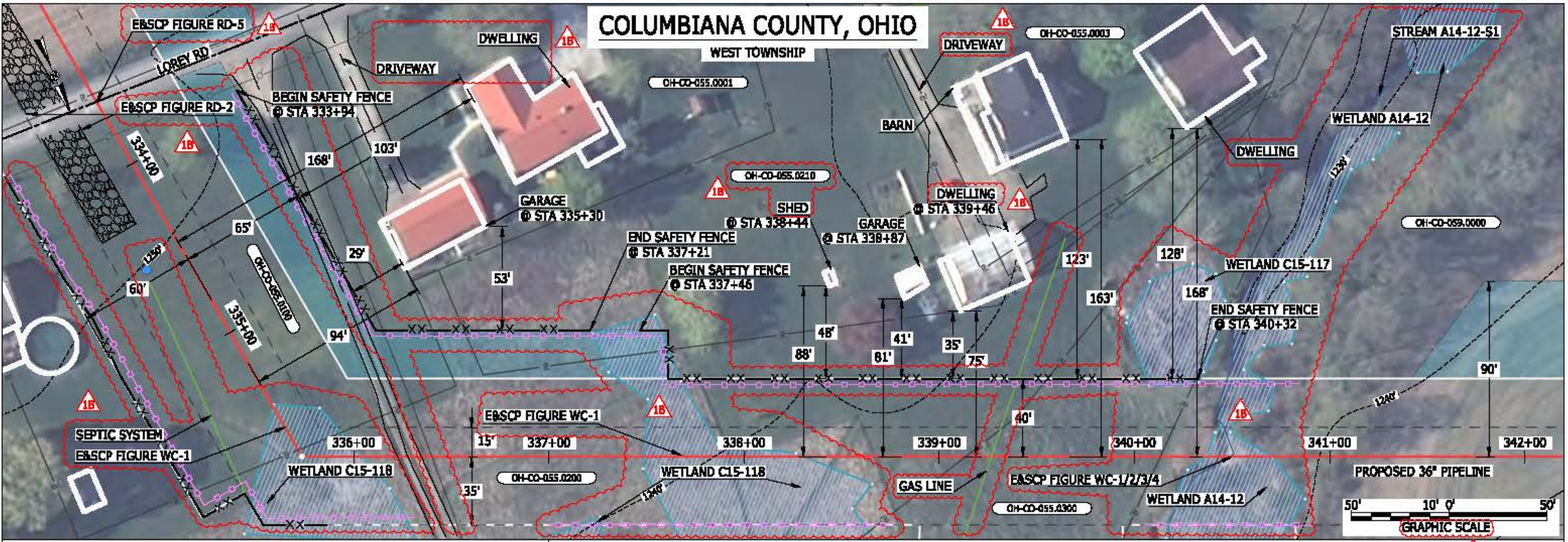
IG#

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1B
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
1B MP 6.25R TO MP 6.37

LOC.: COLUMBIANA COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. HANO-P-8004

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST ◇ M 00 P
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD PAR-0.0
- TEMPORARY ACCESS ROAD TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE —T—T—
- FENCE —x—x—
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE —W—W—
- UTILITY LINE
- PROPERTY LINE —— PL ——
- SAFETY FENCE —XX—XX—
- TRACT NUMBER 00-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS ⊕ WATER ⊕
- OIL ⊕ UNKNOWN ⊕
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING ●
- LIGHT POLE ● FIRE HYDRANT ⊕
- MICROWAVE TOWER ☒ TOWER ☒
- TANK ●

1B

DESCRIPTION:

AT SURVEY STATION 335+30 THERE IS A GARAGE LOCATED 29' TO THE LEFT OF THE CWS AND 94' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 338+44 THERE IS A SHED LOCATED 48' TO THE LEFT OF THE CWS AND 88' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 338+87 THERE IS A GARAGE LOCATED 41' TO THE LEFT OF THE CWS AND 81' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 339+46 THERE IS A DWELLING LOCATED 35' TO THE LEFT OF THE CWS AND 75' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG HANO-P-8004 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1B:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES AND UPDATED FIGURE CALL OUT TO MATCH E&SCP.
TWS/ATWS AND RESOURCES ADJUSTED BASED ON UPDATED FIELD SURVEY WETLAND/WATERBODY DATA. RESOURCE PARTIALLY CHANGED TO AG-PEM WETLAND.
PROPERTY BOUNDARIES, FOREIGN PIPELINE, AND UTILITY LINE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER AND SEPTIC SYSTEM CALLOUT ADDED FOR REFERENCE.
ADDED DRIVEWAY AND UTILITY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

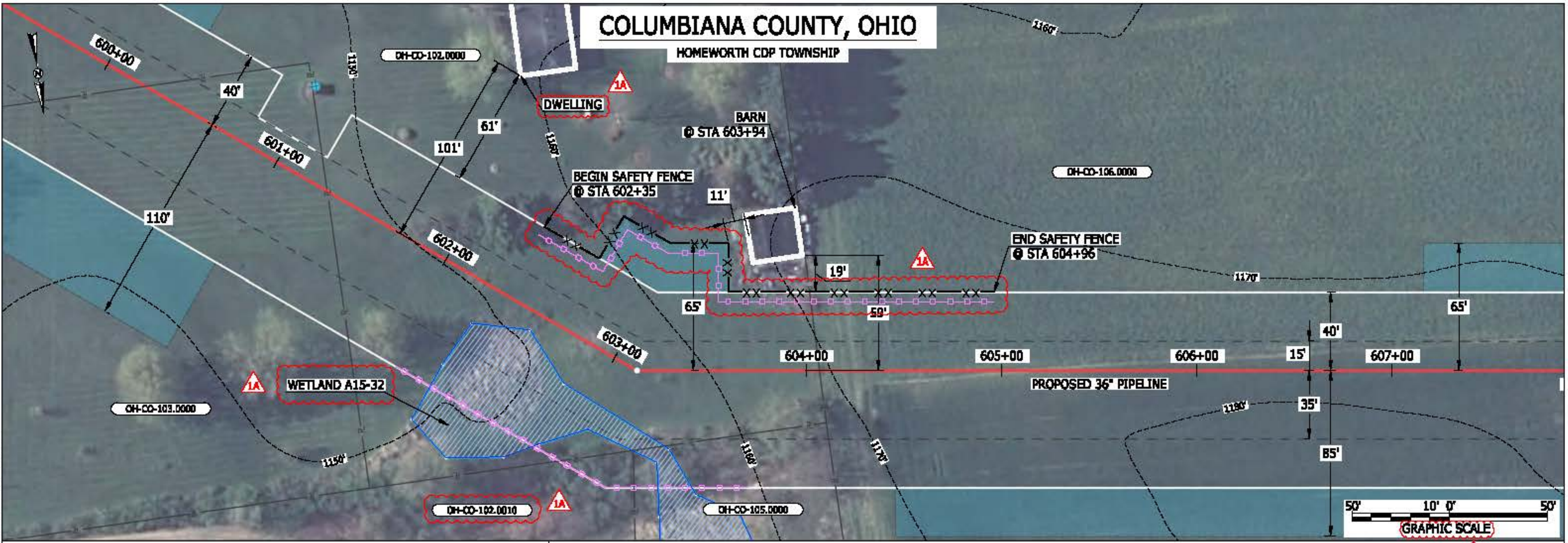
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 6.31 TO MP 6.48

LOC.: COLUMBIANA COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. HANO–P–8005

NEXUS GAS TRANSMISSION

IG.#

MES13858 March 14, 2016 2:43pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HAND\HANO-P-8005.DWG



1A

LEGEND

PROPOSED NEXUS PIPELINE	—○—
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	—○—
PIPELINE MILEPOST	◇ M 00 P
CONSTRUCTION LIMIT	▭
PERMANENT ROW	[- - - -]
ADDITIONAL TEMPORARY WORKSPACE	▭
STAGING AREA	▭
WAREYARD	▭
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	—
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	—
STRUCTURES	

1A

1A

POWERLINES	—⊘—⊘—
CONTOUR LINE	- - - 1200 - - -
SILT FENCE	—□—□—□—
STRAW BALE	—▥—▥—▥—
FOREIGN PIPELINES	—‖—‖—‖—
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	—+—+—+—
ROAD CL	——-——
WATER PIPELINE	—W—W—
UTILITY LINE	——
PROPERTY LINE	—— PL ——
SAFETY FENCE	—XX—XX—
TRACT NUMBER	OO-XX-000.0000
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
WELL: OIL	⊕
WATER	⊕
UNKNOWN	⊕
MAINLINE VALVE (MLV)	⋈
BLOW OFF VALVE	⋈
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A

DESCRIPTION:

AT SURVEY STATION 603+94 THERE IS A BARN LOCATED 11' TO THE LEFT OF THE CWS AND 59' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND SILT FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

PROJ. ENG.	VP
CHECKED BY:	DOB
DRAWN BY:	RSM 1A
SCALE:	AS SHOWN
DATE	

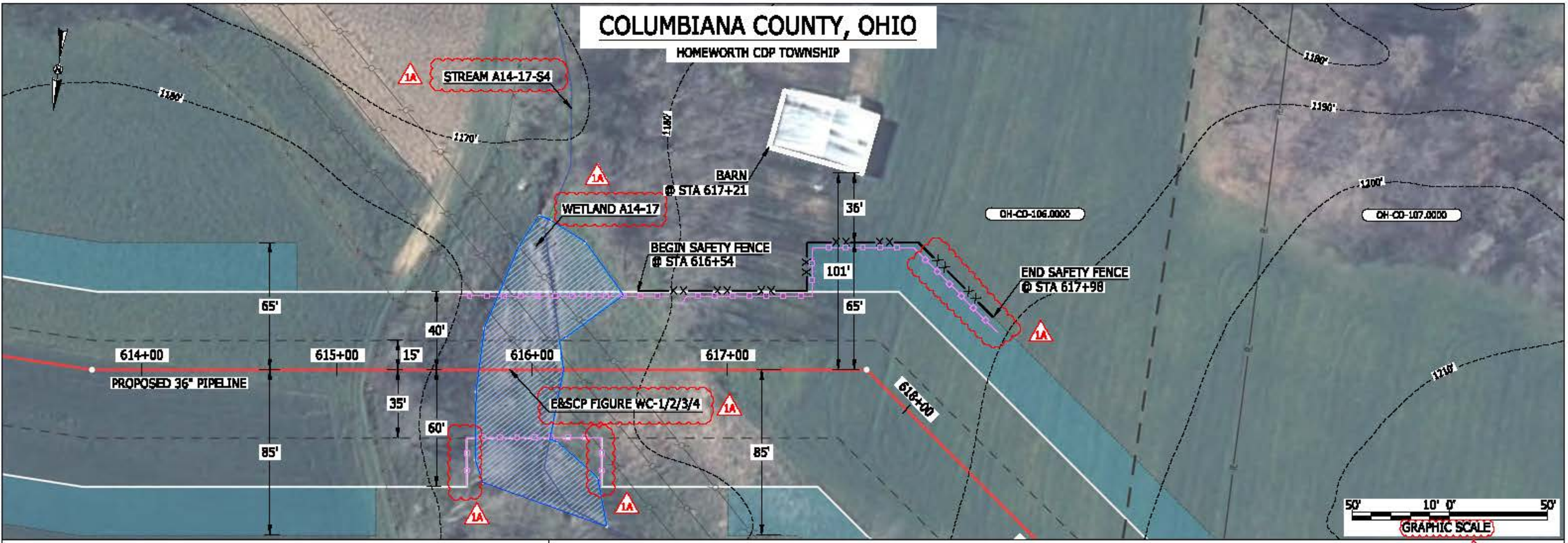
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 11.35 TO MP 11.51

LOC.: COLUMBIANA COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8006

NEXUS GAS TRANSMISSION

IG #

BEL24588
March 14, 2016 12:30pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8006.DWG



BEL24588 March 12, 2016 12:48pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8007.DWG

LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
1A
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
1A
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS WATER
OIL UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE FIRE HYDRANT
MICROWAVE TOWER TOWER
TANK
1A

DESCRIPTION:

AT SURVEY STATION 617+21 THERE IS A BARN LOCATED 36' TO THE LEFT OF THE CWS AND 101' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.

NOTES: 1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

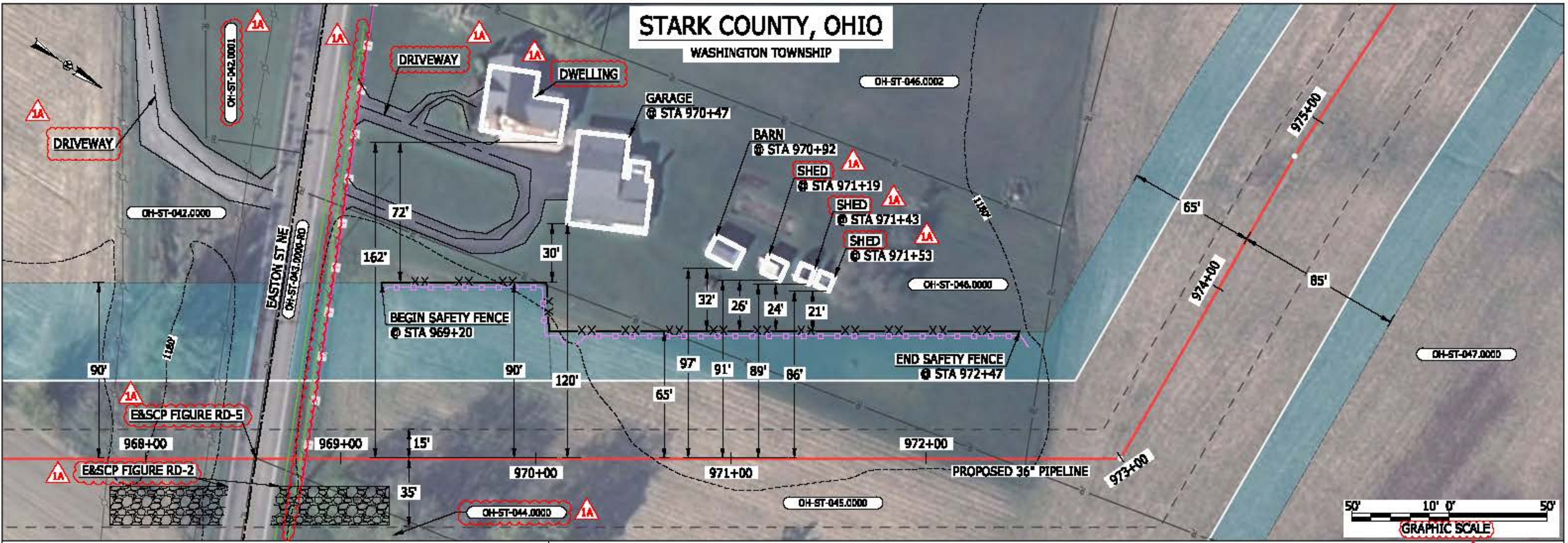
IG.#

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: AF 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 11.62 TO MP 11.72

LOC.: COLUMBIANA COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8007

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	POWERLINES
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	CONTOUR LINE
INTERCONNECTING PIPELINE	SILT FENCE
PIPELINE MILEPOST	STRAW BALE
CONSTRUCTION LIMIT	FOREIGN PIPELINES
PERMANENT ROW	TELEPHONE
ADDITIONAL TEMPORARY WORKSPACE	FENCE
STAGING AREA	RAILROAD TRACK
WAREYARD	ROAD CL
ROCK ACCESS PAD	WATER PIPELINE
PERMANENT ACCESS ROAD (PAR-0.0)	UTILITY LINE
TEMPORARY ACCESS ROAD (TAR-0.0)	PROPERTY LINE
DELINEATED WATERBODY BANK	SAFETY FENCE
DELINEATED WETLAND BOUNDARY	TRACT NUMBER (00-XX-000.0000)
AGRICULTURAL PEM WETLAND BOUNDARY	MUNICIPALITY LINE
DELINEATED WATERBODY CENTERLINE	WELL: GAS, WATER, OIL, UNKNOWN
APPROXIMATE WATERBODY BANK	MAINLINE VALVE (MLV)
APPROXIMATE WETLAND BOUNDARY	BLOW OFF VALVE
APPROXIMATE WATERBODY CENTERLINE	HORIZONTAL DIRECTIONAL DRILLING
STRUCTURES	LIGHT POLE, FIRE HYDRANT
	MICROWAVE TOWER, TOWER
	TANK

DESCRIPTION:

AT SURVEY STATION 970+47 THERE IS A GARAGE LOCATED 30' TO THE LEFT OF THE CWS AND 120' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 970+92 THERE IS A BARN LOCATED 32' TO THE LEFT OF THE CWS AND 97' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 971+19 THERE IS A SHED LOCATED 26' TO THE LEFT OF THE CWS AND 91' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 971+43 THERE IS A SHED LOCATED 24' TO THE LEFT OF THE CWS AND 89' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 971+53 THERE IS A SHED LOCATED 21' TO THE LEFT OF THE CWS AND 86' LEFT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
ADDED DRIVEWAY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588 March 14, 2016 12:41pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8010.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	18FEB16
0	ISSUED FOR FERC FILING	23OCT15

IG #

PROJ. ENG.	VP
CHECKED BY:	DOB
DRAWN BY:	RSM
SCALE:	AS SHOWN
DATE	

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 18.32 TO MP 18.48

LOC.: STARK COUNTY, OHIO | REV.: 1A
YR.: 2017 | W.O. | DWG.NO. HANO-P-8010

NEXUS GAS TRANSMISSION

BEL24588 March 14, 2016 12:37pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8011.DWG

LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 1135+89 THERE IS A BARN LOCATED 39' TO THE RIGHT OF THE CWS AND 124' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
WAREYARD 1-1 HAS BEEN REMOVED FROM THIS LOCATION DUE TO LANDOWNER REQUEST. RELOCATED TO MP 23.0.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUT.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

1A

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

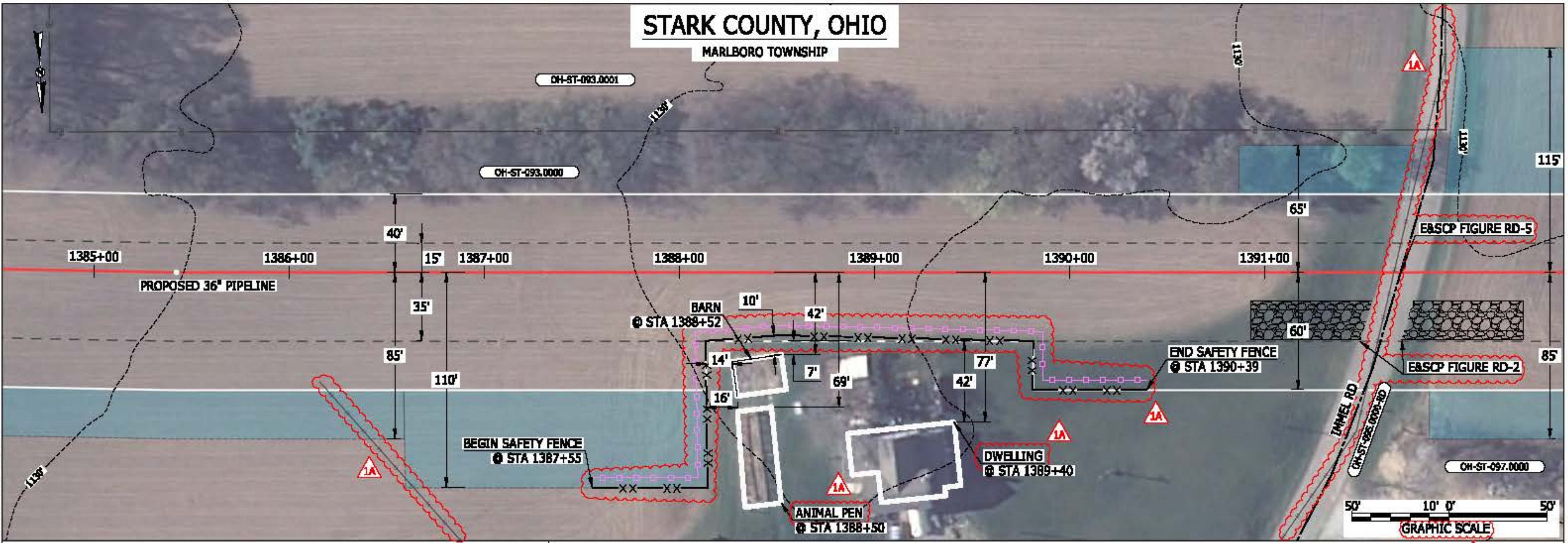
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 21.47 TO MP 21.52

LOC.: STARK COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8011

NEXUS GAS TRANSMISSION



BEL24588 March 14, 2016 12:46pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8012.DWG

LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST ◇ M 00 P
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD PAR-0.0
- TEMPORARY ACCESS ROAD TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE ----1200'----
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE —T—T—
- FENCE —x—x—
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE —W—W—
- UTILITY LINE
- PROPERTY LINE —℄—
- SAFETY FENCE —XX—XX—
- TRACT NUMBER 00-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS ⊕ WATER ⊕
- OIL ⊕ UNKNOWN ⊕
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING ⊙
- LIGHT POLE ● FIRE HYDRANT ⊕
- MICROWAVE TOWER ☒ TOWER ☒
- TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 1388+52 THERE IS A BARN LOCATED 7' TO THE RIGHT OF THE CWS AND 42' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 1389+40 THERE IS A DWELLING LOCATED 42' TO THE RIGHT OF THE CWS AND 77' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 1388+50 THERE IS A ANIMAL PEN LOCATED 16' TO THE RIGHT OF THE CWS AND 69' RIGHT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
PROPERTY BOUNDARIES AND FOREIGN PIPELINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

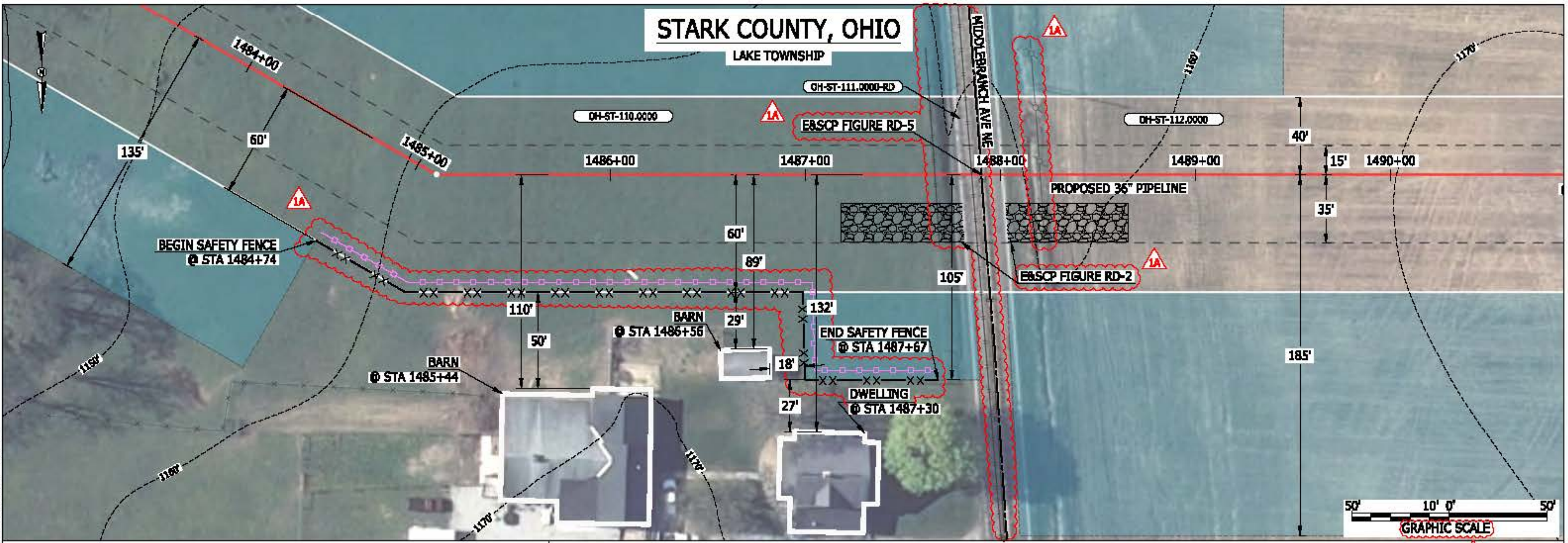
IG #	REV.#	DESCRIPTION	DATE
	1A	ISSUED FOR FERC	15MAR16
	1	ISSUED FOR FERC	23FEB16
	0	ISSUED FOR FERC FILING	23OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 26.22 TO MP 26.37

LOC.: STARK COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8012

NEXUS GAS TRANSMISSION



BEL24588
March 14, 2016 12:48pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8013.DWG

LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
1A
PIPELINE MILEPOST ◇ M 00 P
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
1A
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE ----1160----
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE —T—T—
FENCE —x—x—
RAILROAD TRACK
ROAD CL
WATER PIPELINE —W—W—
UTILITY LINE
PROPERTY LINE —PL—
SAFETY FENCE —XX—XX—
TRACT NUMBER (00-XX-000.0000)
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING ⊙
LIGHT POLE ● FIRE HYDRANT ⊕
MICROWAVE TOWER ☒ TOWER ☒
TANK ●
1A

DESCRIPTION:

AT SURVEY STATION 1485+44 THERE IS A BARN LOCATED 50' TO THE RIGHT OF THE CWS AND 110' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 1486+56 THERE IS A BARN LOCATED 18' TO THE RIGHT OF THE CWS AND 89' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 1487+30 THERE IS A DWELLING LOCATED 27' TO THE RIGHT OF THE CWS AND 132' RIGHT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PARCEL BOUNDARIES AND FOREIGN PIPELINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
UPDATED TYPE OF STRUCTURE CALL OUT.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

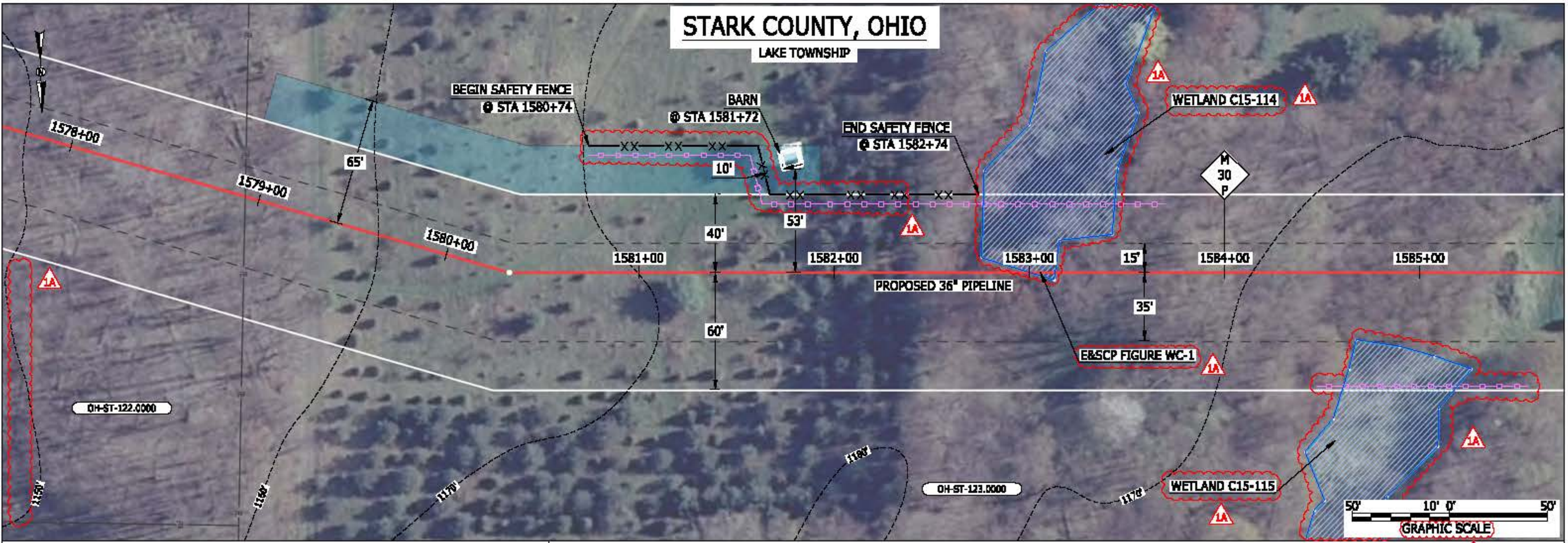
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 28.1 TO MP 28.23

LOC.: STARK COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8013

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
1A
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
1A
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS WATER
OIL UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE FIRE HYDRANT
MICROWAVE TOWER TOWER
TANK
1A

DESCRIPTION:

AT SURVEY STATION 1581+72 THERE IS A BARN LOCATED INSIDE OF THE CWS AND 53' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
RESOURCES AND APPROXIMATED RESOURCES UPDATED BASED ON WETLAND/WATERBODY FIELD SURVEY.
TWS AND PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588 March 12, 2016 12:58pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8014.DWG

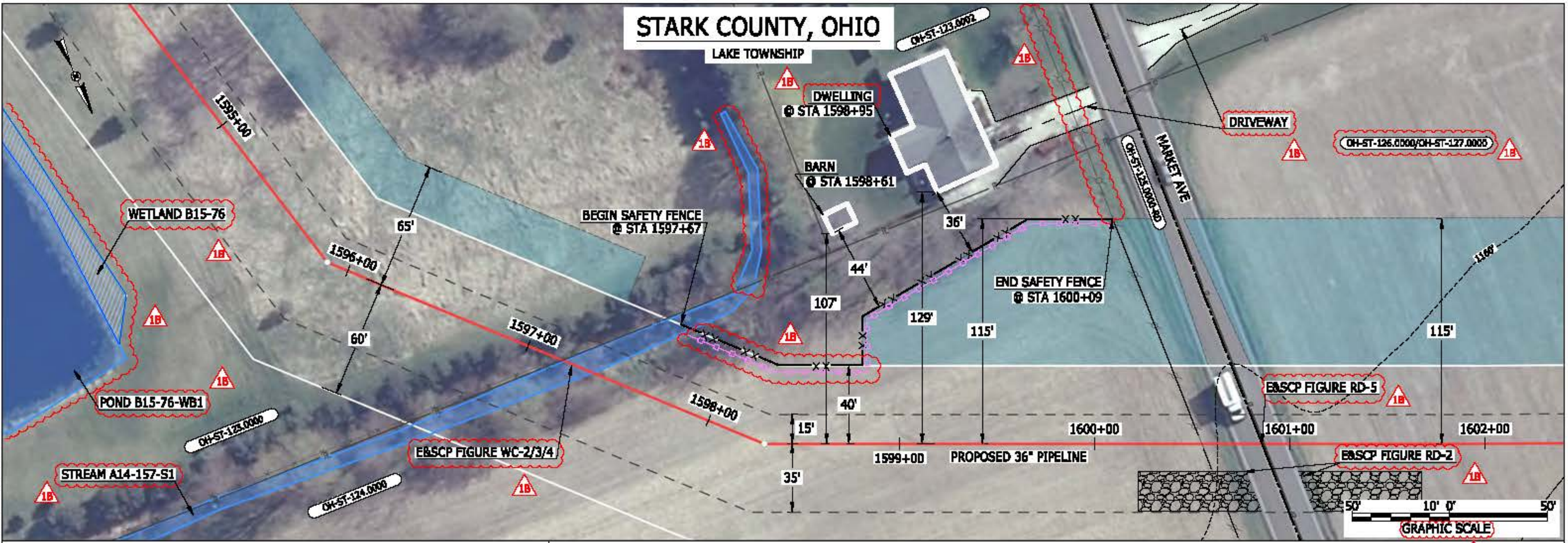
1A	ISSUED FOR FERC	15MAR16	PROJ. ENG. VP		
1	ISSUED FOR FERC	23FEB16	CHECKED BY: DOB		
0	ISSUED FOR FERC FILING	23OCT15	DRAWN BY: RSM 1A		
REV.#	DESCRIPTION	DATE	SCALE: AS SHOWN	DATE	

IG #

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 29.88 TO MP 30.03

LOC.: STARK COUNTY, OHIO REV.: 1A
YR.: 2017 W.O. **DWG.NO.** HANO-P-8014

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD (PAR-0.0)
TEMPORARY ACCESS ROAD (TAR-0.0)
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER (00-XX-000.0000)
MUNICIPALITY LINE
WELL: GAS ● WATER ●
OIL ● UNKNOWN ●
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING ●
LIGHT POLE ● FIRE HYDRANT ●
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

1B

DESCRIPTION:

AT SURVEY STATION 1598+61 THERE IS A BARN LOCATED 44' TO THE LEFT OF THE CWS AND 107' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 1598+95 THERE IS A DWELLING LOCATED 36' TO THE LEFT OF THE CWS AND 129' LEFT OF THE PROPOSED 36" PIPELINE.

1B

REVISION 1B:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND RESOURCES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
ADDED DRIVEWAY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUT.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

1B

REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

IG #

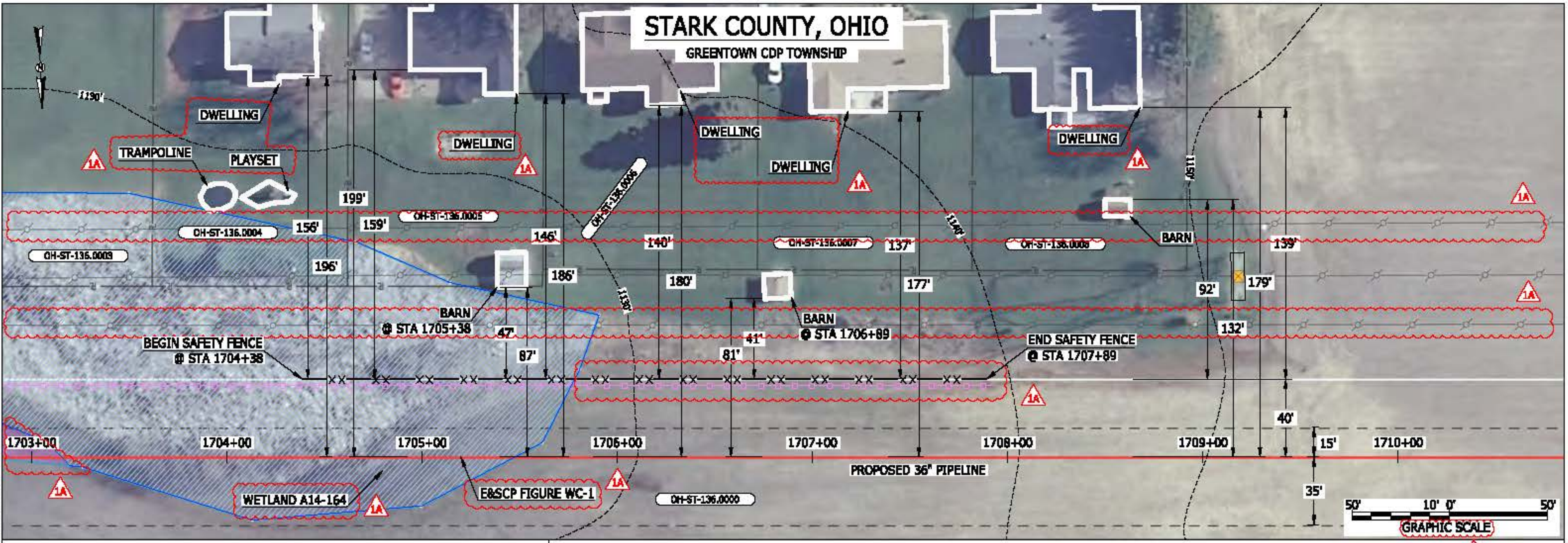
PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 30.19 TO MP 30.35

LOC.: STARK COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. HANO-P-8015

NEXUS GAS TRANSMISSION

BEL24588 March 14, 2016 12:52pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8015.DWG



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD (PAR-0.0)
TEMPORARY ACCESS ROAD (TAR-0.0)
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES
POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER (00-XX-000.0000)
MUNICIPALITY LINE
WELL: GAS, OIL, WATER, UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE
FIRE HYDRANT
MICROWAVE TOWER
TOWER
TANK

DESCRIPTION:

AT SURVEY STATION 1705+38 THERE IS A BARN LOCATED 47' TO THE LEFT OF THE CWS AND 87' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 1706+89 THERE IS A BARN LOCATED 41' TO THE LEFT OF THE CWS AND 81' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
TWS ADJUSTED BASED ON RESOURCES RECLASSIFIED AS AG-PEM WETLANDS.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
POWERLINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
ADDED TRAMPOLINE AND PLAYSET CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 15, 2016 9:29am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FFI\HANO\HANO-P-8016.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

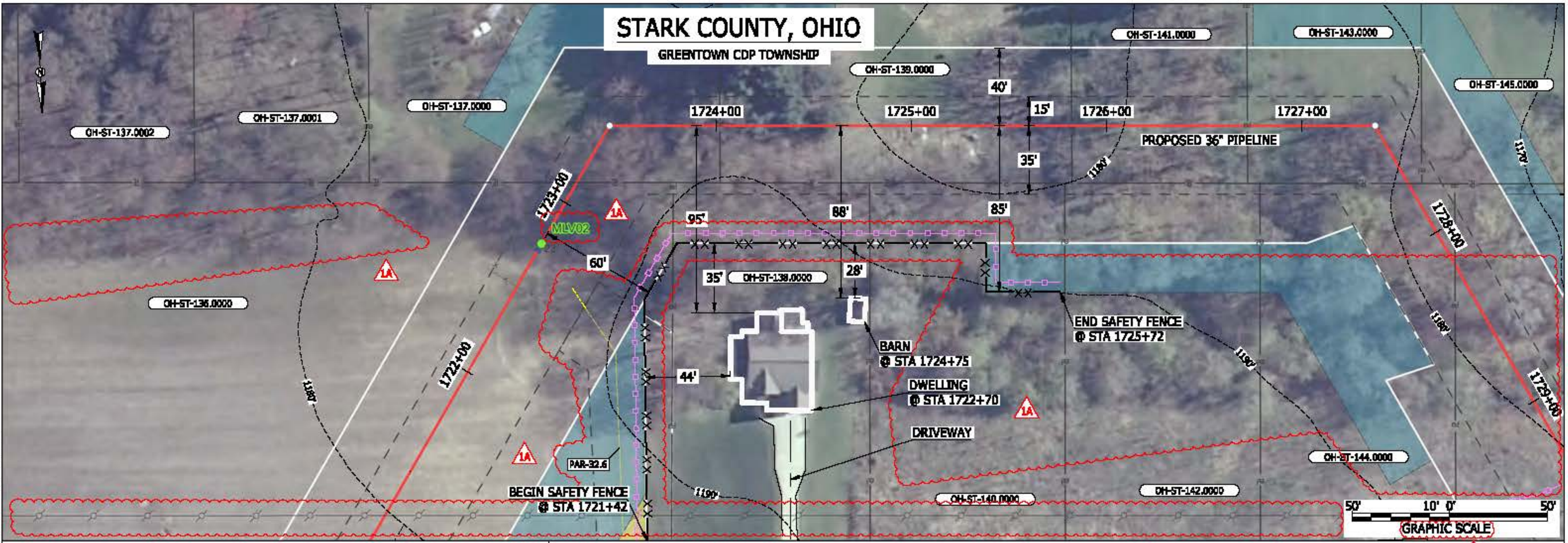
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 32.25 TO MP 32.4

LOC.: STARK COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8016

NEXUS GAS TRANSMISSION

STARK COUNTY, OHIO

GREENTOWN CDP TOWNSHIP



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD PAR-0.0
- TEMPORARY ACCESS ROAD TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER 00-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 1722+70 THERE IS A DWELLING LOCATED 35' TO THE RIGHT OF THE CWS AND 95' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 1724+75 THERE IS A BARN LOCATED 28' TO THE RIGHT OF THE CWS AND 88' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG HANO-P-8018 FOR THE CONTINUATION OF THE RESIDENTIAL AREA. 1A

REVISION 1A:

LEGEND SYMBOLOGY AND MLV CALL OUT UPDATED TO REFLECT NEW UPDATES.
POWER LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
RESOURCES UPDATED BASED ON UPDATED FIELD SURVEY WETLAND DATA.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
PAR 32.6, WORKSPACE AND RESOURCES ADJUSTED DUE TO UPDATED FIELD SURVEY.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUT.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

PROJ. ENG. VP	
CHECKED BY: DOB	
DRAWN BY: RSM	
SCALE: AS SHOWN	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 32.6 TO MP 32.75

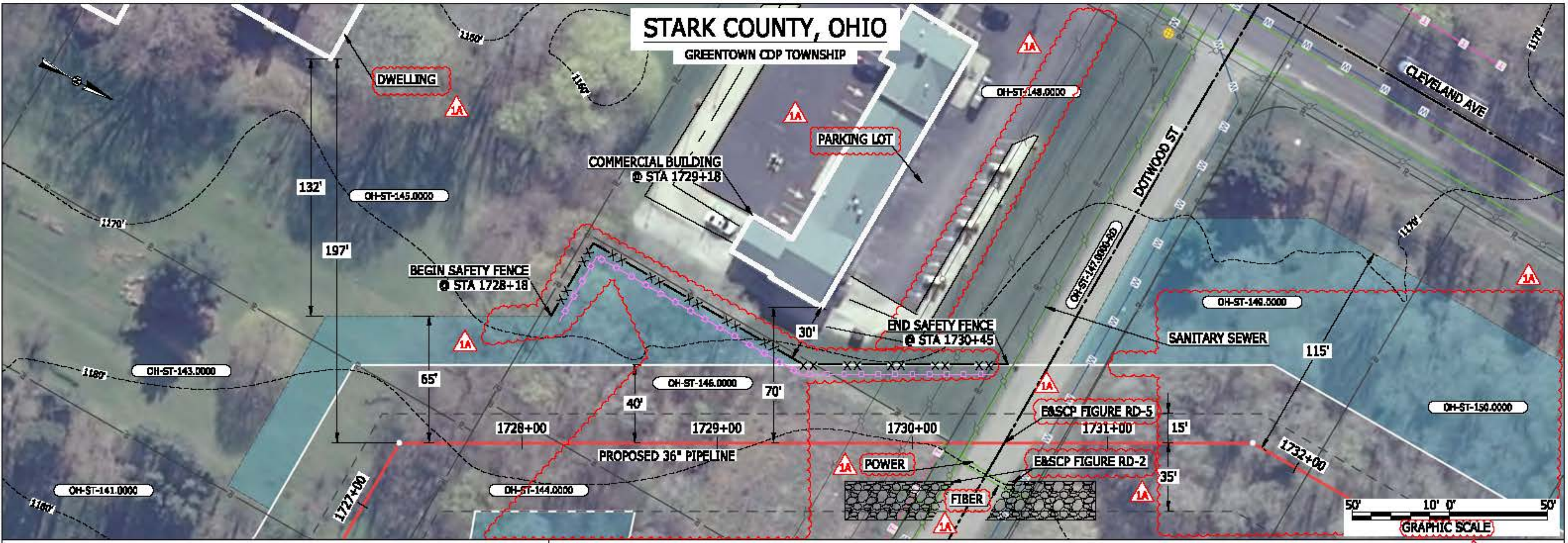
LOC.: STARK COUNTY, OHIO REV.: 1A
YR.: 2017 W.O. DWG.NO. HANO-P-8017

NEXUS GAS TRANSMISSION

IG #:

BEL24588
March 14, 2016 1:02pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8017.DWG

BEL24588
March 14, 2016 1:04pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8018.DWG



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES
1A

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS WATER
OIL UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE FIRE HYDRANT
MICROWAVE TOWER TOWER
TANK
1A

DESCRIPTION:

AT SURVEY STATION 1729+18 THERE IS A COMMERCIAL BUILDING LOCATED 30' TO THE LEFT OF THE CWS AND 70' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG HANO-P-8017 & HANO-P-8019 FOR THE CONTINUATION OF THE RESIDENTIAL AREA. 1A

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
TWS/ATWS, POWERLINES AND RESOURCES ADJUSTED BASED ON UPDATED FIELD SURVEYED WETLAND DATA.
ADDED PARKING LOT AND UTILITY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUT.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

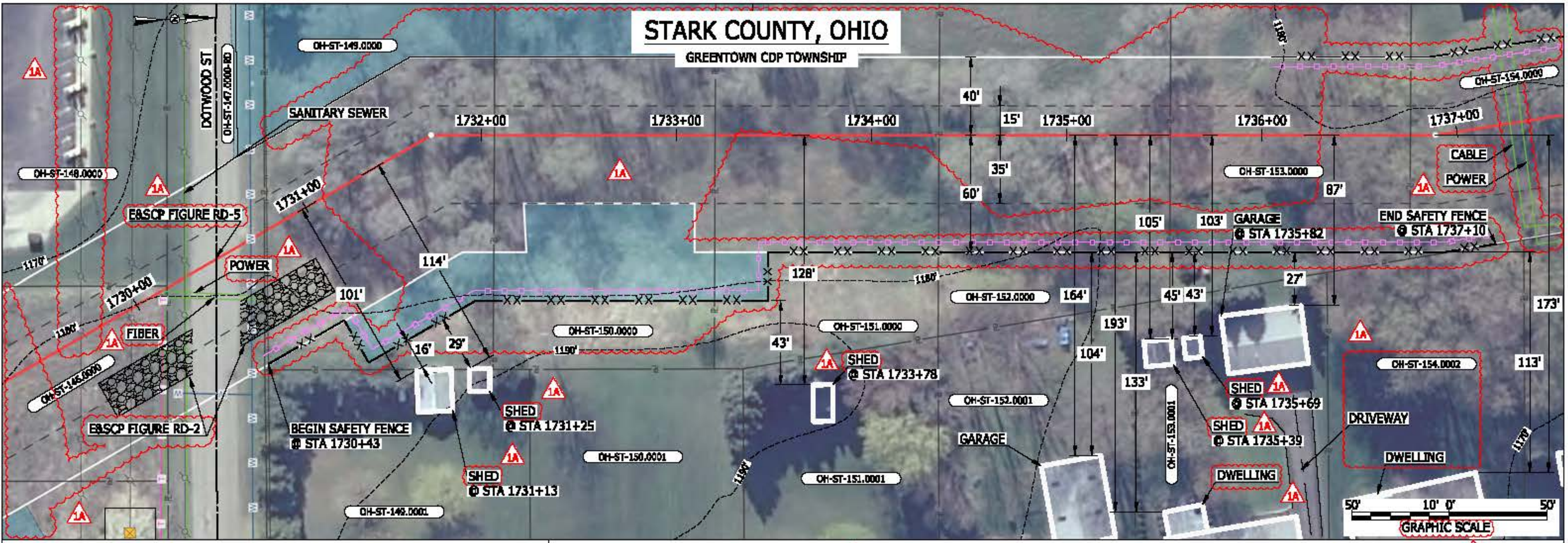
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 32.71 TO MP 32.81

LOC.: STARK COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8018

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE —x——x—
RAILROAD TRACK
ROAD CL
WATER PIPELINE —W——W—
UTILITY LINE
PROPERTY LINE
SAFETY FENCE —XX——XX—
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS WATER
OIL UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE FIRE HYDRANT
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

DESCRIPTION:

AT SURVEY STATION 1731+13 THERE IS A SHED LOCATED 16' TO THE RIGHT OF THE CWS AND 101' RIGHT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 1731+25 THERE IS A SHED LOCATED 29' TO THE RIGHT OF THE CWS AND 114' RIGHT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 1733+78 THERE IS A SHED LOCATED 43' TO THE RIGHT OF THE CWS AND 128' RIGHT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 1735+39 THERE IS A SHED LOCATED 45' TO THE RIGHT OF THE CWS AND 105' RIGHT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 1735+69 THERE IS A SHED LOCATED 43' TO THE RIGHT OF THE CWS AND 103' RIGHT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 1735+82 THERE IS A GARAGE LOCATED 27' TO THE RIGHT OF THE CWS AND 87' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG HANO-P-8018 & HANO-P-8020 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1A:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
RESOURCES, POWERLINES, UTILITY LINES AND APPROXIMATED RESOURCES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE. TWS/ ATWS AND RESOURCES ADJUSTED BASED ON UPDATED FIELD SURVEYED WETLAND DATA.
ADDED DRIVEWAY AND UTILIY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588 March 14, 2016 1:15pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8019.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

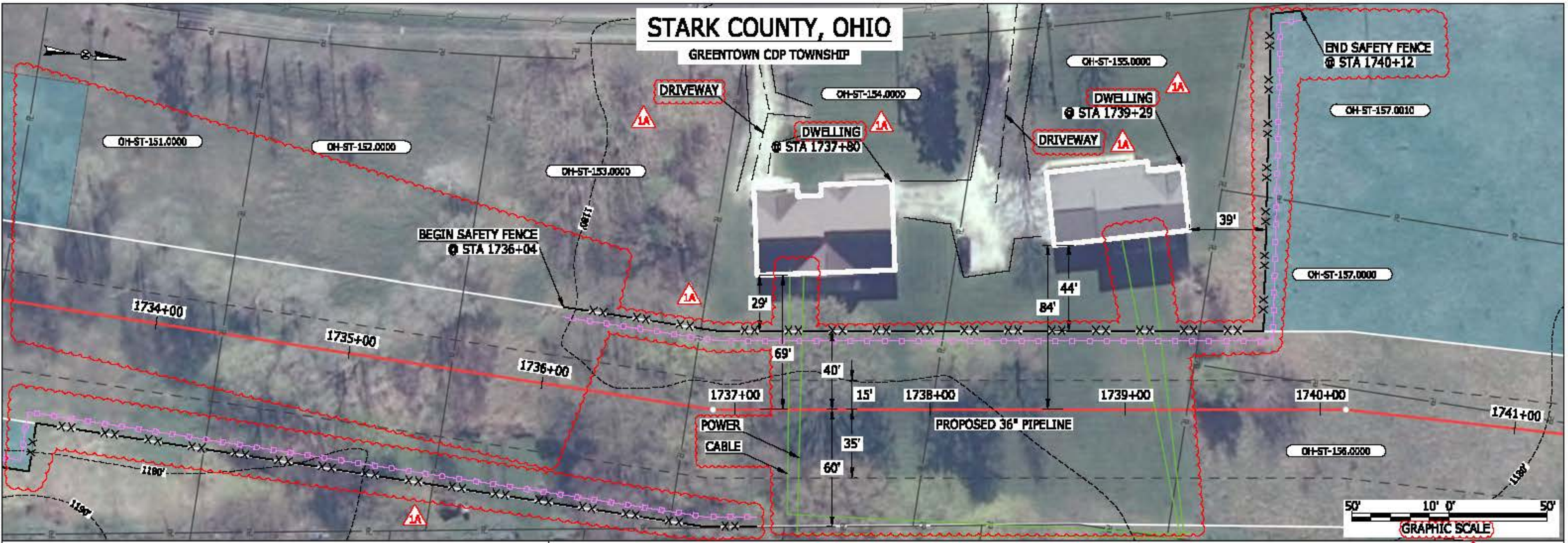
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

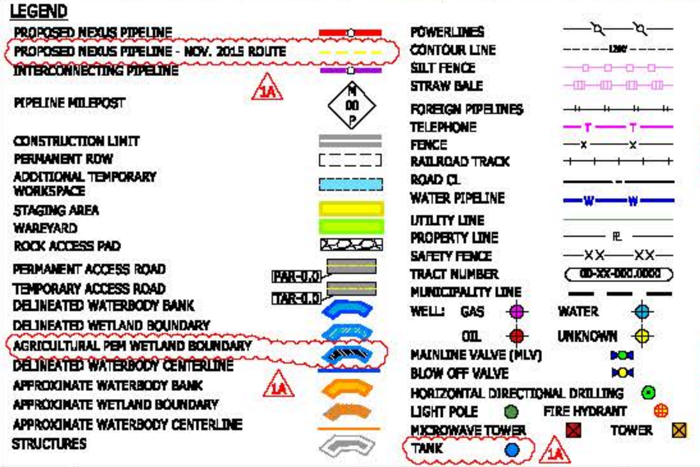
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 32.75 TO MP 32.91

LOC.: STARK COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8019

NEXUS GAS TRANSMISSION



LEGEND



DESCRIPTION:

AT SURVEY STATION 1737+80 THERE IS A DWELLING LOCATED 29' TO THE LEFT OF THE CWS AND 69' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 1739+29 THERE IS A DWELLING LOCATED 44' TO THE LEFT OF THE CWS AND 84' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG HANO-P-8019 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

1A

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES.
RESOURCES, APPROXIMATED RESOURCES AND UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
TWS/ ATWS AND RESOURCES ADJUSTED BASED ON UPDATED FIELD SURVEYED WETLAND DATA.
ADDED DRIVEWAY AND UTILITY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

1A

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

1A	ISSUED FOR FERC	15MAR16	
1	ISSUED FOR FERC	23FEB16	
0	ISSUED FOR FERC FILING	22OCT15	
REV.#	DESCRIPTION	DATE	

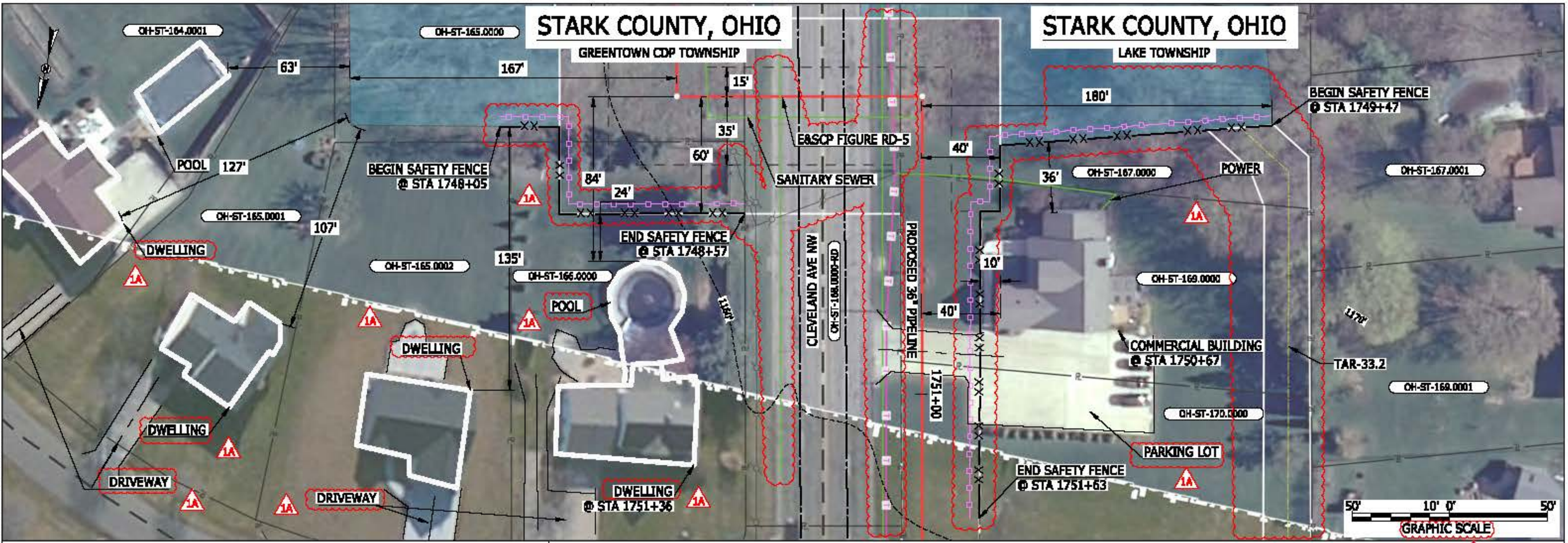
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 32.83 TO MP 32.98

LOC.: STARK COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8020

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD (PAR-0.0)
TEMPORARY ACCESS ROAD (TAR-0.0)
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES
POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER (00-XX-000.0000)
MUNICIPALITY LINE
WELL: GAS, OIL, WATER, UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE
FIRE HYDRANT
MICROWAVE TOWER
TOWER
TANK

DESCRIPTION:

AT SURVEY STATION 1751+36 THERE IS A DWELLING LOCATED 24' TO THE RIGHT OF THE CWS AND 84' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 1750+67 THERE IS A COMMERCIAL BUILDING LOCATED 10' TO THE LEFT OF THE CWS AND 40' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG HANO-P-8022 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE. TAR ADDED. TWS/ATWS ADJUSTED AT ROAD CROSSING.
RESOURCES ADJUSTED BASED ON UPDATED FIELD SURVEY WETLAND DATA.
POWERLINES AND UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
ADDED DRIVEWAY, PARKING LOT, POOL AND UTILITY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 15, 2016 12:43pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8021.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

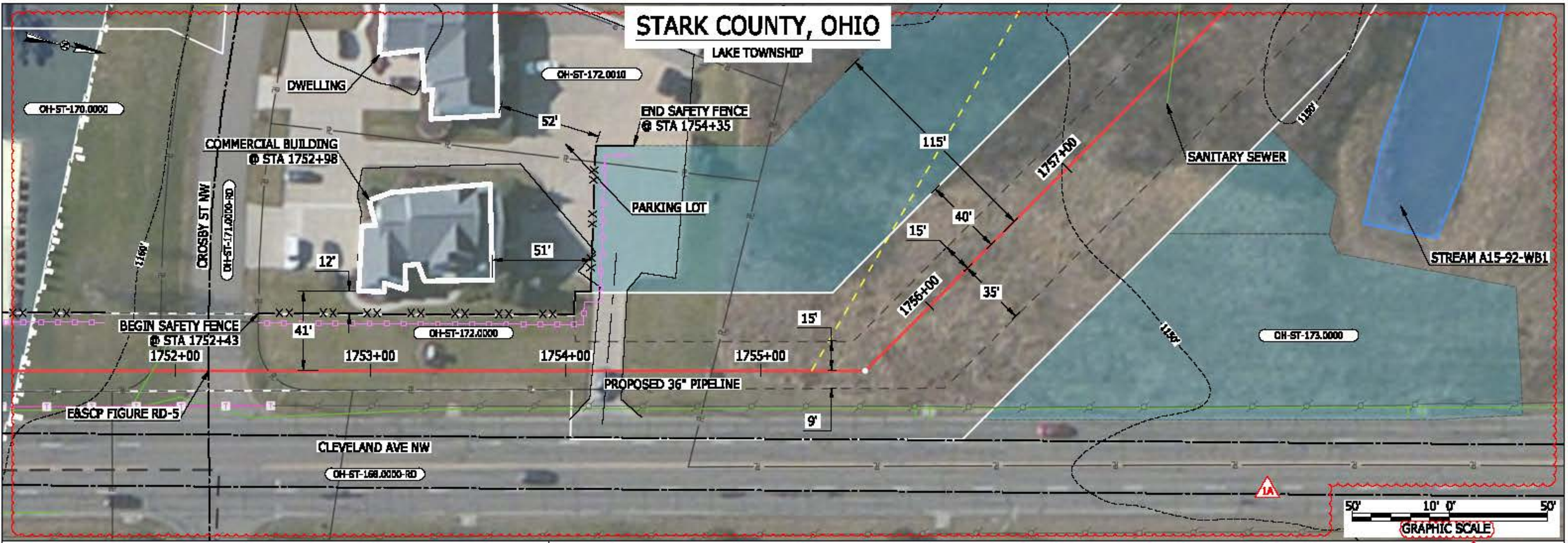
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 33.11 TO MP 33.18

LOC.: STARK COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8021

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 1752+98 THERE IS A COMMERCIAL BUILDING LOCATED 12' TO THE LEFT OF THE CWS AND 41' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG HANO-P-8021 FOR THE CONTINUATION OF THE RESIDENTIAL AREA. 1A

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
CENTERLINE REROUTED TO AVOID UTILITIES. TWS/ATWS RESOURCES ADJUSTED BASED ON UPDATED FIELD SURVEY DATA
WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
ADDED PARKING LOT CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-0036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

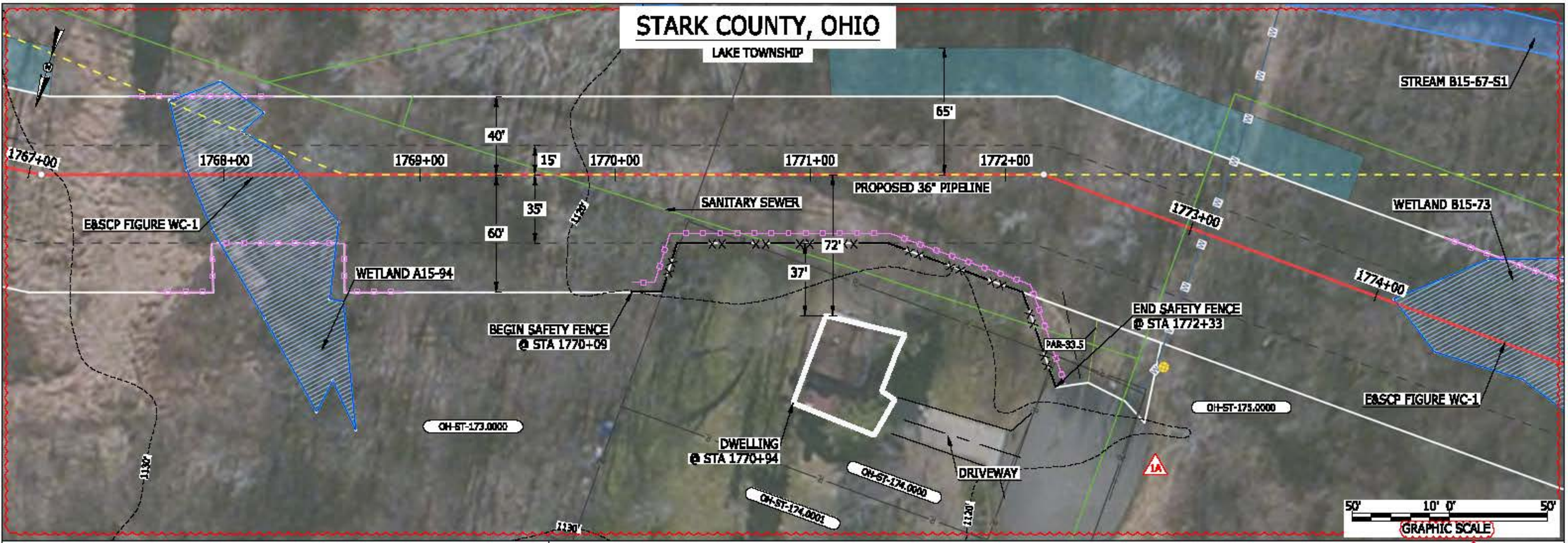
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 33.17 TO MP 33.3R 1A

LOC.: STARK COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8022

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	M 00 P
CONSTRUCTION LIMIT	▬
PERMANENT ROW	[- - - -]
ADDITIONAL TEMPORARY WORKSPACE	🟦
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	
STRUCTURES	

1A

POWERLINES	
CONTOUR LINE	- - - 1200' - - -
SILT FENCE	—□—□—□—
STRAW BALE	—▥—▥—▥—
FOREIGN PIPELINES	—+—+—+—
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	—+—+—+—
ROAD CL	
WATER PIPELINE	—W—W—
UTILITY LINE	
PROPERTY LINE	— PL —
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
WELL: OIL	⊕
WELL: WATER	⊕
WELL: UNKNOWN	⊕
MAINLINE VALVE (MLV)	
BLOW OFF VALVE	
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A

DESCRIPTION:

AT SURVEY STATION 1770+94 THERE IS A DWELLING LOCATED 37' TO THE RIGHT OF THE CWS AND 72' RIGHT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

CENTERLINE REROUTED TO AVOID UTILITIES. TWS/ATWS, AND RESOURCES ADJUSTED BASED ON UPDATED FIELD SURVEYED CIVIL/WETLAND/WATERBODY DATA.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
UTILITY LINES AND SAFETY FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858
March 14, 2016 4:12pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8023.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

IG#

PROJ. ENG.	VP
CHECKED BY:	DOB
DRAWN BY:	RSM
SCALE:	AS SHOWN
DATE	

1A

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 33.46R TO MP 33.62R

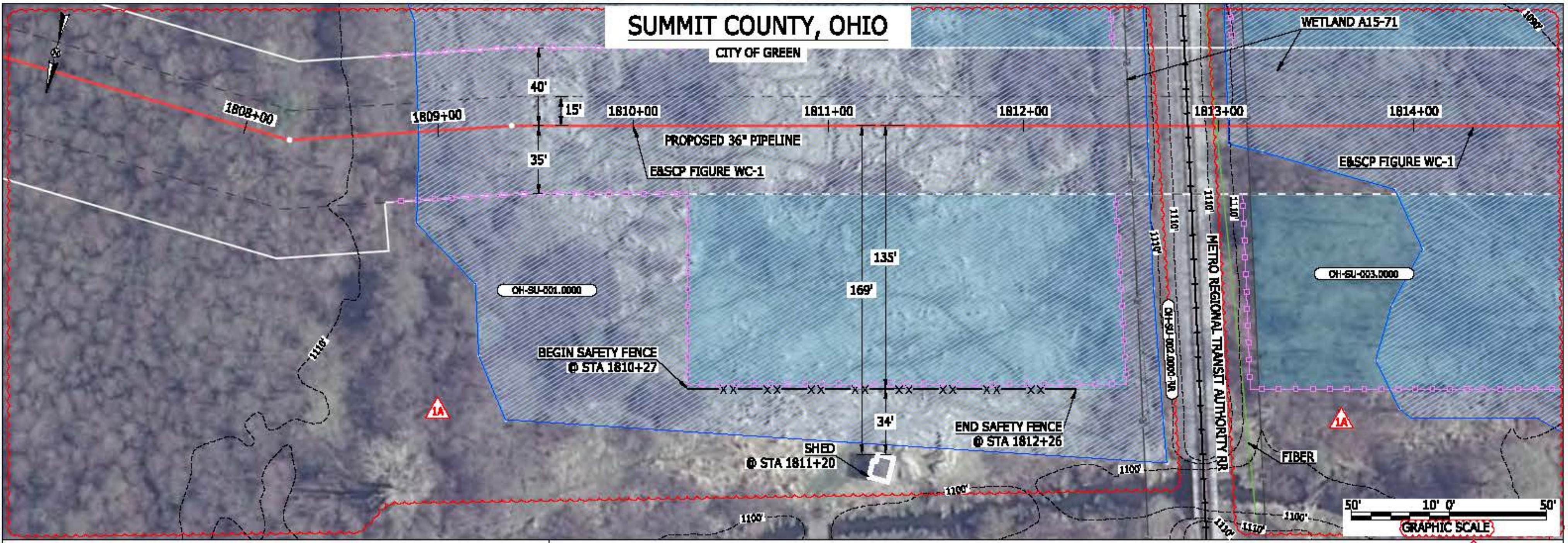
1A

LOC.: STARK COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8023

NEXUS GAS TRANSMISSION

SUMMIT COUNTY, OHIO

CITY OF GREEN



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST (M 00 P)
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE (1200')
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE (T)
- FENCE (X)
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE (W)
- UTILITY LINE
- PROPERTY LINE (PL)
- SAFETY FENCE (XX)
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS ● WATER ●
- OIL ● UNKNOWN ●
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE ● FIRE HYDRANT
- MICROWAVE TOWER ☒ TOWER ☒
- TANK ●

1A 1A 1A

DESCRIPTION:

AT SURVEY STATION 1811+20 THERE IS A SHED LOCATED 34' TO THE RIGHT OF THE CWS AND 169' RIGHT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
RESOURCES AND UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
ATWS ADJUSTED TO AVOID OVERLAP WITH EXISTING RAILROAD EASEMENT AT RAILROAD CROSSING.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
APPROXIMATED RESOURCES AND SILT FENCE UPDATED BASED ON FIELD SURVEY DATA.
ADDED UTILITY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858
March 15, 2016 9:31am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8024.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

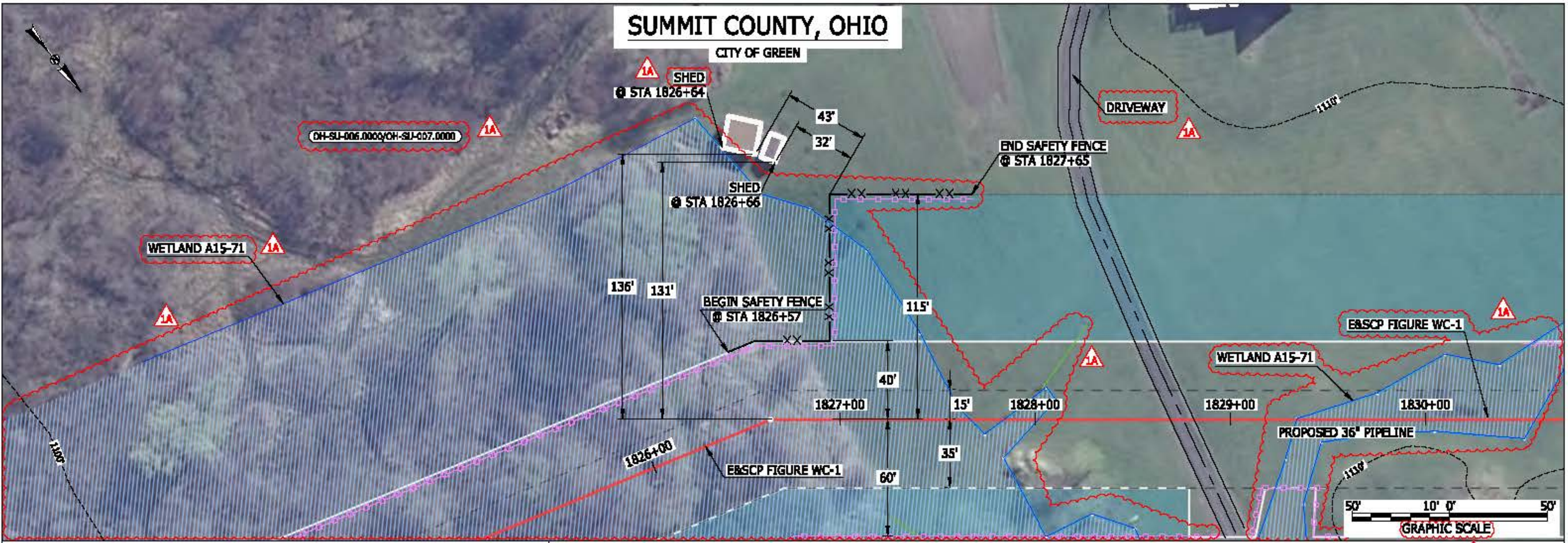
IG.#

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 34.22 TO MP 34.37

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8024

NEXUS GAS TRANSMISSION



MES13858 March 14, 2016 4:16pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8025.DWG

LEGEND

PROPOSED NEXUS PIPELINE	🟥	POWERLINES	─ϙ─ϙ─
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -	CONTOUR LINE	----1200'----
INTERCONNECTING PIPELINE	🟪	SILT FENCE	─□─□─□─
1A		STRAW BALE	─▥─▥─▥─
PIPELINE MILEPOST	◇ M 00 P	FOREIGN PIPELINES	─╫─╫─╫─
		TELEPHONE	─T─T─
CONSTRUCTION LIMIT	▬	FENCE	─x─x─
PERMANENT ROW	[- - -]	RAILROAD TRACK	─┼─┼─┼─
ADDITIONAL TEMPORARY WORKSPACE	🟦	ROAD CL	── - ──
STAGING AREA	🟨	WATER PIPELINE	─W─W─
WAREYARD	🟩	UTILITY LINE	──
ROCK ACCESS PAD	▨	PROPERTY LINE	─ PL ─
PERMANENT ACCESS ROAD	PAR-0.0 ▬	SAFETY FENCE	─XX─XX─
TEMPORARY ACCESS ROAD	TAR-0.0 ▬	TRACT NUMBER	(00-XX-000.0000)
DELINEATED WATERBODY BANK	🟦	MUNICIPALITY LINE	▬ ▬ ▬
DELINEATED WETLAND BOUNDARY	🟦	WELL: GAS ⊕ WATER ⊕	
AGRICULTURAL PEM WETLAND BOUNDARY	🟦	OIL ⊕ UNKNOWN ⊕	
DELINEATED WATERBODY CENTERLINE	──	MAINLINE VALVE (MLV)	⋈
APPROXIMATE WATERBODY BANK	🟧	BLOW OFF VALVE	⋈
APPROXIMATE WETLAND BOUNDARY	🟧	HORIZONTAL DIRECTIONAL DRILLING	⊙
APPROXIMATE WATERBODY CENTERLINE	──	LIGHT POLE ● FIRE HYDRANT ⊕	
STRUCTURES	▭	MICROWAVE TOWER ☒ TOWER ☒	
1A		TANK ●	1A

DESCRIPTION:

AT SURVEY STATION 1826+64 THERE IS A SHED LOCATED 43' TO THE LEFT OF THE CWS AND 136' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 1826+66 THERE IS A SHED LOCATED 32' TO THE LEFT OF THE CWS AND 131' LEFT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

TWS AND RESOURCES ADJUSTED BASED ON UPDATED FIELD SURVEYED WETLAND DATA.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

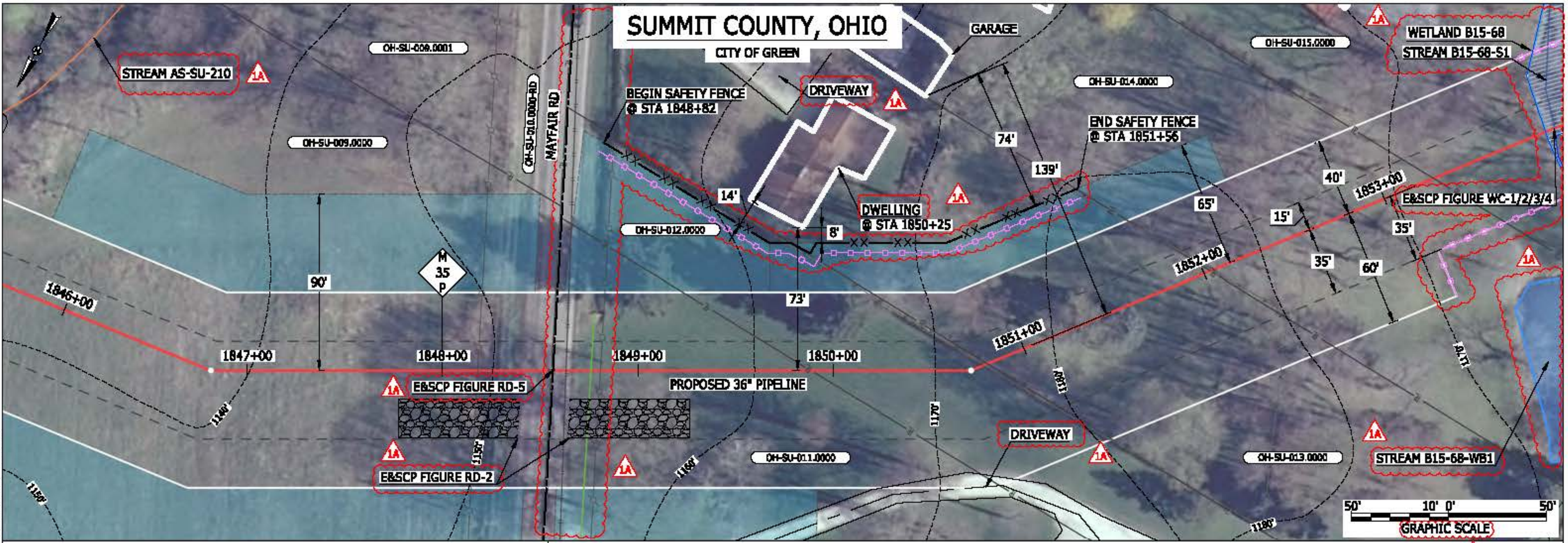
1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

IG #					
	1A	ISSUED FOR FERC	15MAR16	PROJ. ENG. VP	
	1	ISSUED FOR FERC	23FEB16	CHECKED BY: DOB	
	0	ISSUED FOR FERC FILING	22OCT15	DRAWN BY: RSM 1A	
	REV.#	DESCRIPTION	DATE	SCALE: AS SHOWN	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 34.57 TO MP 34.67

LOC.: SUMMIT COUNTY, OHIO		REV.: 1A
YR.: 2017	W.O.	DWG.NO. HANO-P-8025

NEXUS
GAS TRANSMISSION



MES13858 March 14, 2016 4:17pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8026.DWG

LEGEND

PROPOSED NEXUS PIPELINE	🟥	POWERLINES	
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE		CONTOUR LINE	1280'
INTERCONNECTING PIPELINE	🟪	SILT FENCE	
		STRAW BALE	
PIPELINE MILEPOST	M 00 P	FOREIGN PIPELINES	
		TELEPHONE	T
CONSTRUCTION LIMIT		FENCE	x
PERMANENT ROW		RAILROAD TRACK	
ADDITIONAL TEMPORARY WORKSPACE	🟦	ROAD CL	
STAGING AREA	🟨	WATER PIPELINE	W
WAREYARD	🟩	UTILITY LINE	
ROCK ACCESS PAD		PROPERTY LINE	PL
PERMANENT ACCESS ROAD	PAR-0.0	SAFETY FENCE	XX
TEMPORARY ACCESS ROAD	TAR-0.0	TRACT NUMBER	00-XX-000.0000
DELINEATED WATERBODY BANK		MUNICIPALITY LINE	
DELINEATED WETLAND BOUNDARY		WELL: GAS / WATER	
AGRICULTURAL PEM WETLAND BOUNDARY		OIL / UNKNOWN	
DELINEATED WATERBODY CENTERLINE		MAINLINE VALVE (MLV)	
APPROXIMATE WATERBODY BANK		BLOW OFF VALVE	
APPROXIMATE WETLAND BOUNDARY		HORIZONTAL DIRECTIONAL DRILLING	
APPROXIMATE WATERBODY CENTERLINE		LIGHT POLE / FIRE HYDRANT	
STRUCTURES		MICROWAVE TOWER / TOWER	☒
		TANK	●

1A 1A 1A

DESCRIPTION:

1A

AT SURVEY STATION 1850+25 THERE IS A DWELLING LOCATED 8' TO THE LEFT OF THE CWS AND 73' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTE :

1. CONSTRUCTION WORKSPACE FOR THE MAYFAIR RD BORE PIT EXCAVATION SPOIL STORAGE AND INSTALLATION OF 22.5° FORMED BEND ON THE WEST SIDE OF MAYFAIR RD PLACES THE WORKSPACE WITHIN 8-FT OF THE RESIDENTAIL STRUCTURE.
2. NEXUS AND NEXUS' SUBCONTRACTORS WILL EXECUTE THE REQUIRED SAFETY FENCING AS MITIGATION TO ENSURE THIS STRUCTURE IS NOT DAMAGED DURING CONSTRUCTION.

REVISION 1A:

TWS AND RESOURCES ADJUSTED BASED ON UPDATED WETLAND/WATERBODY FIELD SURVEY. ATWS DIMENSIONS UPDATED.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
PROPERTY BOUNDARIES, UTILITY LINES, FOREIGN PIPELINES, AND POWER LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE. ADDED DRIVEWAY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8038.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

IG.#			
	1A	ISSUED FOR FERC	15MAR16
	1	ISSUED FOR FERC	23FEB16
	0	ISSUED FOR FERC FILING	22OCT15
	REV.#	DESCRIPTION	DATE

PROJ. ENG. VP		
CHECKED BY: DOB		
DRAWN BY: RSM 1A		
SCALE: AS SHOWN	DATE	

TITLE:

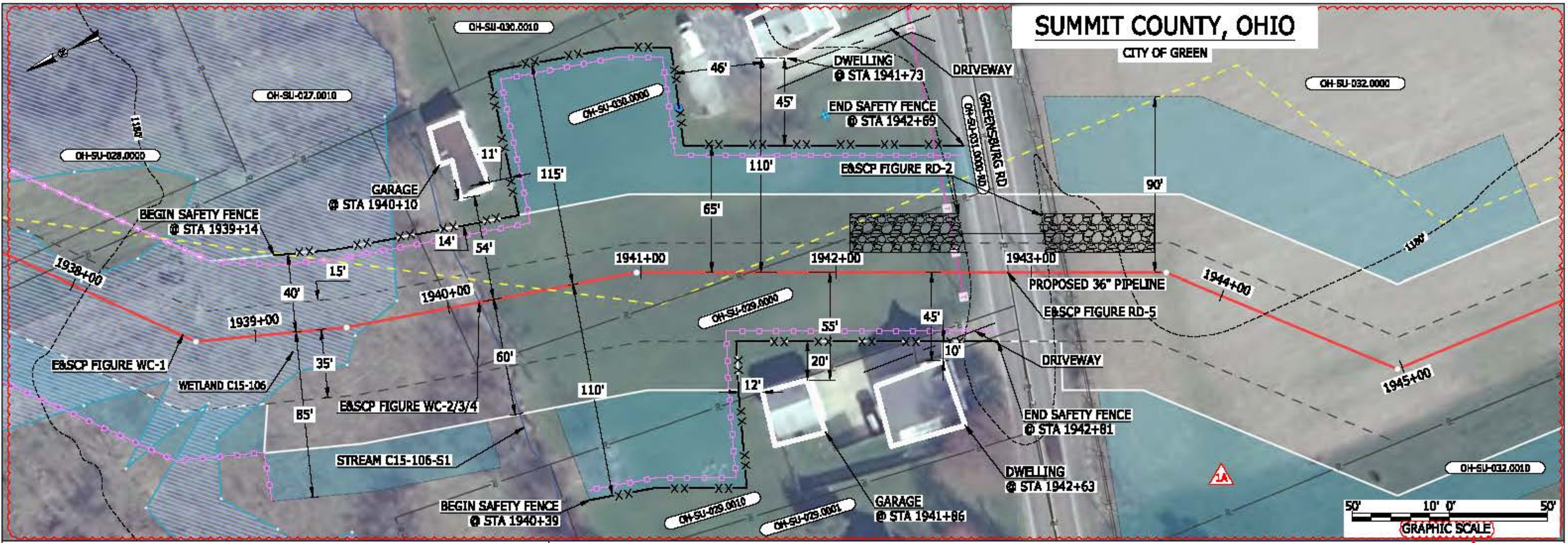
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 34.96 TO MP 35.11

LOC.: SUMMIT COUNTY, OHIO — REV.: 1A

YR.: 2017 — W.O. — DWG.NO. HANO-P-8026

NEXUS GAS TRANSMISSION

MES13858 March 14, 2016 4:18pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8028.DWG



1A

LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

1A

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS WATER
OIL UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE FIRE HYDRANT
MICROWAVE TOWER TOWER
TANK

1A

DESCRIPTION:

AT SURVEY STATION 1940+10 THERE IS A GARAGE LOCATED 11' TO THE LEFT OF THE CWS AND 54' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 1941+73 THERE IS A DWELLING LOCATED 45' TO THE LEFT OF THE CWS AND 110' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 1941+86 THERE IS A GARAGE LOCATED 12' TO THE RIGHT OF THE CWS AND 55' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 1942+63 THERE IS A DWELLING LOCATED 10' TO THE RIGHT OF THE CWS AND 45' RIGHT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

CENTERLINE REROUTED TO AVOID CONFLICT WITH PROPOSED BUSINESS EXPANSION.
TWS/ATWS, TAR AND RESOURCES UPDATED BASED ON UPDATED FIELD SURVEY WETLAND/WATERBODY DATA.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
PROPERTY BOUNDARIES, UTILITY LINES, SAFETY FENCE, FOREIGN PIPELINES, AND POWER LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES: 1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

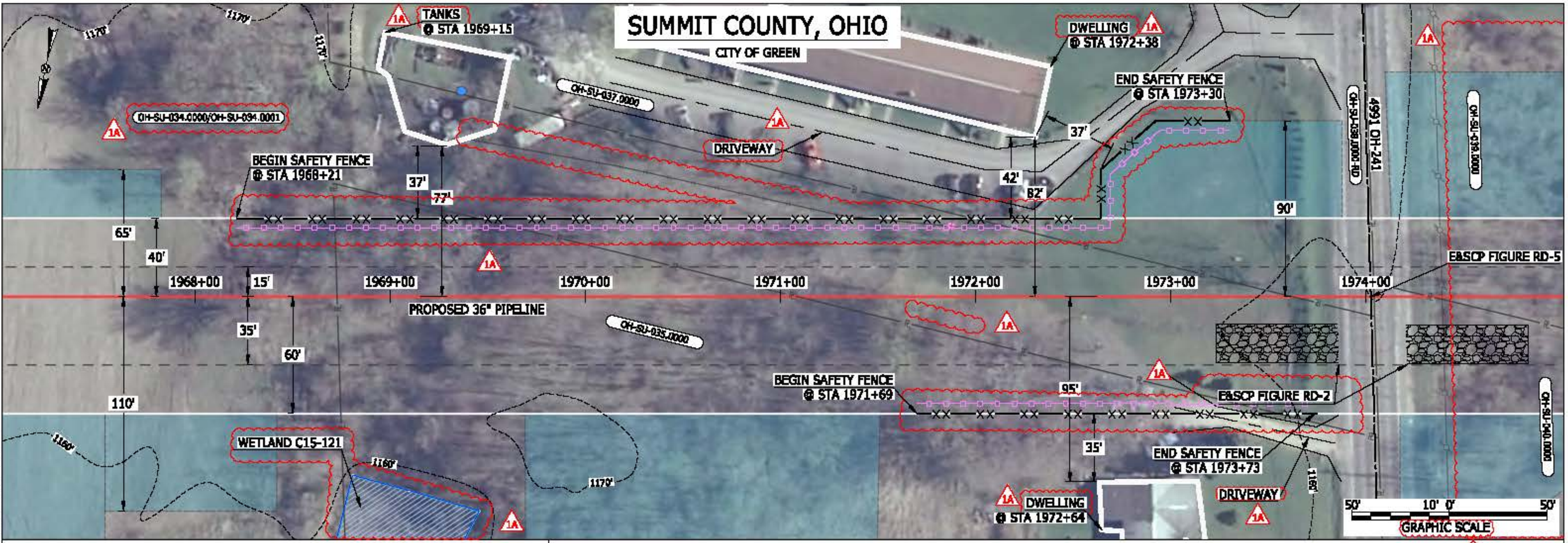
IG #	REV.#	DESCRIPTION	DATE
	1A	ISSUED FOR FERC	15MAR16
	1	ISSUED FOR FERC	23FEB16
	0	ISSUED FOR FERC FILING	22OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 36.7R TO MP 36.85R 1A

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8028

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE 1200
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE T
FENCE x
RAILROAD TRACK
ROAD CL
WATER PIPELINE W
UTILITY LINE
PROPERTY LINE PL
SAFETY FENCE XX
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ⊕ OIL ⊕ WATER ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 1969+15 THERE ARE TANKS LOCATED 37' TO THE LEFT OF THE CWS AND 77' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 1972+64 THERE IS A DWELLING LOCATED 35' TO THE RIGHT OF THE CWS AND 95' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 1972+38 THERE IS A DWELLING LOCATED 37' TO THE LEFT OF THE CWS AND 82' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

TWS/ATWS AND RESOURCES ADJUSTED BASED ON UPDATED FIELD SURVEYED WETLAND/WATERBODY DATA.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
PROPERTY BOUNDARIES AND FOREIGN PIPELINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
APPROXIMATED WETLAND BOUNDARIES AND SILT FENCE REMOVED.
ADDED DRIVEWAY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 4:19pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8029.DWG

IG #	REV.#	DESCRIPTION	DATE
	1A	ISSUED FOR FERC	15MAR16
	1	ISSUED FOR FERC	23FEB16
	0	ISSUED FOR FERC FILING	22OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

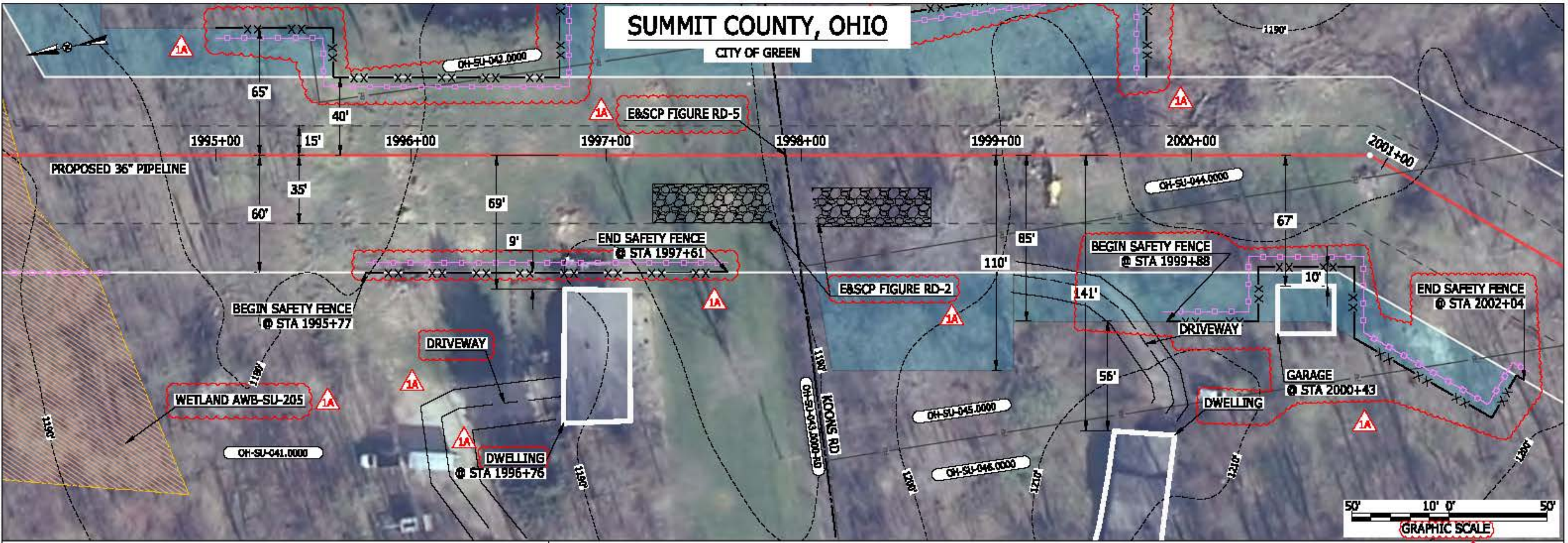
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 37.25 TO MP 37.41

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8029

NEXUS GAS TRANSMISSION

SUMMIT COUNTY, OHIO

CITY OF GREEN



MES13858 March 14, 2016 5:28pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8030.DWG

LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD PAR-0.0
- TEMPORARY ACCESS ROAD TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER 00-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 1996+76 THERE IS A DWELLING LOCATED 9' TO THE RIGHT OF THE CWS AND 69' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2000+43 THERE IS A GARAGE LOCATED INSIDE OF THE CWS AND 67' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. FULL WIDTH OF NOMINAL 100-FT ROW HAS BEEN SHOWN DUE TO THE REQUIRED ROAD BORE OF KOONS RD. NO ATWS HAS BEEN PLACED ON THE LAND OWNER WHOSE RESIDENCE IS WITHIN 9-FT OF THE NOMINAL ROW TO REDUCE IMPACTS TO THE LANDSCAPING.
2. NEXUS WILL USE SAFETY FENCING ALONG THE BOUNDARY OF THIS ROW TO ENSURE NO DAMAGE TO THE RESIDENCE.
3. SEE DWG HANO-P-8031 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE. SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
PROPERTY BOUNDARIES AND SAFETY FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

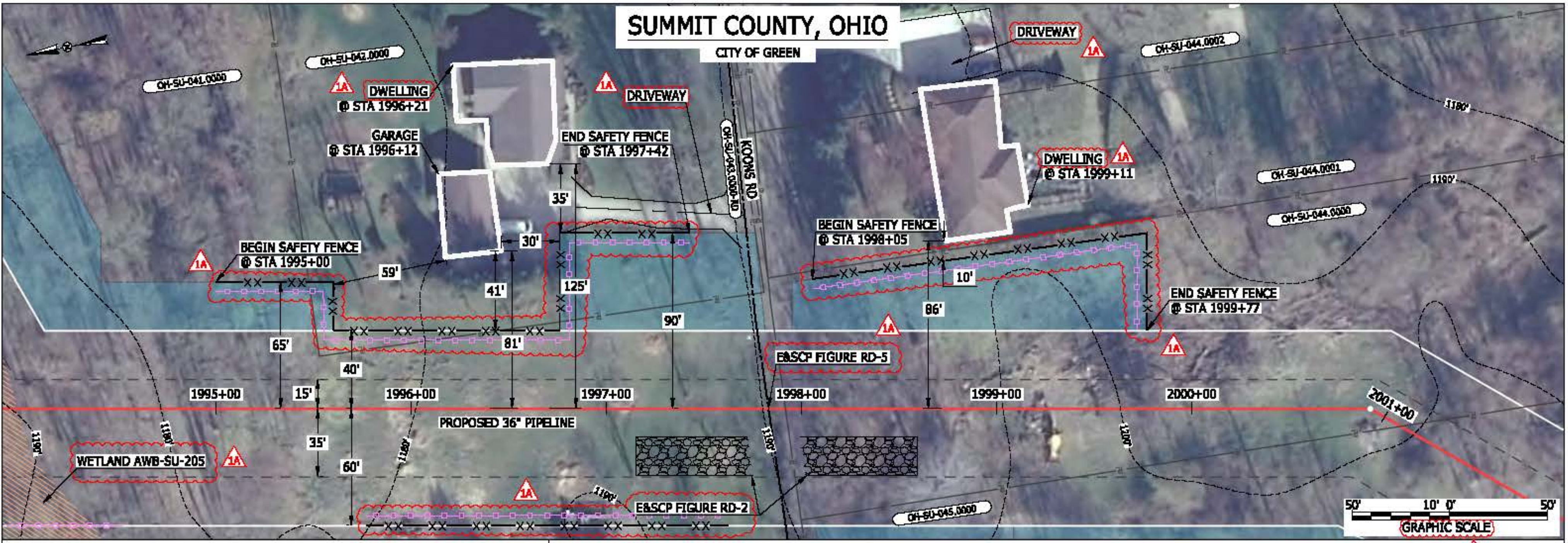
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 37.76 TO MP 37.92

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8030

NEXUS GAS TRANSMISSION

SUMMIT COUNTY, OHIO

CITY OF GREEN



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD (PAR-0.0)
TEMPORARY ACCESS ROAD (TAR-0.0)
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES
POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER (00-XX-000.0000)
MUNICIPALITY LINE
WELL: GAS, OIL, WATER, UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE
FIRE HYDRANT
MICROWAVE TOWER
TOWER
TANK

1A

DESCRIPTION:

AT SURVEY STATION 1996+12 THERE IS A GARAGE LOCATED 30' TO THE LEFT OF THE CWS AND 81' LEFT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 1996+21 THERE IS A DWELLING LOCATED 35' TO THE LEFT OF THE CWS AND 125' LEFT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 1999+11 THERE IS A DWELLING LOCATED 10' TO THE LEFT OF THE CWS AND 86' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTE :

1. ATWS UP TO 10-FT TO THE EDGE OF THE RESIDENCE HAS BEEN SHOWN TO ACCOMMODATE THE KOONS RD BORE.
2. NEXUS WILL USE SAFETY FENCING ALONG THE BOUNDARY OF THIS ROW TO ENSURE NO DAMAGE TO THE RESIDENCE.
3. SEE DWG HANO-P-8030 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
PROPERTY BOUNDARIES AND SAFETY FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

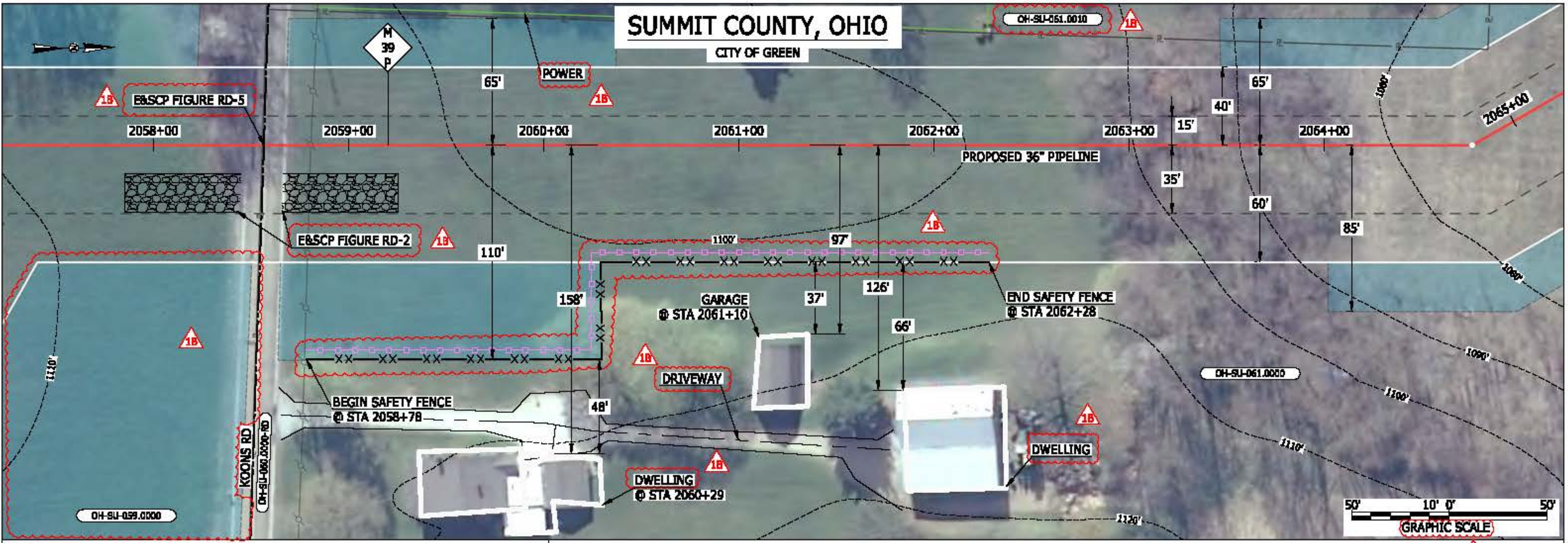
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 37.76 TO MP 37.92

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8031

NEXUS GAS TRANSMISSION

IG #

MES13858 March 14, 2016 4:21pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8031.DWG



LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	M 00 P
CONSTRUCTION LIMIT	═
PERMANENT ROW	[- - - -]
ADDITIONAL TEMPORARY WORKSPACE	▭
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	━
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	━
STRUCTURES	
POWERLINES	
CONTOUR LINE	- - - - 1200' - - - -
SILT FENCE	—□—□—□—□—
STRAW BALE	—▥—▥—▥—▥—
FOREIGN PIPELINES	—‖—‖—‖—‖—
TELEPHONE	—T——T—
FENCE	—x——x—
RAILROAD TRACK	—+—+—+—+—
ROAD CL	——— - ———
WATER PIPELINE	—W——W—
UTILITY LINE	——
PROPERTY LINE	—— PL ——
SAFETY FENCE	—XX——XX—
TRACT NUMBER	(00-XX-000.0000)
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
WELL: OIL	⊕
WELL: WATER	⊕
WELL: UNKNOWN	⊕
MAINLINE VALVE (MLV)	⋈
BLOW OFF VALVE	⋈
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1B

DESCRIPTION:

AT SURVEY STATION 2060+29 THERE IS A DWELLING LOCATED 48' TO THE RIGHT OF THE CWS AND 158' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2061+10 THERE IS A GARAGE LOCATED 37' TO THE RIGHT OF THE CWS AND 97' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1B:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY AND UTILITY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858
March 14, 2016 4:23pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8032.DWG

REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

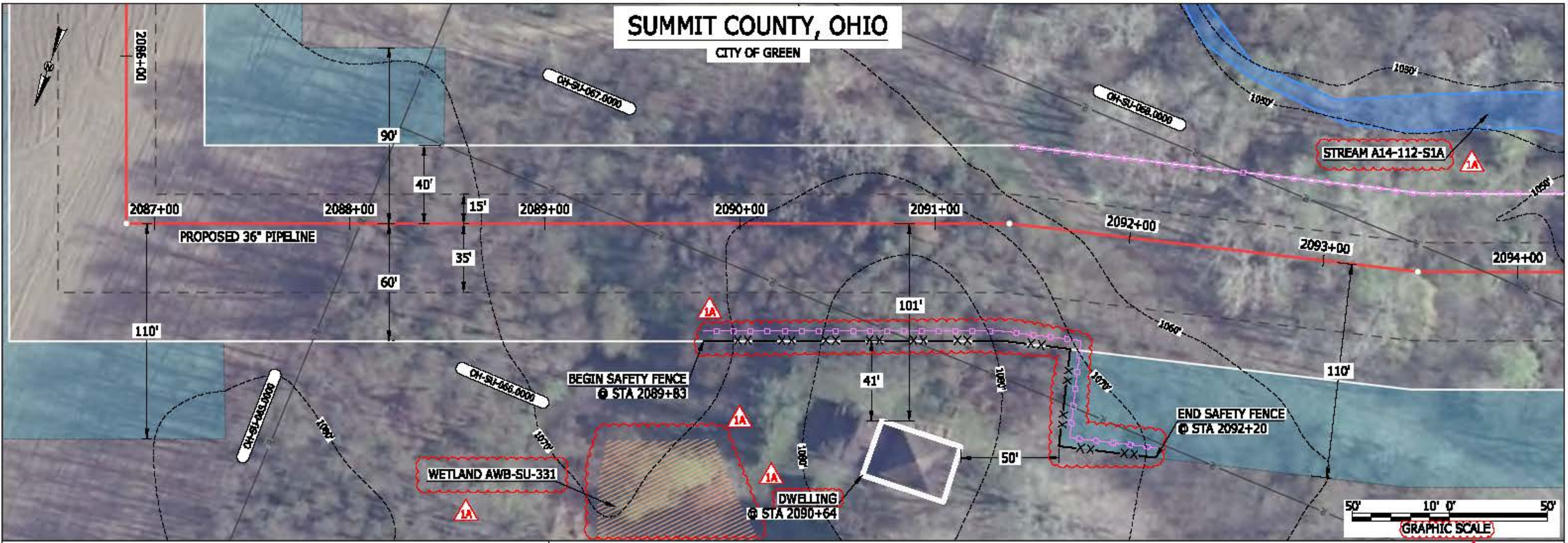
IG #

PROJ. ENG.	VP
CHECKED BY:	DOB
DRAWN BY:	RSM
SCALE:	AS SHOWN
DATE	

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 38.96 TO MP 39.11

LOC.: SUMMIT COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. HANO-P-8032

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 2090+64 THERE IS A DWELLING LOCATED 41' TO THE RIGHT OF THE CWS AND 101' RIGHT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

RESOURCE ADJUSTED BASED ON UPDATED FIELD SURVEYED WETLAND DATA.
APPROXIMATED RESOURCE ADDED.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

1A

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

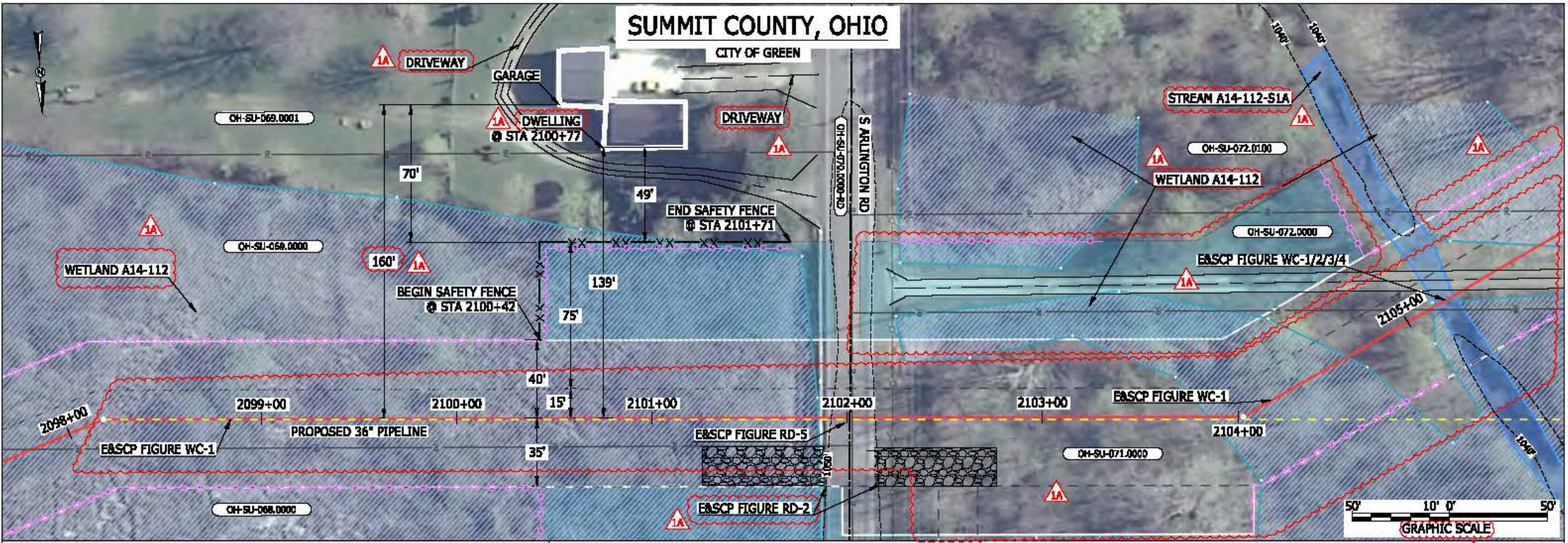
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 39.5 TO MP 39.66

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8033

NEXUS GAS TRANSMISSION

IG #

MES13858 March 14, 2016 4:24pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8033.DWG



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD PAR-0.0
- TEMPORARY ACCESS ROAD TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER OO-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 2100+77 THERE IS A DWELLING LOCATED 49' TO THE LEFT OF THE CWS AND 139' LEFT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

CENTERLINE REROUTED DUE TO STAKEHOLDER INPUT, UPDATED CIVIL SURVEY AND WETLAND SURVEY. TWS/ATWS AND RESOURCES UPDATED ACCORDINGLY.
CATHODIC PROTECTION SITE LOCATION UPDATED. TWS/ATWS ADJUSTED ACCORDINGLY.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES AND UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

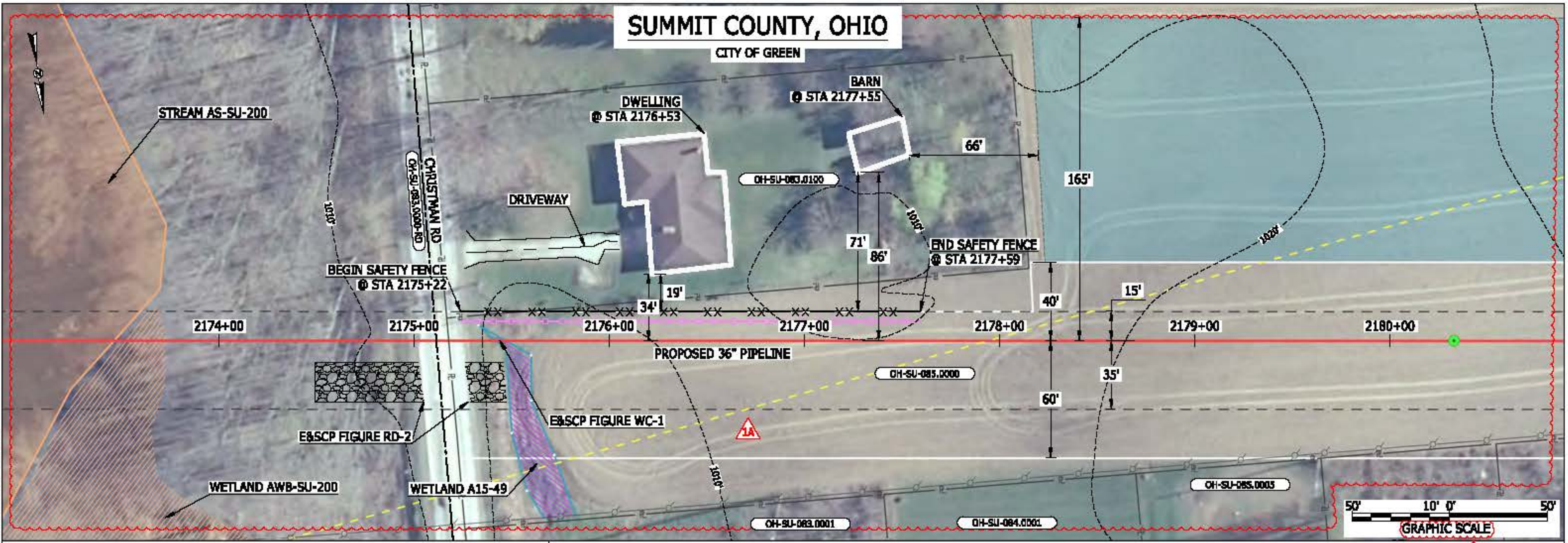
PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 39.73 TO MP 39.88R 1A

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8034

NEXUS GAS TRANSMISSION

IG.#
MES13858
March 14, 2016 4:28pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8034.DWG



LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	M 00 P
CONSTRUCTION LIMIT	▬
PERMANENT ROW	[- - - -]
ADDITIONAL TEMPORARY WORKSPACE	🟦
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	
STRUCTURES	

1A

POWERLINES	
CONTOUR LINE	- - - 1200 - - -
SILT FENCE	—□—□—□—
STRAW BALE	
FOREIGN PIPELINES	
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	—+—+—+—
ROAD CL	
WATER PIPELINE	—W—W—
UTILITY LINE	
PROPERTY LINE	— PL —
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
WATER	⊕
OIL	⊕
UNKNOWN	⊕
MAINLINE VALVE (MLV)	
BLOW OFF VALVE	
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A

DESCRIPTION:

AT SURVEY STATION 2176+53 THERE IS A DWELLING LOCATED 19' TO THE LEFT OF THE CWS AND 34' LEFT OF THE PROPOSED 36" PIPELINE.

1A

SPECIAL NOTE :

1. CHRISTMAN RD TO BE INSTALLED VIA HORIZONTAL DIRECTIONAL DRILLING.

REVISION 1A:

CENTERLINE REROUTED DUE TO STAKEHOLDER INPUT, UPDATED CIVIL SURVEY AND WETLAND SURVEY. TWS/ATWS AND RESOURCES UPDATED ACCORDINGLY.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND SAFETY FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858
March 14, 2016 4:29pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8036.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 41.15R TO MP 41.3R

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8036

NEXUS GAS TRANSMISSION

LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
1A
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD (PAR-0.0)
TEMPORARY ACCESS ROAD (TAR-0.0)
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
1A
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER (00-XX-000.0000)
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT
MICROWAVE TOWER ☒ TOWER ☒
TANK ●
1A

DESCRIPTION:

1A

AT SURVEY STATION 2221+61 THERE IS A BARN LOCATED 12' TO THE RIGHT OF THE CWS AND 97' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2223+80 THERE IS A DWELLING LOCATED 34' TO THE RIGHT OF THE CWS AND 107' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2220+92 THERE IS A BARN LOCATED 43' TO THE RIGHT OF THE CWS AND 128' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG HANO-P-8038 FOR THE CONTINUATION OF THE RESIDENTIAL AREA. 1A

REVISION 1A:

TWS/ATWS AND RESOURCE ADJUSTED BASED ON UPDATED FIELD SURVEYED WETLAND DATA.
PROPERTY BOUNDARIES AND UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE. SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
SOME AREA OF APPROXIMATED RESOURCE REMOVED DUE TO UPDATED FIELD SURVEY DATA.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES: 1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858
March 14, 2016 4:30pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8037.DWG

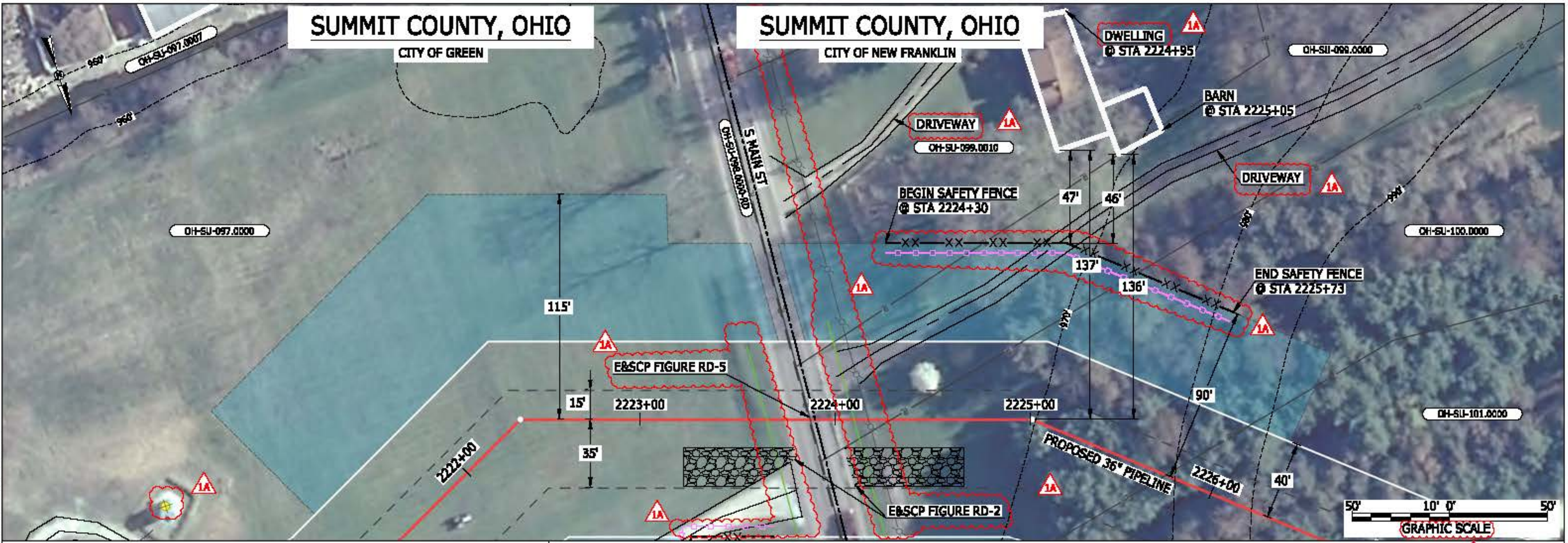
IG #	REV.#	DESCRIPTION	DATE	
	1A	ISSUED FOR FERC	15MAR16	
	1	ISSUED FOR FERC	23FEB16	
	0	ISSUED FOR FERC FILING	22OCT15	

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 42.03 TO MP 42.18

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8037

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE 🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE — — —
INTERCONNECTING PIPELINE 🟪
PIPELINE MILEPOST ◇ M 00 P
CONSTRUCTION LIMIT ▬
PERMANENT ROW [- - - -]
ADDITIONAL TEMPORARY WORKSPACE 🟦
STAGING AREA 🟨
WAREYARD 🟩
ROCK ACCESS PAD ▨
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES
POWERLINES
CONTOUR LINE - - - 1200' - - -
SILT FENCE —□—□—□—□—
STRAW BALE
FOREIGN PIPELINES
TELEPHONE —T——T—
FENCE —x——x—
RAILROAD TRACK
ROAD CL
WATER PIPELINE —W——W—
UTILITY LINE
PROPERTY LINE —— PL ——
SAFETY FENCE —XX——XX—
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING ⊙
LIGHT POLE ● FIRE HYDRANT ⊕
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

DESCRIPTION:

AT SURVEY STATION 2224+95 THERE IS A DWELLING LOCATED 47' TO THE LEFT OF THE CWS AND 137' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2225+05 THERE IS A BARN LOCATED 46' TO THE LEFT OF THE CWS AND 136' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG HANO-P-8037 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
POWER LINES, PROPERTY BOUNDARIES, UTILITY LINES AND AN UNKNOWN WELL HAVE BEEN UPDATED BASED ON UPDATED FIELD SURVEY DATA.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858
March 14, 2016 4:31pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8038.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

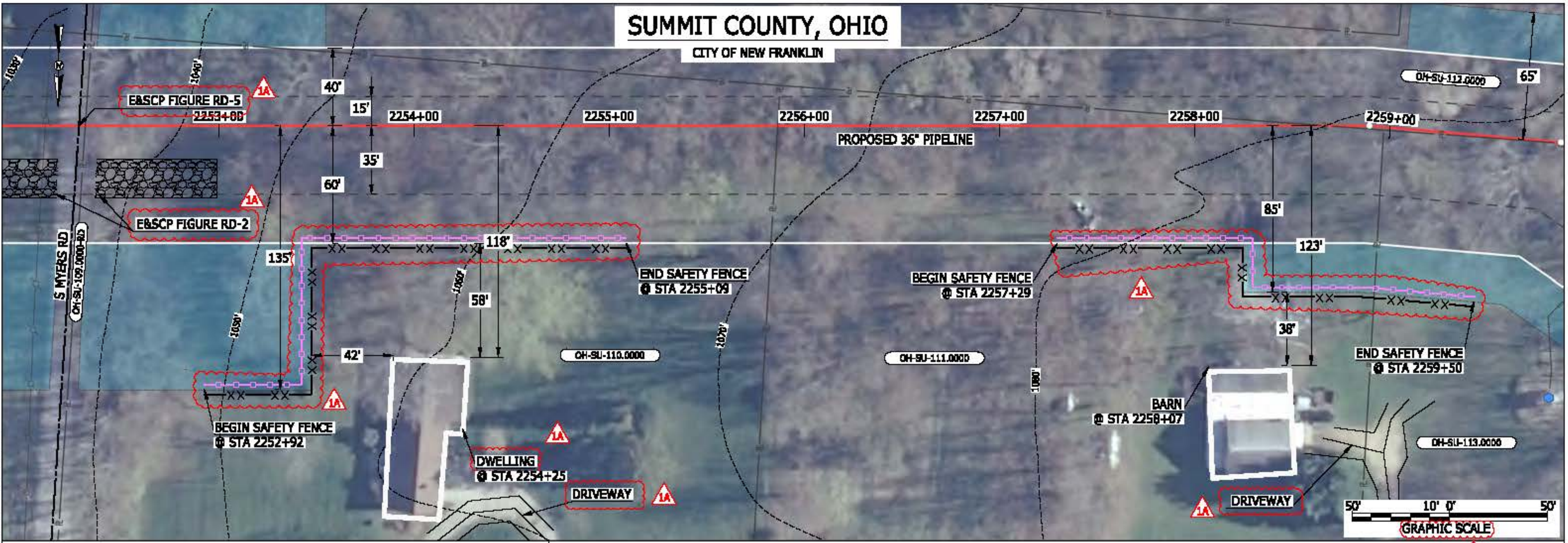
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 42.07 TO MP 42.17

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8038

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 2254+25 THERE IS A DWELLING LOCATED 42' TO THE RIGHT OF THE CWS AND 118' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2258+07 THERE IS A BARN LOCATED 38' TO THE RIGHT OF THE CWS AND 123' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE. ADDED DRIVEWAY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858
March 14, 2016 2:52pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8039.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

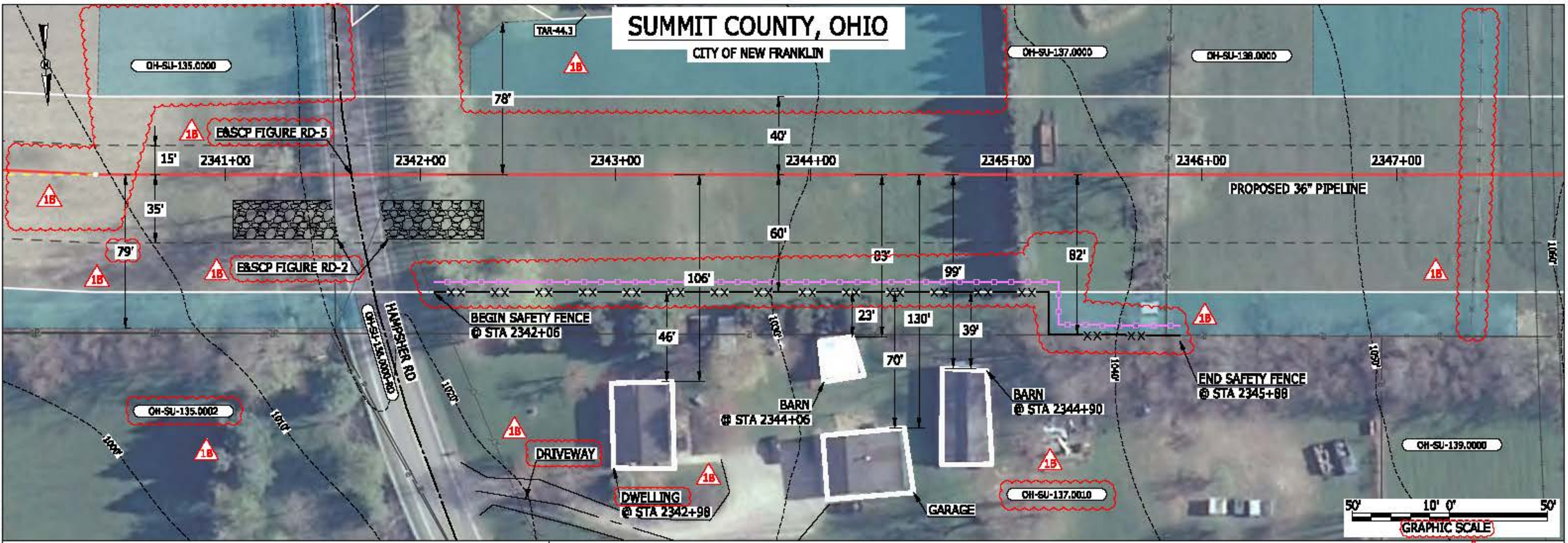
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 42.65 TO MP 42.8

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8039

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	
INTERCONNECTING PIPELINE	
PIPELINE MILEPOST	M 00 P
CONSTRUCTION LIMIT	
PERMANENT ROW	
ADDITIONAL TEMPORARY WORKSPACE	
STAGING AREA	
WAREYARD	
ROCK ACCESS PAD	
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	
STRUCTURES	
POWERLINES	
CONTOUR LINE	UW
SILT FENCE	
STRAW BALE	
FOREIGN PIPELINES	
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	
ROAD CL	
WATER PIPELINE	—W—W—
UTILITY LINE	
PROPERTY LINE	— PL —
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	
WELL: GAS	⊕
WATER	⊕
OIL	⊕
UNKNOWN	⊕
MAINLINE VALVE (MLV)	
BLOW OFF VALVE	
HORIZONTAL DIRECTIONAL DRILLING	
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1B

DESCRIPTION:

AT SURVEY STATION 2342+98 THERE IS A DWELLING LOCATED 46' TO THE RIGHT OF THE CWS AND 106' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2344+06 THERE IS A BARN LOCATED 23' TO THE RIGHT OF THE CWS AND 83' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2344+90 THERE IS A BARN LOCATED 39' TO THE RIGHT OF THE CWS AND 99' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1B:

CENTERLINE REROUTED TO CHANGE CROSSING ANGLE OF EXISTING PIPELINE. TWS/ATWS ADJUSTED ACCORDINGLY.
ATWS ADJUSTED TO ALIGN WITH PROPERTY BOUNDARY BASED ON UPDATED CIVIL SURVEY.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND LANDOWNER FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1B

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BAN26537 March 14, 2016 12:34pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8042.DWG

IG #:

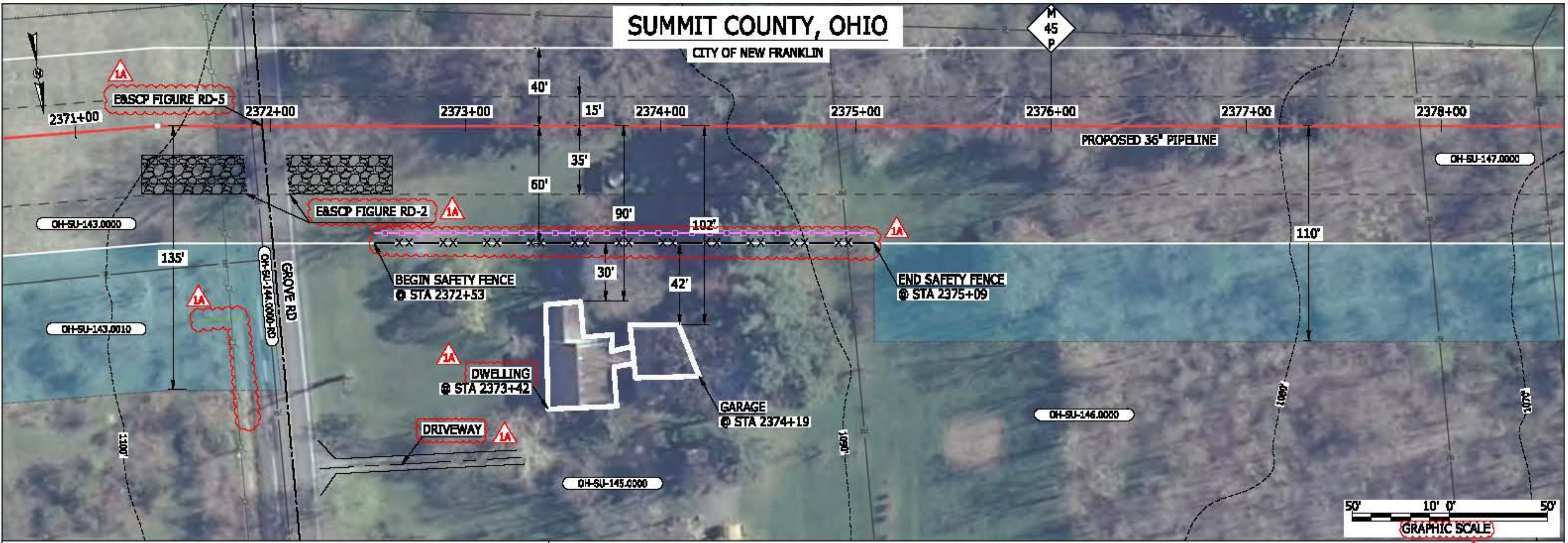
REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
1B MP 44.32R TO MP 44.47

LOC.: SUMMIT COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. HANO-P-8042

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	M 00 P
CONSTRUCTION LIMIT	▬
PERMANENT ROW	[- - - -]
ADDITIONAL TEMPORARY WORKSPACE	🟦
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	🟦
DELINEATED WETLAND BOUNDARY	🟦
AGRICULTURAL PEM WETLAND BOUNDARY	▨
DELINEATED WATERBODY CENTERLINE	▬
APPROXIMATE WATERBODY BANK	🟧
APPROXIMATE WETLAND BOUNDARY	🟧
APPROXIMATE WATERBODY CENTERLINE	▬
STRUCTURES	▭

1A

POWERLINES	—ϕ—ϕ—
CONTOUR LINE	- - - 1200 - - -
SILT FENCE	—□—□—□—□—
STRAW BALE	—▥—▥—▥—▥—
FOREIGN PIPELINES	—‖—‖—‖—‖—
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	—+—+—+—+—
ROAD CL	——-——
WATER PIPELINE	—W—W—
UTILITY LINE	———
PROPERTY LINE	—— PL ——
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
WATER	⊕
OIL	⊕
UNKNOWN	⊕
MAINLINE VALVE (MLV)	⋈
BLOW OFF VALVE	⋈
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A

DESCRIPTION:

1A

AT SURVEY STATION 2373+42 THERE IS A DWELLING LOCATED 30' TO THE RIGHT OF THE CWS AND 90' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2374+19 THERE IS A GARAGE LOCATED 42' TO THE RIGHT OF THE CWS AND 102' RIGHT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE. ADDED DRIVEWAY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

1A

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BAN26537 March 14, 2016 12:35pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8043.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

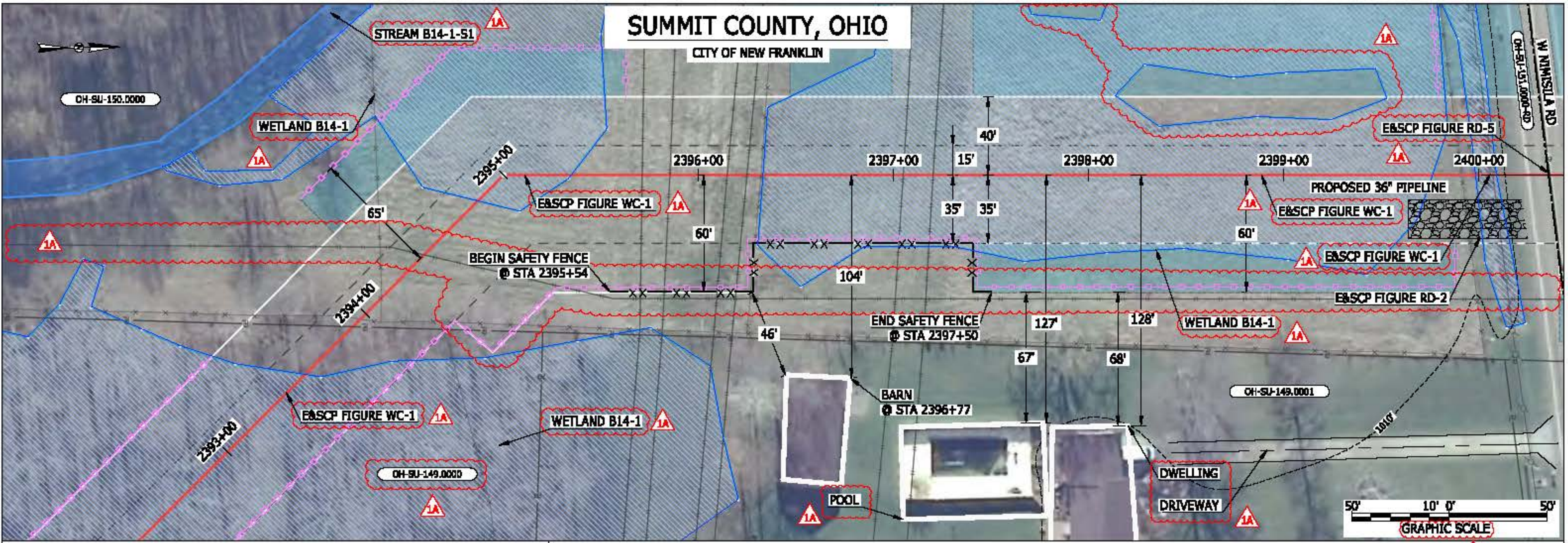
PROJ. ENG.	VP
CHECKED BY:	DOB
DRAWN BY:	RSM 1A
SCALE:	AS SHOWN
DATE	

IG #

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 44.9 TO MP 45.05

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8043

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, WATER, OIL, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 2396+77 THERE IS A BARN LOCATED 46' TO THE RIGHT OF THE CWS AND 104' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

RESOURCE UPDATED BASED ON FIELD SURVEY WETLAND DATA.
LEGEND SYMBOLOGY AND PARCEL NUMBER UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND FOREIGN PIPELINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE. ADDED DRIVEWAY AND POOL CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 15, 2016 12:42pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8045.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

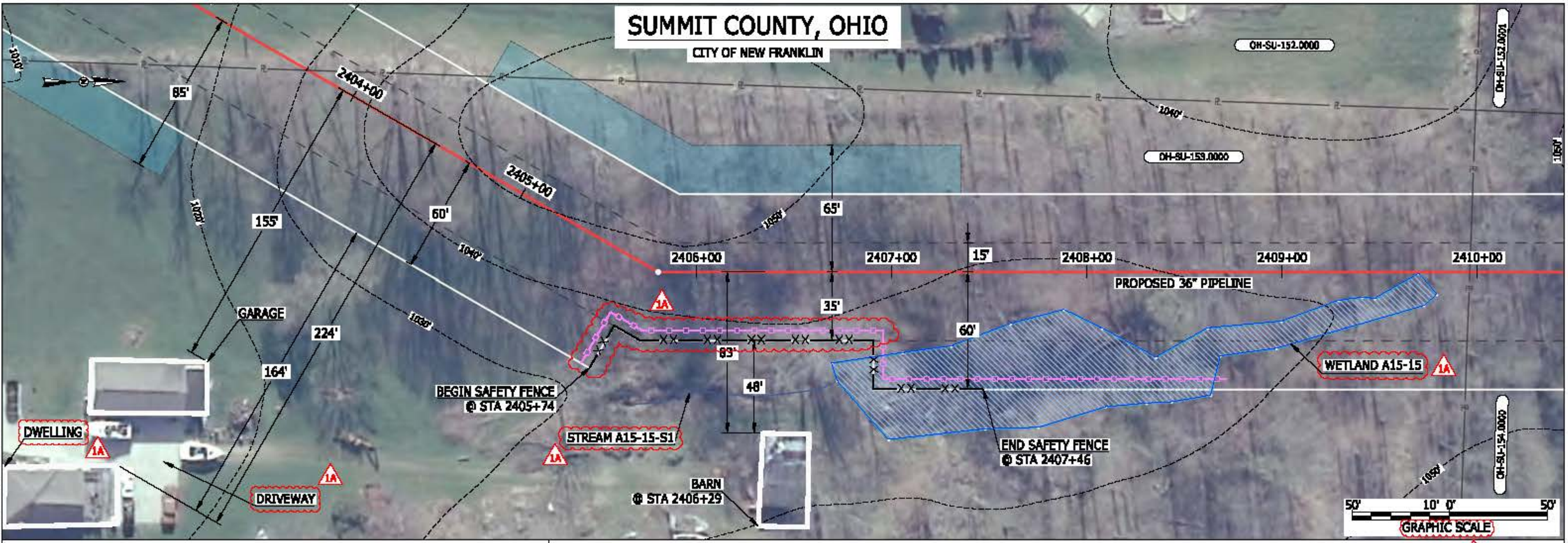
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 45.31 TO MP 45.46

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8045

NEXUS GAS TRANSMISSION



MES13858 March 14, 2016 4:47pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8046.DWG

LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
1A
PIPELINE MILEPOST M 00 P
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
1A
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES
POWERLINES
CONTOUR LINE 1280
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ● WATER ●
OIL ● UNKNOWN ●
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT
MICROWAVE TOWER ☒ TOWER ☒
TANK ●
1A

DESCRIPTION:

AT SURVEY STATION 2406+29 THERE IS A BARN LOCATED 48' TO THE RIGHT OF THE CWS AND 83' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES: 1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

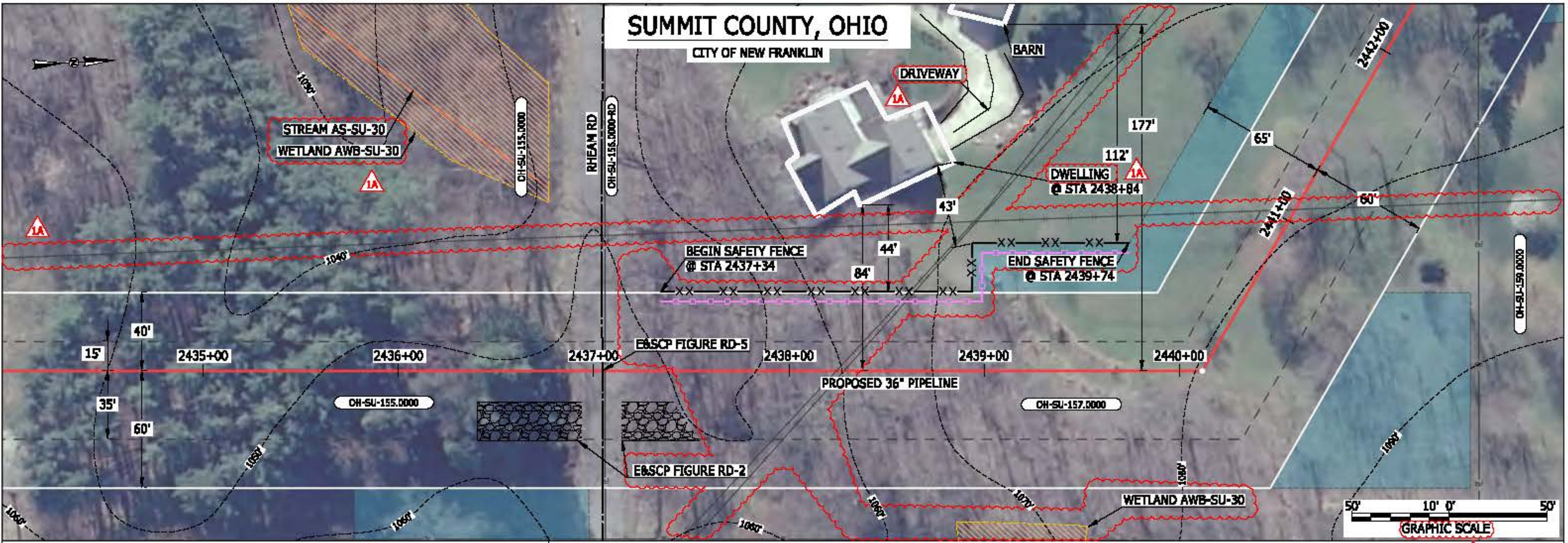
IG #			
	1A	ISSUED FOR FERC	15MAR16
	1	ISSUED FOR FERC	23FEB16
	0	ISSUED FOR FERC FILING	22OCT15
	REV.#	DESCRIPTION	DATE

PROJ. ENG. VP	
CHECKED BY: DOB	
DRAWN BY: RSM 1A	
SCALE: AS SHOWN	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 45.51 TO MP 45.65

LOC.: SUMMIT COUNTY, OHIO		REV.: 1A
YR.: 2017	W.O.	DWG.NO. HANO-P-8046

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE	PIPELINE MILEPOST
CONSTRUCTION LIMIT	PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE	STAGING AREA
WAREYARD	ROCK ACCESS PAD
PERMANENT ACCESS ROAD (PAR-0.0)	TEMPORARY ACCESS ROAD (TAR-0.0)
DELINEATED WATERBODY BANK	DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY	DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK	APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE	STRUCTURES

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST (M 00 P)
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE (1200')
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE (—T—T—)
- FENCE (—x—x—)
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE (—W—W—)
- UTILITY LINE
- PROPERTY LINE (℄)
- SAFETY FENCE (—XX—XX—)
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS ⊕ WATER ⊕
- OIL ⊕ UNKNOWN ⊕
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING ⊙
- LIGHT POLE ● FIRE HYDRANT ⊕
- MICROWAVE TOWER ☒ TOWER ☒
- TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 2438+84 THERE IS A DWELLING LOCATED 44' TO THE LEFT OF THE CWS AND 84' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

RESOURCES UPDATED BASED ON WETLAND/WATERBODY FIELD SURVEY DATA.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WETLAND, WATERBODY, FOREIGN PIPELINE AND PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEYED DATA.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE. APPROXIMATED RESOURCE DELETED.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

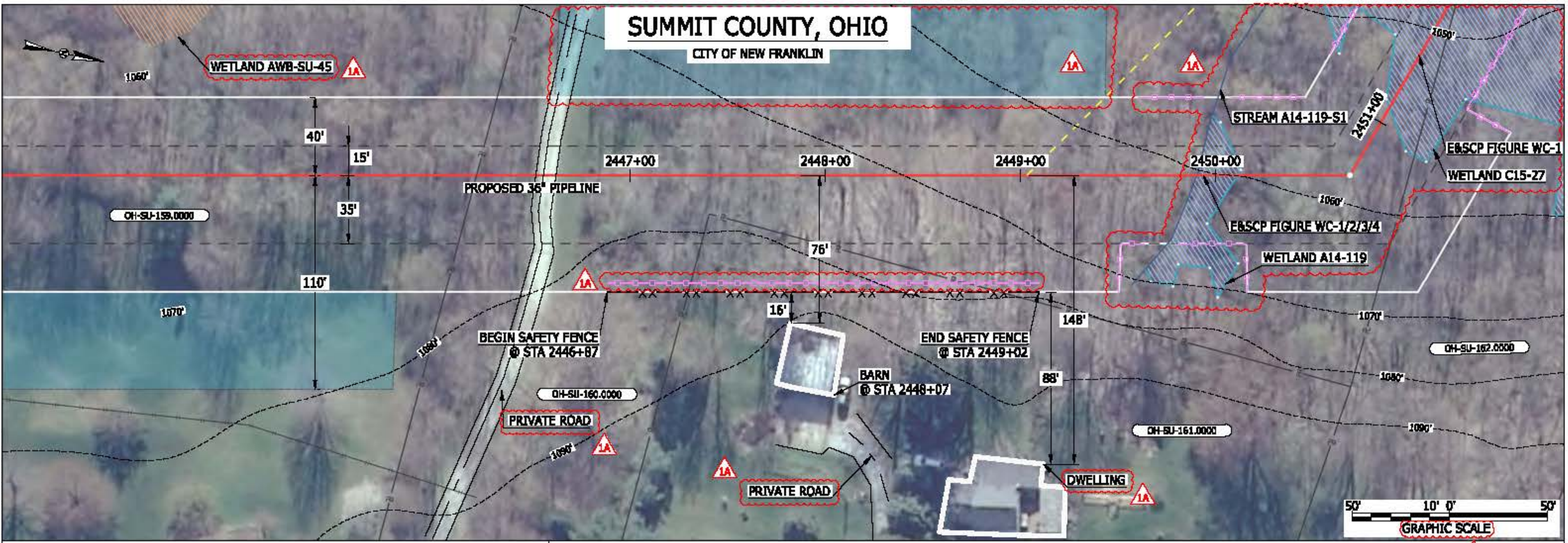
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 46.1 TO MP 46.25

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8047

NEXUS GAS TRANSMISSION

IG #

MES13858 March 15, 2016 9:33am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8047.DWG



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES
1A

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS WATER
OIL UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE FIRE HYDRANT
MICROWAVE TOWER TOWER
TANK
1A

DESCRIPTION:

AT SURVEY STATION 2448+07 THERE IS A BARN LOCATED 16' TO THE RIGHT OF THE CWS AND 76' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

CENTERLINE REROUTED TO AVOID STREAM IMPACTS. TWS/ATWS AND RESOURCES UPDATED BASED OF FIELD SURVEY WETLAND/WATERBODY.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED PRIVATE ROADS CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 5:42pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8048.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

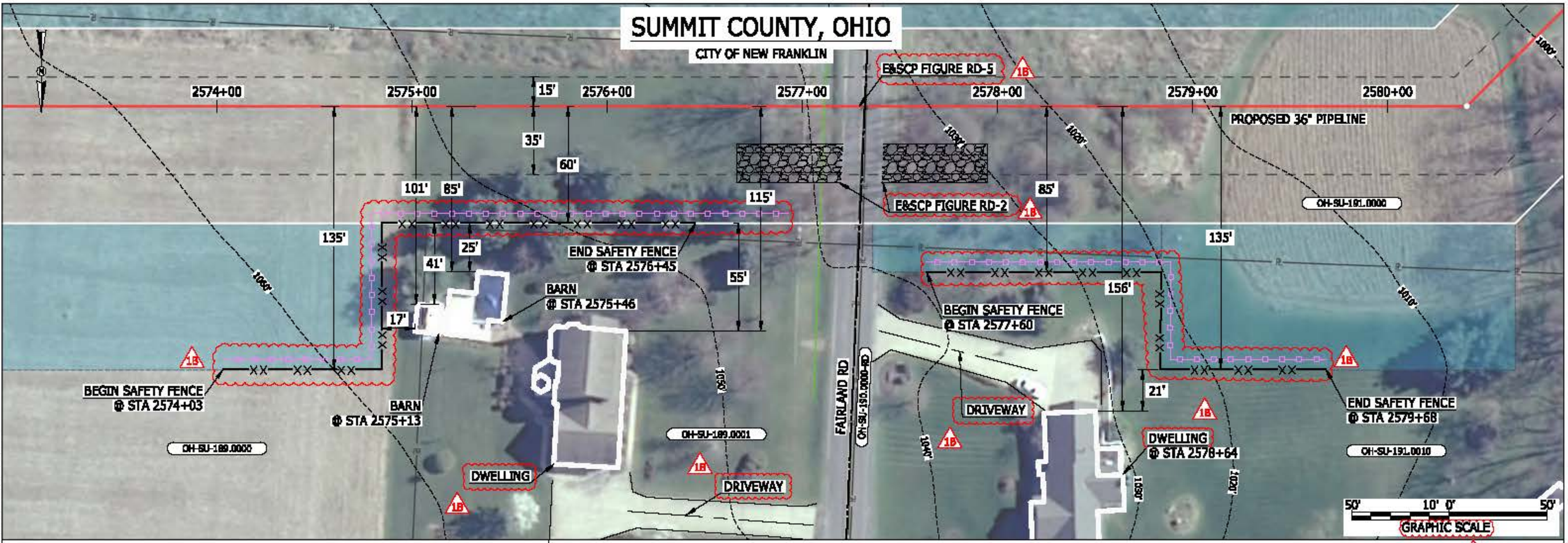
IG#

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 46.28 TO MP 46.55R

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8048

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
1B
PIPELINE MILEPOST (M 00 P)
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
1B
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE (1200')
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE —XX——XX—
TRACT NUMBER (00-XX-000.0000)
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT ⊕
MICROWAVE TOWER ☒ TOWER ☒
TANK ●
1B

DESCRIPTION:

AT SURVEY STATION 2575+13 THERE IS A BARN LOCATED 17' TO THE RIGHT OF THE CWS AND 101' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2575+46 THERE IS A BARN LOCATED 25' TO THE RIGHT OF THE CWS AND 85' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2578+64 THERE IS A DWELLING LOCATED 22' TO THE RIGHT OF THE CWS AND 156' RIGHT OF THE PROPOSED 36" PIPELINE.

1B

REVISION 1B:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1B

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 5:43pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8049.DWG

REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1B
SCALE: AS SHOWN
DATE

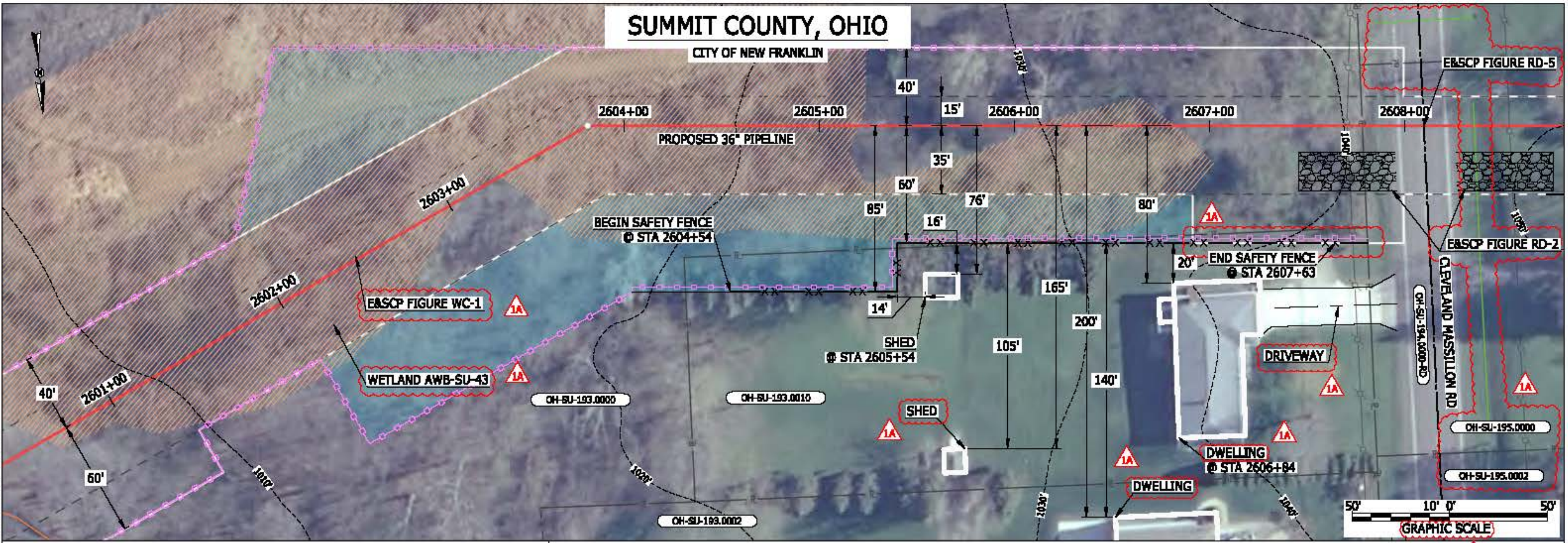
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 48.73 TO MP 48.88

LOC.: SUMMIT COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. HANO-P-8049

NEXUS GAS TRANSMISSION

SUMMIT COUNTY, OHIO

CITY OF NEW FRANKLIN



LEGEND

PROPOSED NEXUS PIPELINE		POWERLINES	
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE		CONTOUR LINE	----1000----
INTERCONNECTING PIPELINE		SILT FENCE	
PIPELINE MILEPOST		STRAW BALE	
CONSTRUCTION LIMIT		FOREIGN PIPELINES	
PERMANENT ROW		TELEPHONE	—T—T—
ADDITIONAL TEMPORARY WORKSPACE		FENCE	—x—x—
STAGING AREA		RAILROAD TRACK	
WAREYARD		ROAD CL	
ROCK ACCESS PAD		WATER PIPELINE	—W—W—
PERMANENT ACCESS ROAD	PAR-0.0	UTILITY LINE	
TEMPORARY ACCESS ROAD	TAR-0.0	PROPERTY LINE	PL
DELINEATED WATERBODY BANK		SAFETY FENCE	—XX—XX—
DELINEATED WETLAND BOUNDARY		TRACT NUMBER	00-XX-000.0000
AGRICULTURAL PEM WETLAND BOUNDARY		MUNICIPALITY LINE	
DELINEATED WATERBODY CENTERLINE		WELL: GAS / OIL / WATER / UNKNOWN	
APPROXIMATE WATERBODY BANK		MAINLINE VALVE (MLV)	
APPROXIMATE WETLAND BOUNDARY		BLOW OFF VALVE	
APPROXIMATE WATERBODY CENTERLINE		HORIZONTAL DIRECTIONAL DRILLING	
STRUCTURES		LIGHT POLE / FIRE HYDRANT	
		MICROWAVE TOWER / TOWER	
		TANK	●

1A

DESCRIPTION:

AT SURVEY STATION 2605+54 THERE IS A SHED LOCATED 14' TO THE RIGHT OF THE CWS AND 76' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2606+84 THERE IS A DWELLING LOCATED 20' TO THE RIGHT OF THE CWS AND 80' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG HANO-P-8051 FOR THE CONTINUATION OF THE RESIDENTIAL AREA. 1A

REVISION 1A:

APPROXIMATED RESOURCE ADDED.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

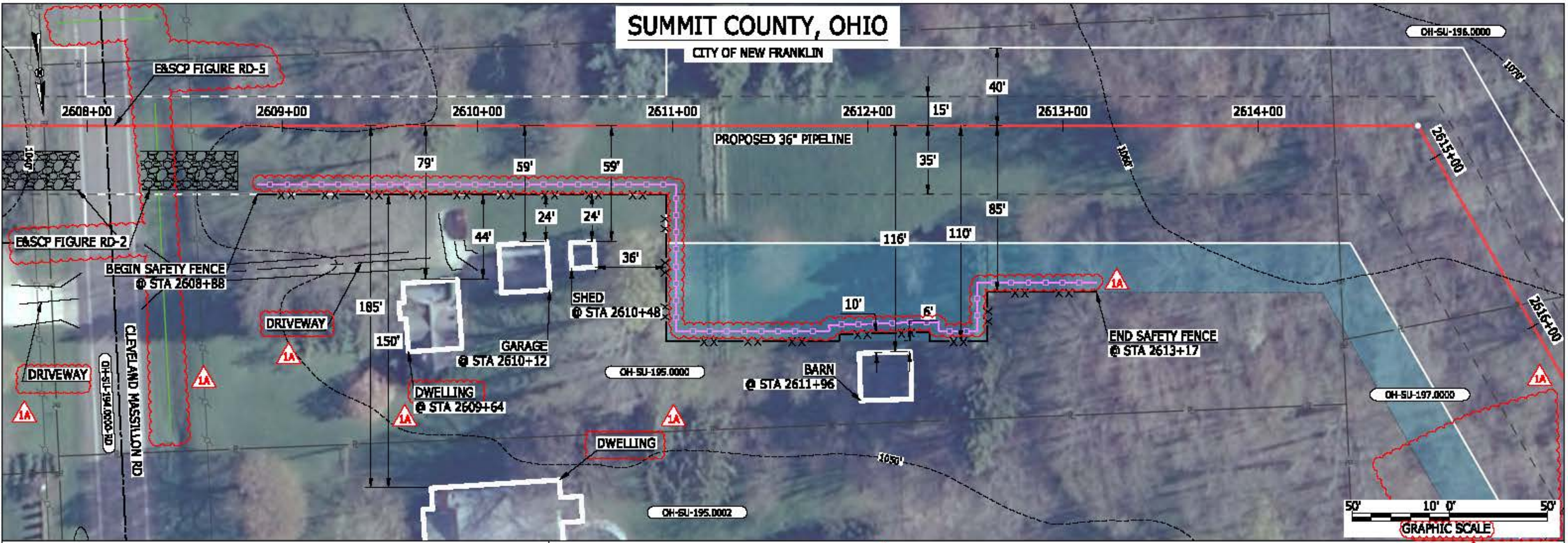
IG.#	REV.#	DESCRIPTION	DATE	
	1A	ISSUED FOR FERC	15MAR16	
	1	ISSUED FOR FERC	23FEB16	
	0	ISSUED FOR FERC FILING	23OCT15	

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 49.25 TO MP 49.41

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8050

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	
INTERCONNECTING PIPELINE	
PIPELINE MILEPOST	M 00 P
CONSTRUCTION LIMIT	
PERMANENT ROW	
ADDITIONAL TEMPORARY WORKSPACE	
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	
STRUCTURES	
POWERLINES	
CONTOUR LINE	1200'
SILT FENCE	
STRAW BALE	
FOREIGN PIPELINES	
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	
ROAD CL	
WATER PIPELINE	—W—W—
UTILITY LINE	
PROPERTY LINE	—PL—
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	
WELL: GAS	●
WATER	●
OIL	●
UNKNOWN	●
MAINLINE VALVE (MLV)	
BLOW OFF VALVE	
HORIZONTAL DIRECTIONAL DRILLING	●
LIGHT POLE	●
FIRE HYDRANT	●
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A

DESCRIPTION:

AT SURVEY STATION 2609+64 THERE IS A DWELLING LOCATED 44' TO THE RIGHT OF THE CWS AND 79' RIGHT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 2610+12 THERE IS A GARAGE LOCATED 24' TO THE RIGHT OF THE CWS AND 59' RIGHT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 2610+48 THERE IS A SHED LOCATED 24' TO THE RIGHT OF THE CWS AND 59' RIGHT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 2611+96 THERE IS A BARN LOCATED 6' TO THE RIGHT OF THE CWS AND 116' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG HANO-P-8050 FOR THE CONTINUATION OF THE RESIDENTIAL AREA. 1A

REVISION 1A:

APPROXIMATED RESOURCE REMOVED BASED ON UPDATED FIELD SURVEY DATA.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 5:02pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8051.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

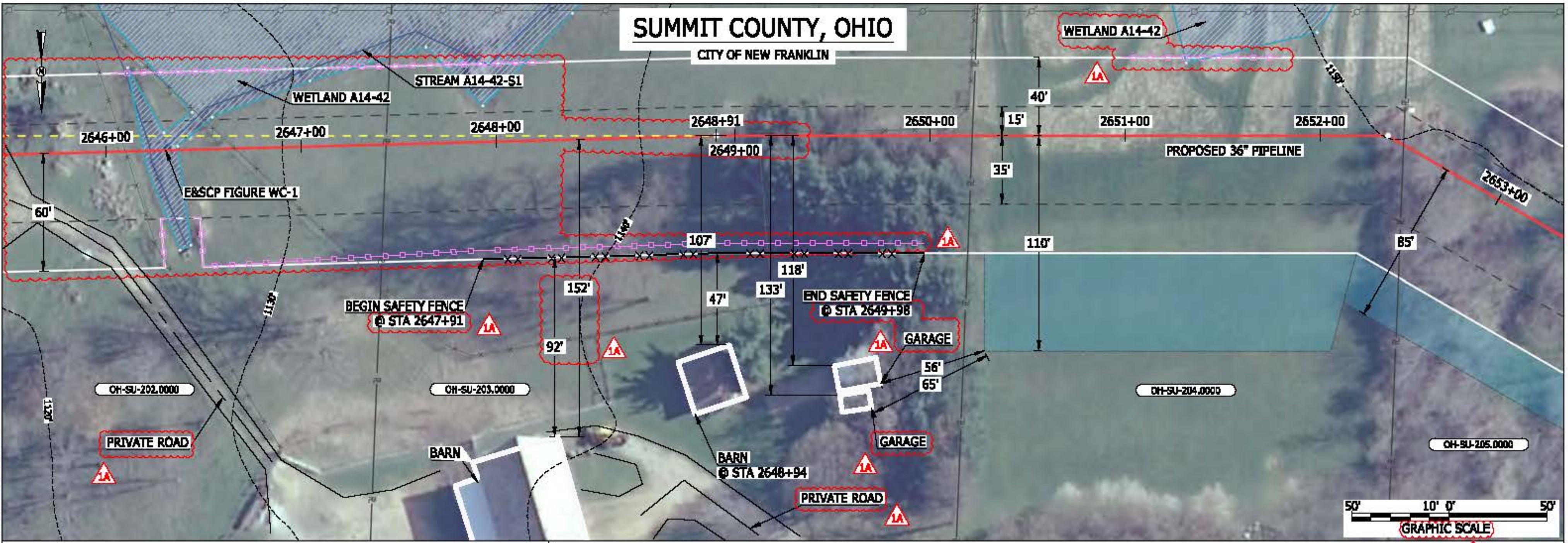
IG #:

PROJ. ENG.	VP
CHECKED BY:	DOB
DRAWN BY:	RSM 1A
SCALE:	AS SHOWN
DATE	

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 49.39 TO MP 49.55

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8051

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ● WATER ●
OIL ● UNKNOWN ●
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 2648+94 THERE IS A BARN LOCATED 47' TO THE RIGHT OF THE CWS AND 107' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

CENTERLINE SHIFTED TO AVOID OVERLAP WITH EXISTING UTILITY EASEMENT. ASSOCIATED TWS/ATWS UPDATED ACCORDINGLY.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
STATIONING UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED PRIVATE ROAD CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

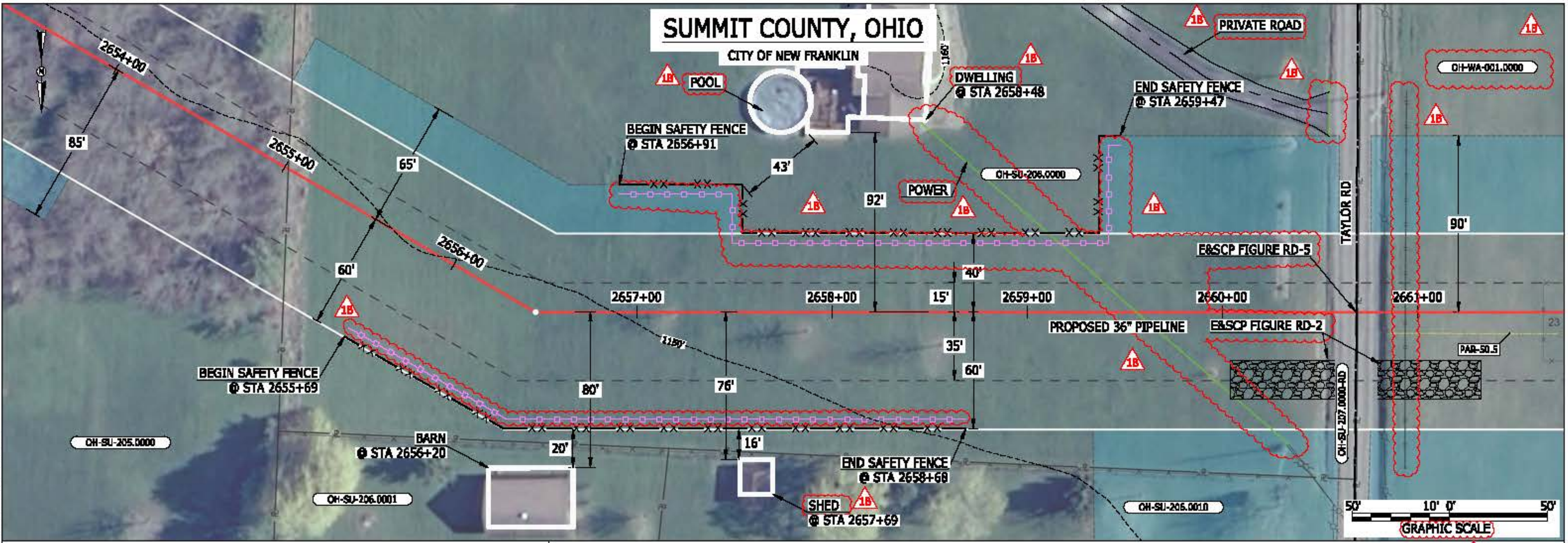
MES13858
March 14, 2016 4:49pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8052.DWG

1A	ISSUED FOR FERC	15MAR16	PROJ. ENG. VP		
1	ISSUED FOR FERC	23FEB16	CHECKED BY: DOB		
0	ISSUED FOR FERC FILING	21OCT15	DRAWN BY: RSM		
REV.#	DESCRIPTION	DATE	SCALE: AS SHOWN	DATE	

IG #

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 50.1R TO MP 50.25

LOC.: SUMMIT COUNTY, OHIO REV.: 1A
YR.: 2017 W.O. DWG.NO. HANO-P-8052



LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	◇ M 00 P
CONSTRUCTION LIMIT	▬
PERMANENT ROW	[- - - -]
ADDITIONAL TEMPORARY WORKSPACE	🟦
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	
STRUCTURES	
POWERLINES	
CONTOUR LINE	- - - 1200 - - -
SILT FENCE	—□—□—□—
STRAW BALE	
FOREIGN PIPELINES	
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	+++
ROAD CL	
WATER PIPELINE	—W—W—
UTILITY LINE	
PROPERTY LINE	— PL —
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
WATER	⊕
OIL	⊕
UNKNOWN	⊕
MAINLINE VALVE (MLV)	
BLOW OFF VALVE	
HORIZONTAL DIRECTIONAL DRILLING	◉
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1B

DESCRIPTION:

AT SURVEY STATION 2656+20 THERE IS A BARN LOCATED 20' TO THE RIGHT OF THE CWS AND 80' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2657+69 THERE IS A SHED LOCATED 16' TO THE RIGHT OF THE CWS AND 76' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2658+48 THERE IS A DWELLING LOCATED 43' TO THE LEFT OF THE CWS AND 92' LEFT OF THE PROPOSED 36" PIPELINE.

1B

REVISION 1B:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES, UTILITY LINES, AND FOREIGN PIPELINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED PRIVATE ROAD, POOL AND UTILITY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1B

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 15, 2016 9:35am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8053.DWG

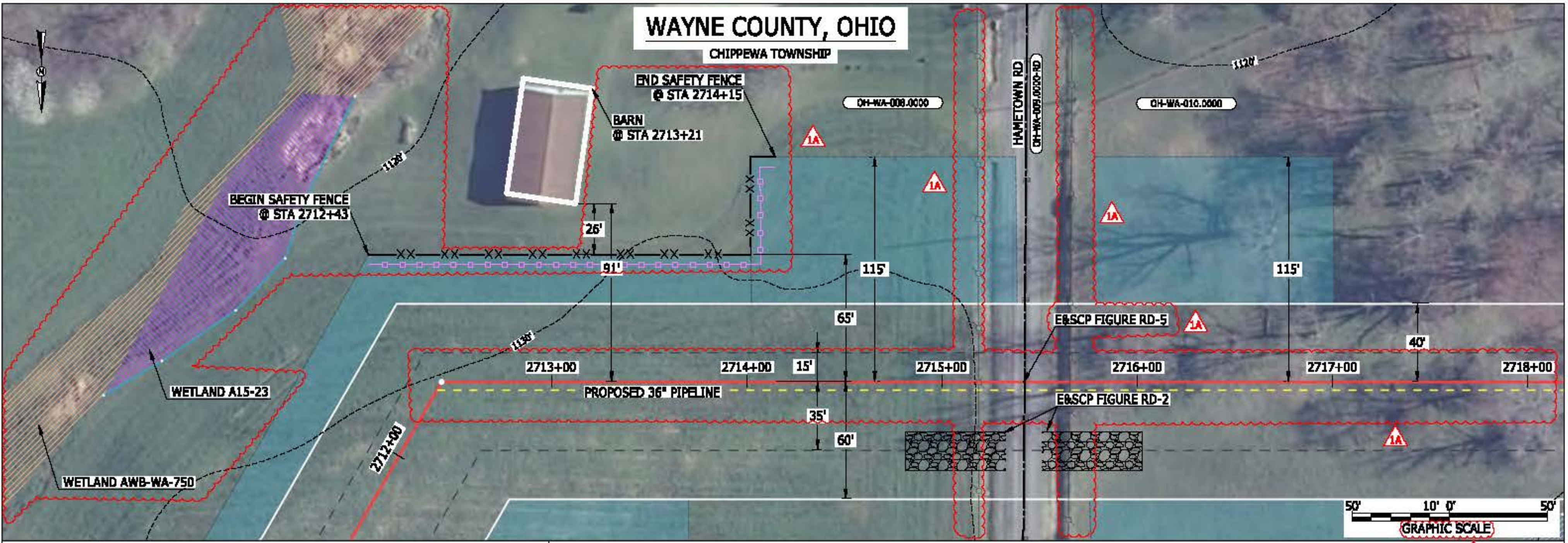
IG#	REV.#	DESCRIPTION	DATE
	1B	ISSUED FOR FERC	15MAR16
	1A	ISSUED FOR FERC	26FEB16
	1	ISSUED FOR FERC	23FEB16
	0	ISSUED FOR FERC FILING	21OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1B
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 50.25 TO MP 50.41

LOC.: SUMMIT COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. HANO-P-8053

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST (MP 00)
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, WATER, OIL, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 2713+21 THERE IS A BARN LOCATED 26' TO THE LEFT OF THE CWS AND 91' LEFT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

CENTERLINE SHIFTED TO AVOID OVERLAP WITH EXISTING UTILITY EASEMENT. ASSOCIATED TWS/ATWS UPDATED ACCORDINGLY
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
RESOURCE PARTIALLY CHANGED TO AG-PEM WETLAND BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 4:52pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8054.DWG

1A	ISSUED FOR FERC	15MAR16	
1	ISSUED FOR FERC	23FEB16	
0	ISSUED FOR FERC FILING	21OCT15	
REV.#	DESCRIPTION	DATE	

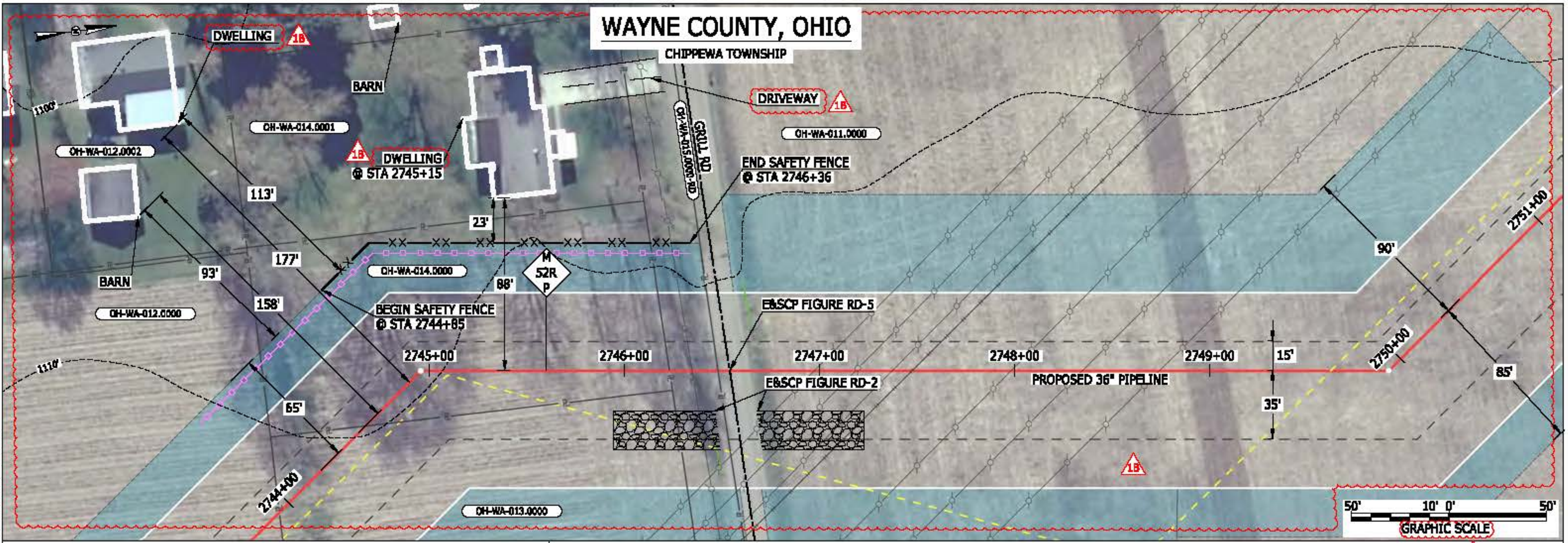
IG #

PROJ. ENG. VP	
CHECKED BY: DOB	
DRAWN BY: RSM	
SCALE: AS SHOWN	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 51.35 TO MP 51.48R

LOC.: WAYNE COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8054

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD PAR-0.0
- TEMPORARY ACCESS ROAD TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE 1280'
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER 00-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1B

DESCRIPTION:

AT SURVEY STATION 2745+15 THERE IS A DWELLING LOCATED 23' TO THE LEFT OF THE CWS AND 88' LEFT OF THE PROPOSED 36" PIPELINE.

1B

REVISION 1B:

CENTERLINE SHIFTED TO AVOID OVERLAP WITH EXISTING UTILITY EASEMENT. ASSOCIATED TWS/ATWS UPDATED ACCORDINGLY.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1B

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

PROJ. ENG.	VP
CHECKED BY:	DOB
DRAWN BY:	RSM 1B
SCALE:	AS SHOWN
DATE	

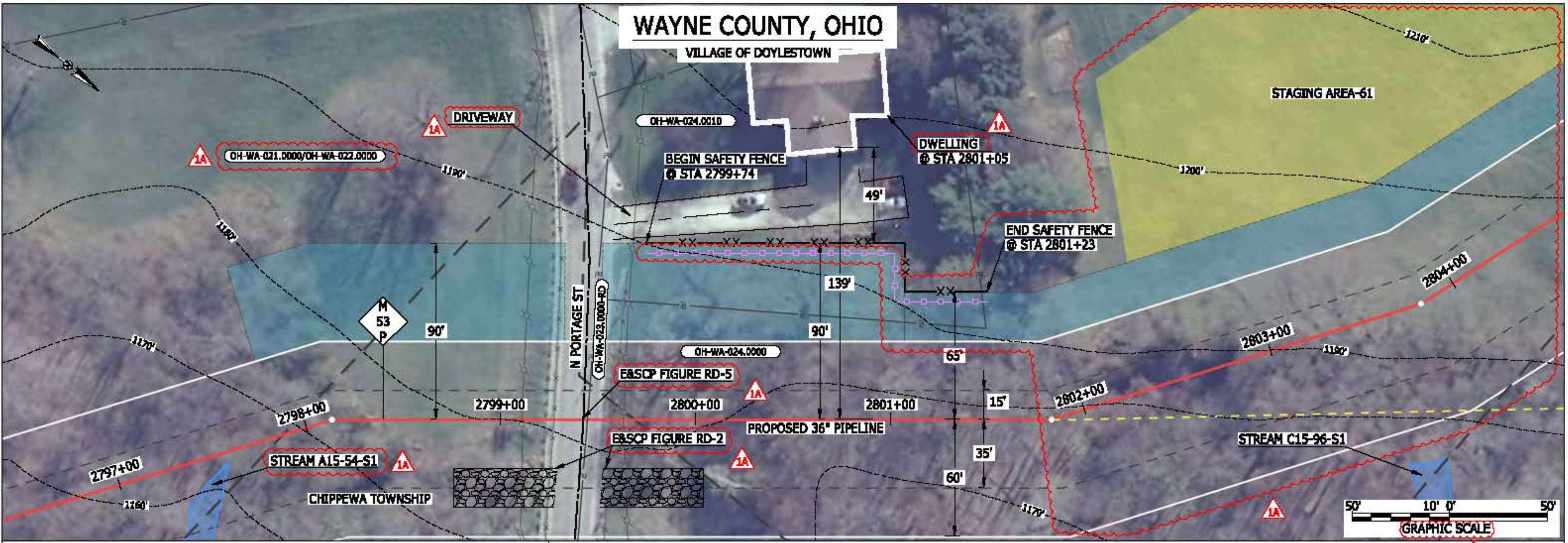
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 51.96R TO MP 52.11R 1B

LOC.: WAYNE COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. HANO-P-8055

NEXUS GAS TRANSMISSION

IG #

MES13858 March 14, 2016 1:10pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\HANO\HANO-P-8055.DWG



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST (M 00 P)
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE (1200)
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE (T)
- FENCE (x)
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE (W)
- UTILITY LINE
- PROPERTY LINE (PL)
- SAFETY FENCE (XX)
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS ⊕ WATER ⊕
- OIL ⊕ UNKNOWN ⊕
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE ● FIRE HYDRANT
- MICROWAVE TOWER ☒ TOWER ☒
- TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 2801+05 THERE IS A DWELLING LOCATED 49' TO THE LEFT OF THE CWS AND 139' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

CENTERLINE REROUTED TO AVOID A PONDED WETLAND. TWS/ATWS ADJUSTED. STAGING AREA TRIMMED TO MINIMIZE IMPACTS TO TREES.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT . UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 1:11pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8056.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

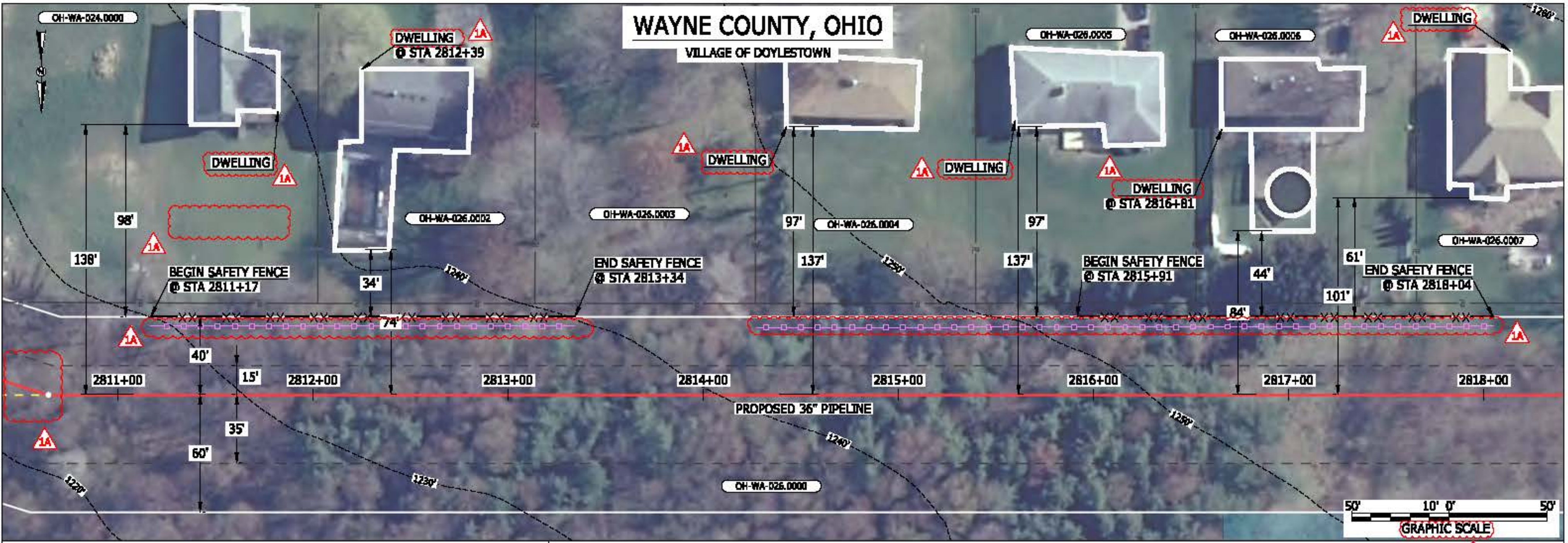
IG#

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 52.96 TO MP 53.12R

LOC.: WAYNE COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8056

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, WATER, OIL, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 2812+39 THERE IS A DWELLING LOCATED 34' TO THE LEFT OF THE CWS AND 74' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2816+81 THERE IS A DWELLING LOCATED 44' TO THE LEFT OF THE CWS AND 84' LEFT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

CENTERLINE REROUTED TO AVOID A PONDED WETLAND.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 8:57am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8057.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

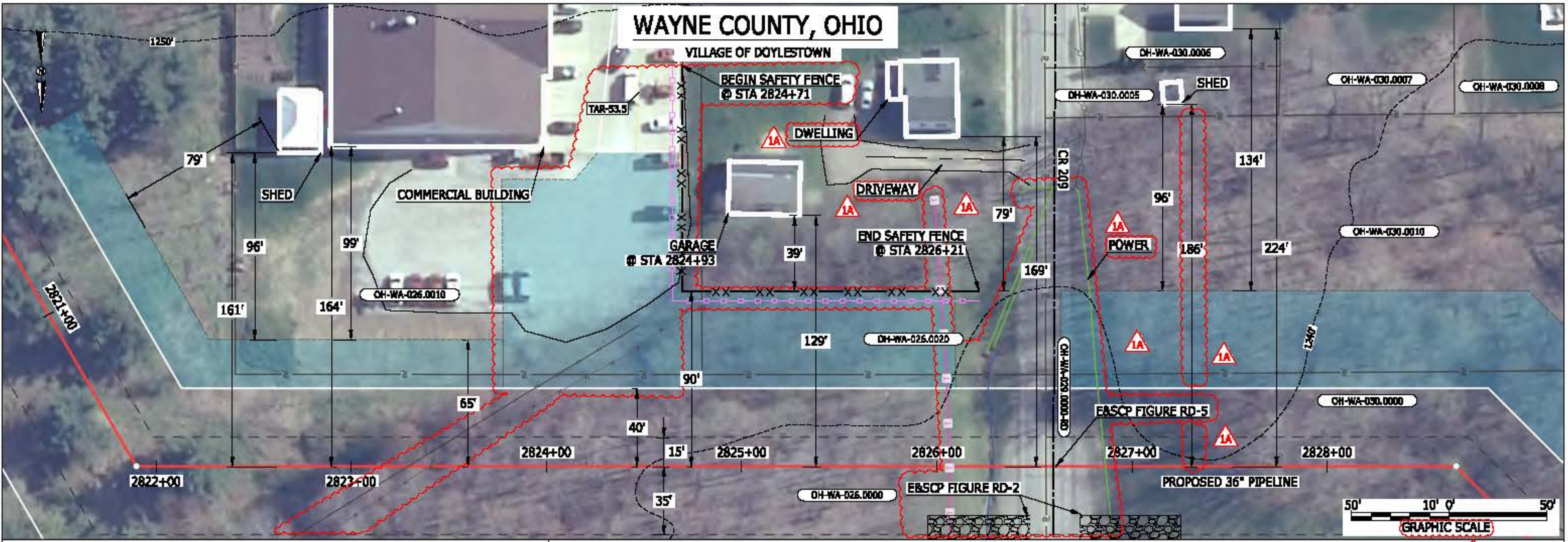
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
1A MP 53.21R TO MP 53.38

LOC.: WAYNE COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8057

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS WATER
OIL UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE FIRE HYDRANT
MICROWAVE TOWER TOWER
TANK

1A

DESCRIPTION:

AT SURVEY STATION 2824+93 THERE IS A GARAGE LOCATED 39' TO THE LEFT OF THE CWS AND 129' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

TAR AND ATWS ADJUSTED TO PROVIDE BETTER ACCESS TO ROW.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
SAFETY FENCE, PROPERTY BOUNDARIES, UTILITY LINES, FOREIGN PIPELINE, AND FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
ADDED DRIVEWAY AND UTILITY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8058.DWG
8:59am
MES13858
March 14, 2016
IG.#

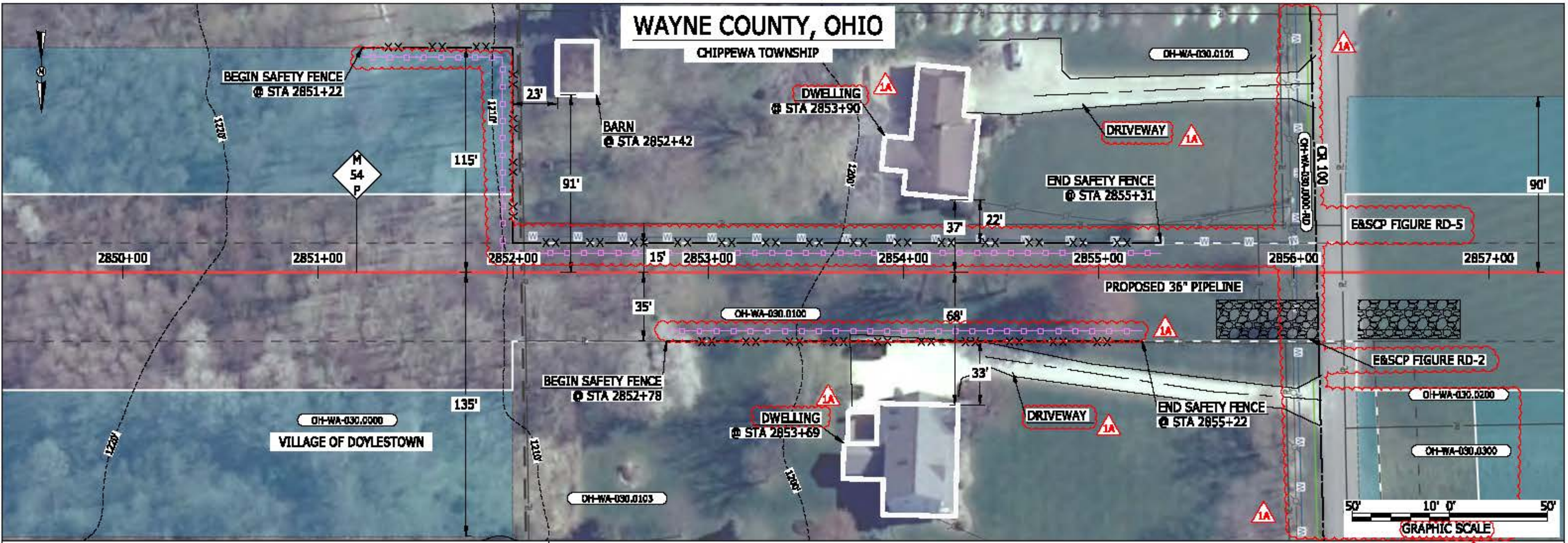
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15
REV.#	DESCRIPTION	DATE

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 53.42 TO MP 53.58

LOC.: WAYNE COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO–P–8058

NEXUS
GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD PAR-0.0
- TEMPORARY ACCESS ROAD TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER 00-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS, WATER, OIL, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 2852+42 THERE IS A BARN LOCATED 23' TO THE LEFT OF THE CWS AND 91' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2853+90 THERE IS A DWELLING LOCATED 22' TO THE LEFT OF THE CWS AND 37' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2853+69 THERE IS A DWELLING LOCATED 33' TO THE RIGHT OF THE CWS AND 68' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

NEW CATHODIC PROTECTION SITE 4B ADDED. ASSOCIATED TWS/ATWS UPDATED.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT AND UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 9:04am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8059.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

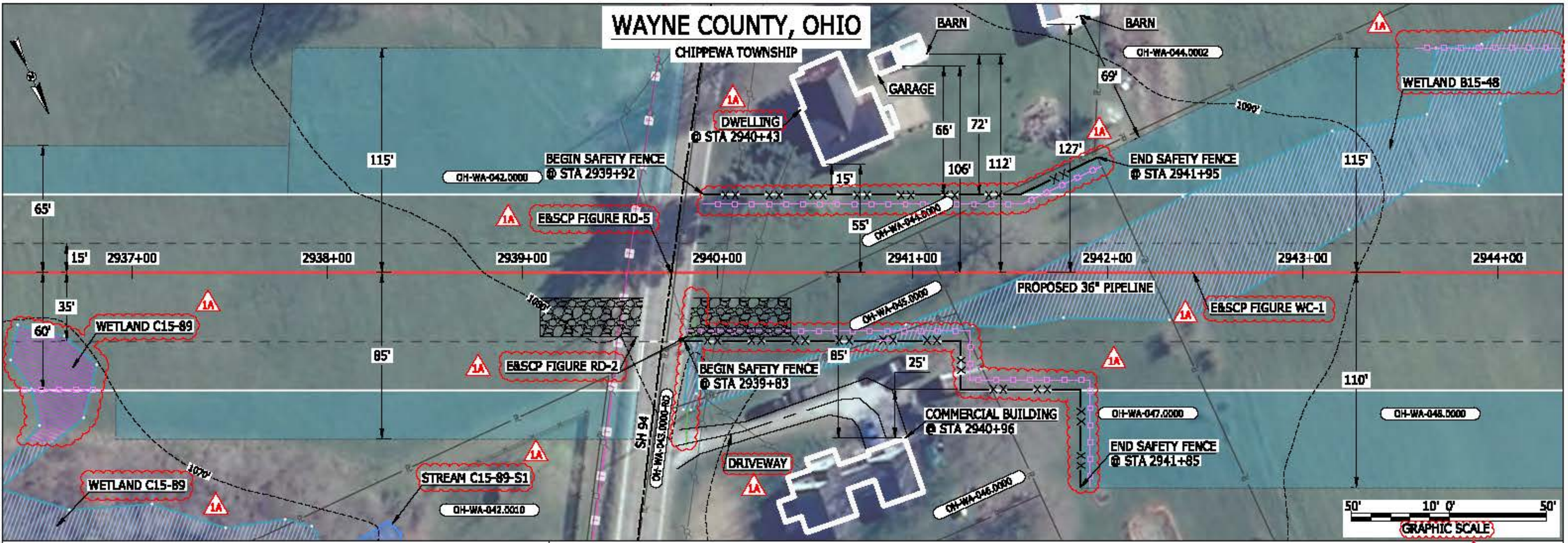
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 53.97 TO MP 54.12

LOC.: WAYNE COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8059

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	🟥	POWERLINES	
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE		CONTOUR LINE	120'
INTERCONNECTING PIPELINE		SILT FENCE	
PIPELINE MILEPOST	M 00 P	STRAW BALE	
		FOREIGN PIPELINES	
		TELEPHONE	T T
CONSTRUCTION LIMIT		FENCE	x x
PERMANENT ROW		RAILROAD TRACK	
ADDITIONAL TEMPORARY WORKSPACE		ROAD CL	
STAGING AREA	🟨	WATER PIPELINE	W W
WAREYARD	🟩	UTILITY LINE	
ROCK ACCESS PAD		PROPERTY LINE	PL
PERMANENT ACCESS ROAD	PAR-0.0	SAFETY FENCE	XX XX
TEMPORARY ACCESS ROAD	TAR-0.0	TRACT NUMBER	00-XX-000.0000
DELINEATED WATERBODY BANK		MUNICIPALITY LINE	
DELINEATED WETLAND BOUNDARY		WELL: GAS / WATER	
AGRICULTURAL PEM WETLAND BOUNDARY		OIL / UNKNOWN	
DELINEATED WATERBODY CENTERLINE		MAINLINE VALVE (MLV)	
APPROXIMATE WATERBODY BANK		BLOW OFF VALVE	
APPROXIMATE WETLAND BOUNDARY		HORIZONTAL DIRECTIONAL DRILLING	
APPROXIMATE WATERBODY CENTERLINE		LIGHT POLE / FIRE HYDRANT	
STRUCTURES		MICROWAVE TOWER / TOWER	☒ ☒
		TANK	●

1A

DESCRIPTION:

AT SURVEY STATION 2940+96 THERE IS A COMMERCIAL BUILDING LOCATED 25' TO THE RIGHT OF THE CWS AND 85' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2940+43 THERE IS A DWELLING LOCATED 15' TO THE LEFT OF THE CWS AND 55' LEFT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

RESOURCE HAS BEEN PARTIALLY RECLASSIFIED AS AN AG-PEM WETLAND BASED ON UPDATED FIELD SURVEY WETLAND DATA.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858
March 14, 2016 2:18pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8062.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

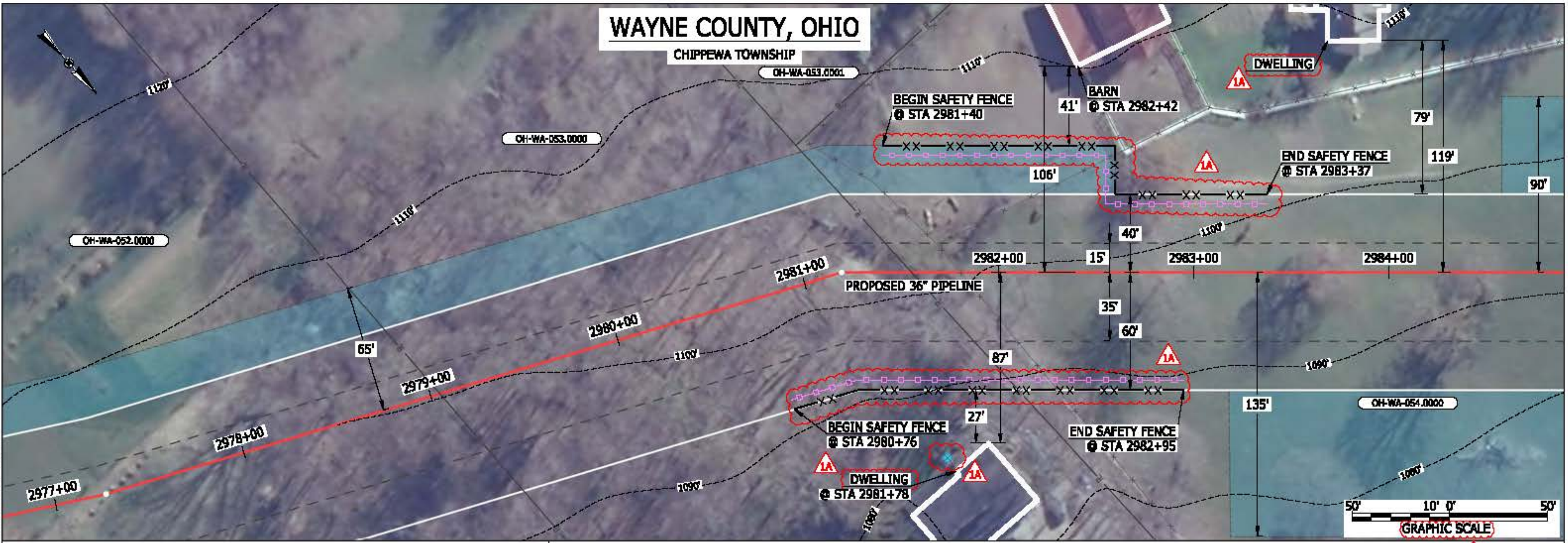
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
1A MP 55.61 TO MP 55.76

LOC.: WAYNE COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8062

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	
INTERCONNECTING PIPELINE	
PIPELINE MILEPOST	M 00 P
CONSTRUCTION LIMIT	
PERMANENT ROW	
ADDITIONAL TEMPORARY WORKSPACE	
STAGING AREA	
WAREYARD	
ROCK ACCESS PAD	
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	
STRUCTURES	
POWERLINES	
CONTOUR LINE	1200'
SILT FENCE	
STRAW BALE	
FOREIGN PIPELINES	
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	
ROAD CL	
WATER PIPELINE	—W—W—
UTILITY LINE	
PROPERTY LINE	— PL —
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	
WELL: GAS	●
WELL: WATER	●
WELL: OIL	●
WELL: UNKNOWN	●
MAINLINE VALVE (MLV)	
BLOW OFF VALVE	
HORIZONTAL DIRECTIONAL DRILLING	●
LIGHT POLE	●
FIRE HYDRANT	●
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A

DESCRIPTION:

1A

AT SURVEY STATION 2981+78 THERE IS A DWELLING LOCATED 27' TO THE RIGHT OF THE CWS AND 87' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2982+42 THERE IS A BARN LOCATED 41' TO THE LEFT OF THE CWS AND 106' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WATER WELL ADDED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858
March 14, 2016 4:54pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\HANO\HANO-P-8063.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

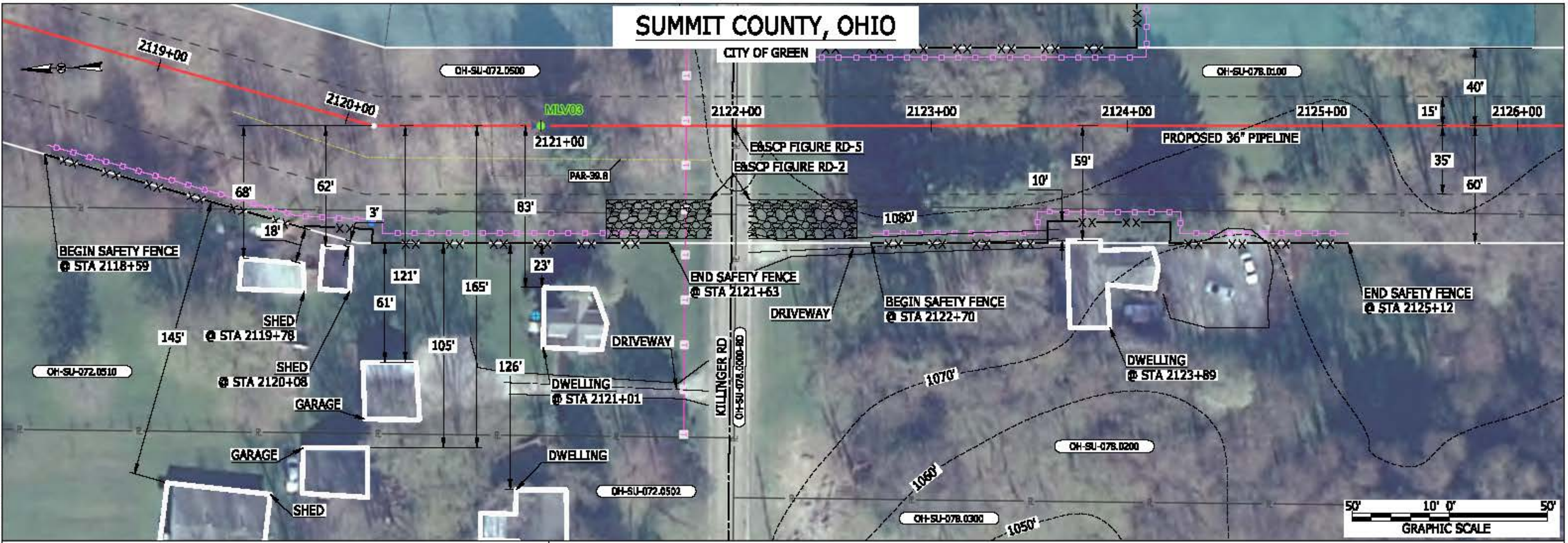
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 56.38 TO MP 56.53

LOC.: WAYNE COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8063

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	◇ M 00 P
CONSTRUCTION LIMIT	═
PERMANENT ROW	⬚
ADDITIONAL TEMPORARY WORKSPACE	🟦
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	—
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	—
STRUCTURES	
POWERLINES	
CONTOUR LINE	- - - 1200 - - -
SILT FENCE	—□—□—□—□—
STRAW BALE	—⊞—⊞—⊞—⊞—
FOREIGN PIPELINES	—+—+—+—+—
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	—+—+—+—+—
ROAD CL	—— - ——
WATER PIPELINE	—W—W—
UTILITY LINE	——
PROPERTY LINE	—— PL ——
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
OIL	⊕
WATER	⊕
UNKNOWN	⊕
MAINLINE VALVE (MLV)	⋈
BLOW OFF VALVE	⋈
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

DESCRIPTION:

AT SURVEY STATION 2119+78 THERE IS A SHED LOCATED 18' TO THE RIGHT OF THE CWS AND 68' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2120+08 THERE IS A SHED LOCATED 3' TO THE RIGHT OF THE CWS AND 62' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2121+01 THERE IS A DWELLING LOCATED 23' TO THE RIGHT OF THE CWS AND 83' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2123+89 THERE IS A DWELLING LOCATED ON EDGE THE CWS AND 59' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG HANO-P-8071 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1A:

CENTERLINE REROUTED DUE TO STAKEHOLDER INPUT, UPDATED CIVIL SURVEY AND WETLAND SURVEY.
VALVE, TWS/ATWS AND RESOURCES UPDATED ACCORDINGLY.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858
March 14, 2016 9:07am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\ADDITIONAL\HANO-P-8070.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC	23FEB16

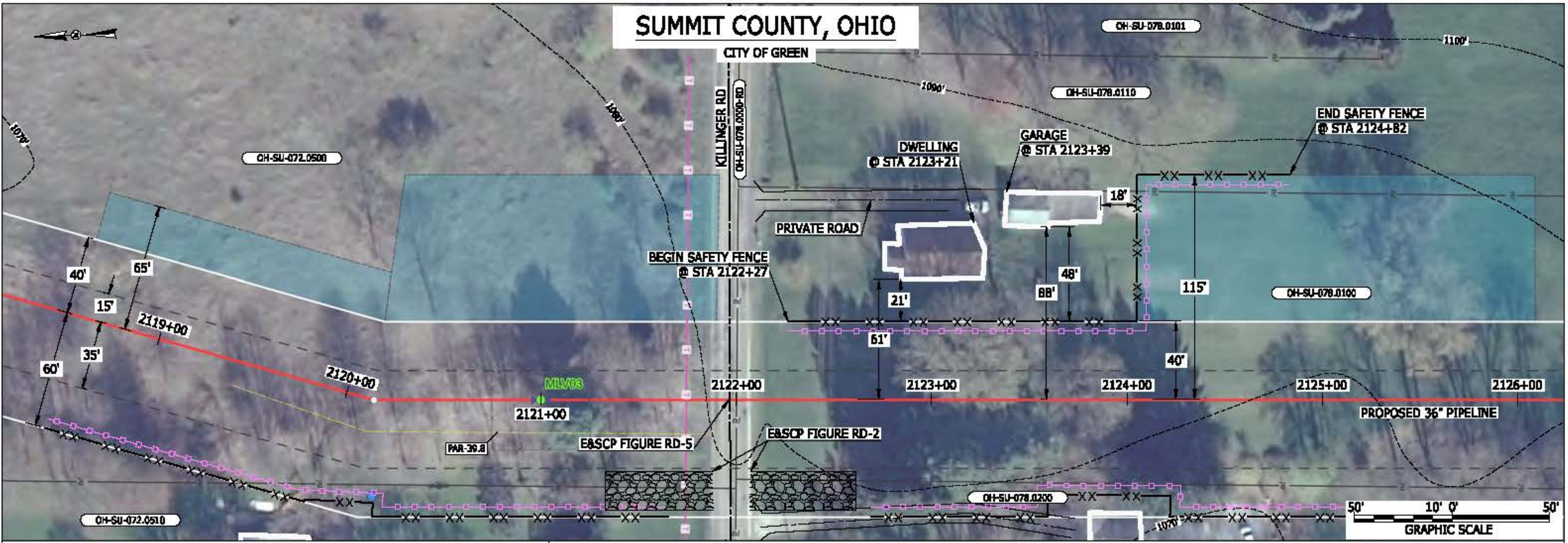
IG #

PROJ. ENG. VP	
CHECKED BY: DOB	
DRAWN BY: RSM	
SCALE: AS SHOWN	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 40.12R TO MP 40.27R

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8070

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE —T—T—
FENCE —x—x—
RAILROAD TRACK
ROAD CL
WATER PIPELINE —W—W—
UTILITY LINE
PROPERTY LINE
SAFETY FENCE —XX—XX—
TRACT NUMBER OO-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ● WATER ● OIL ● UNKNOWN ●
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING ●
LIGHT POLE ● FIRE HYDRANT ●
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

DESCRIPTION:

AT SURVEY STATION 2123+21 THERE IS A DWELLING LOCATED 21' TO THE LEFT OF THE CWS AND 61' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2123+39 THERE IS A GARAGE LOCATED 48' TO THE LEFT OF THE CWS AND 88' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :
1. SEE DWG HANO-P-8070 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1A:
CENTERLINE REROUTED DUE TO STAKEHOLDER INPUT, UPDATED CIVIL SURVEY AND WETLAND SURVEY.
VALVE, TWS/ATWS AND RESOURCES UPDATED ACCORDINGLY.

NOTES:
1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 9:08am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\ADDITIONAL\HANO-P-8071.DWG

1A	ISSUED FOR FERC	15MAR16	
1	ISSUED FOR FERC	23FEB16	
0	ISSUED FOR FERC	23FEB16	
REV.#	DESCRIPTION	DATE	

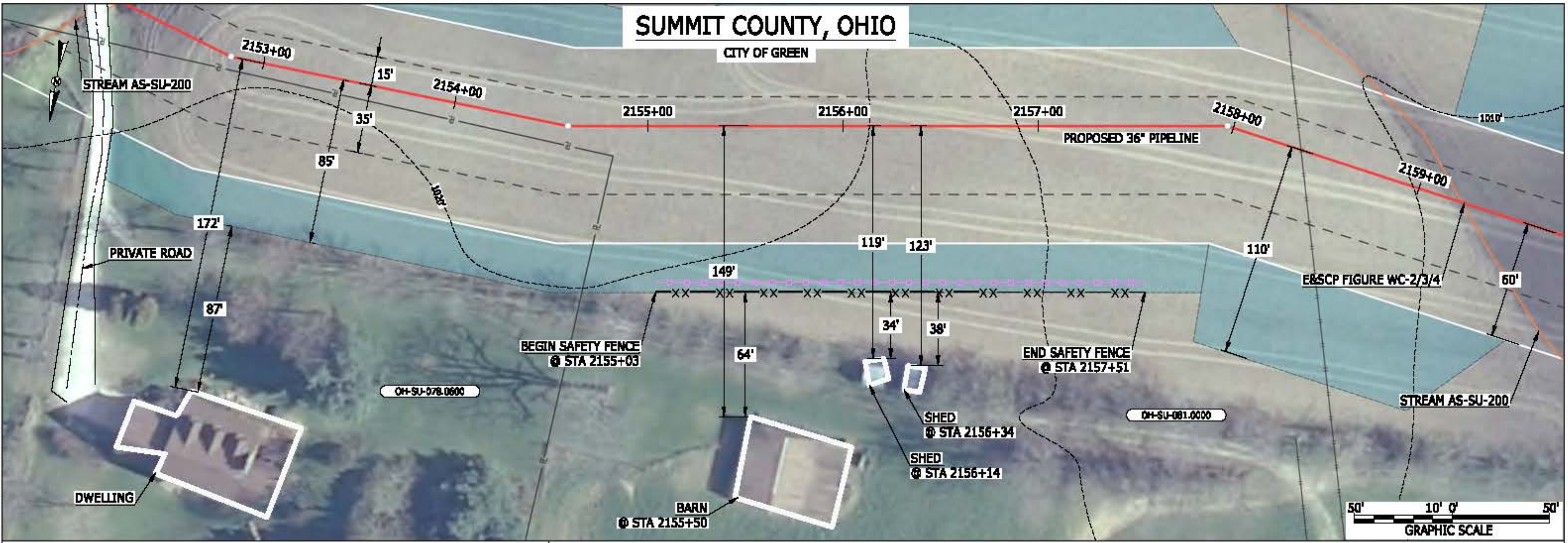
PROJ. ENG. VP	
CHECKED BY: DOB	
DRAWN BY: RSM	
SCALE: AS SHOWN	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 40.12R TO MP 40.27R

LOC.: SUMMIT COUNTY, OHIO		REV.: 1A
YR.: 2017	W.O.	DWG.NO. HANO-P-8071

NEXUS GAS TRANSMISSION

IG #



LEGEND

PROPOSED NEXUS PIPELINE	🟥	POWERLINES	—ᵒ—ᵒ—
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -	CONTOUR LINE	- - - -1200- - - -
INTERCONNECTING PIPELINE	🟪	SILT FENCE	—□—□—□—□—
PIPELINE MILEPOST	M 00 P	STRAW BALE	—▥—▥—▥—▥—
		FOREIGN PIPELINES	—+—+—+—+—
CONSTRUCTION LIMIT	▬	TELEPHONE	—T—T—
PERMANENT ROW	[- - - -]	FENCE	—x—x—
ADDITIONAL TEMPORARY WORKSPACE	🟦	RAILROAD TRACK	—+—+—+—+—
STAGING AREA	🟨	ROAD CL	—— - ——
WAREYARD	🟩	WATER PIPELINE	—W—W—
ROCK ACCESS PAD	▨	UTILITY LINE	——
PERMANENT ACCESS ROAD	PAR-0.0	PROPERTY LINE	—— PL ——
TEMPORARY ACCESS ROAD	TAR-0.0	SAFETY FENCE	—XX—XX—
DELINEATED WATERBODY BANK	🟦	TRACT NUMBER	00-XX-000.0000
DELINEATED WETLAND BOUNDARY	🟦	MUNICIPALITY LINE	— — —
AGRICULTURAL PEM WETLAND BOUNDARY	🟪	WELL: GAS ⊕ WATER ⊕	
DELINEATED WATERBODY CENTERLINE	——	OIL ⊕ UNKNOWN ⊕	
APPROXIMATE WATERBODY BANK	🟧	MAINLINE VALVE (MLV)	⋈
APPROXIMATE WETLAND BOUNDARY	🟧	BLOW OFF VALVE	⋈
APPROXIMATE WATERBODY CENTERLINE	——	HORIZONTAL DIRECTIONAL DRILLING	⊙
STRUCTURES	▨	LIGHT POLE ● FIRE HYDRANT ⊕	
		MICROWAVE TOWER ☒ TOWER ☒	
		TANK	●

DESCRIPTION:

AT SURVEY STATION 2156+14 THERE IS A SHED LOCATED 34' TO THE RIGHT OF THE CWS AND 119' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2156+34 THERE IS A SHED LOCATED 38' TO THE RIGHT OF THE CWS AND 123' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

CENTERLINE REROUTED DUE TO STAKEHOLDER INPUT, UPDATED CIVIL SURVEY AND WETLAND SURVEY. TWS/ATWS AND RESOURCES UPDATED ACCORDINGLY.

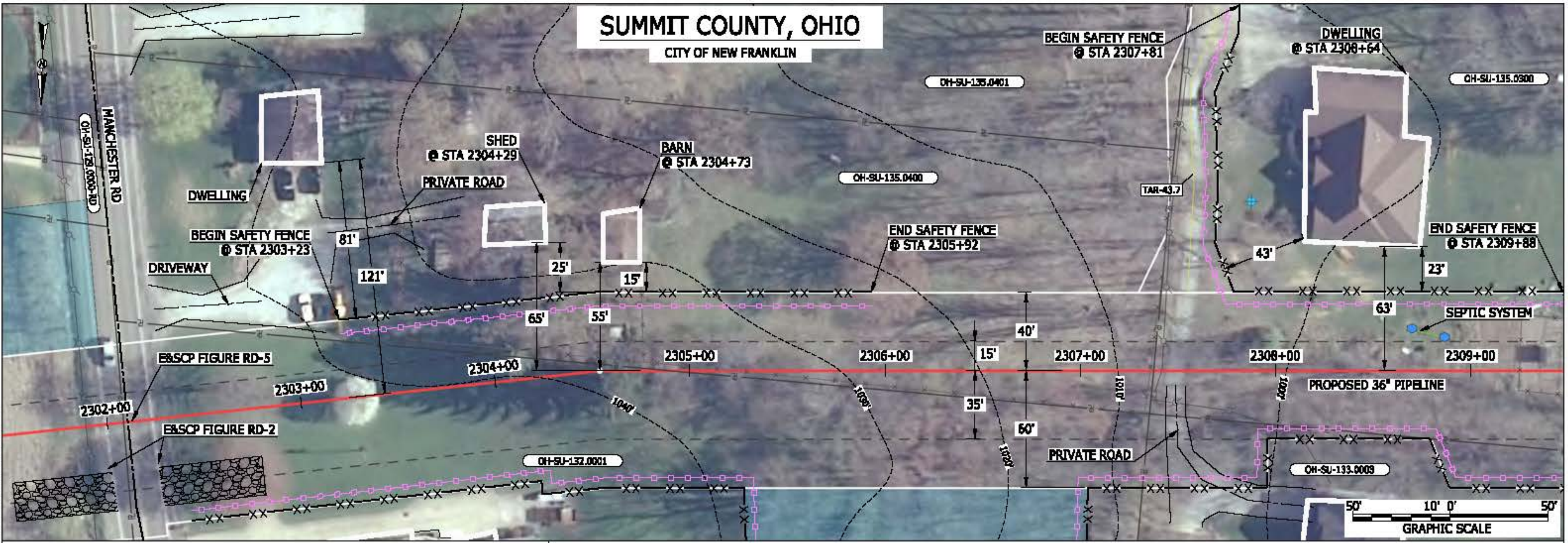
NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858
March 14, 2016 9:09am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\ADDITIONAL\HANO-P-8072.DWG

					TITLE: NEXUS GAS TRANSMISSION PROJECT RESIDENTIAL DRAWING MP 40.76R TO MP 40.9R		NEXUS GAS TRANSMISSION
1A	ISSUED FOR FERC	15MAR16		PROJ. ENG. VP			
1	ISSUED FOR FERC	23FEB16		CHECKED BY: DOB			
0	ISSUED FOR FERC	23FEB16		DRAWN BY: RSM	LOC.: SUMMIT COUNTY, OHIO	REV.: 1A	
REV.#	DESCRIPTION	DATE		SCALE: AS SHOWN	YR.: 2017	W.O.	DWG.NO. HANO-P-8072

IG #



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD PAR-0.0
- TEMPORARY ACCESS ROAD TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER 00-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS WATER OIL UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

DESCRIPTION:

AT SURVEY STATION 2304+29 THERE IS A SHED LOCATED 25' TO THE LEFT OF THE CWS AND 65' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2304+73 THERE IS A BARN LOCATED 15' TO THE LEFT OF THE CWS AND 55' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2308+64 THERE IS A DWELLING LOCATED 23' TO THE LEFT OF THE CWS AND 63' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG HANO-P-8074 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1B:

CENTERLINE REROUTED TO AVOID STRUCTURES AND WORKSPACE CONSTRAINTS.
TWS/ATWS AND RESOURCES UPDATED BASED ON UPDATED FIELD SURVEY WETLAND/WATERBODY DATA.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 9:11am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\ADDITIONAL\HANO-P-8073.DWG

IG#

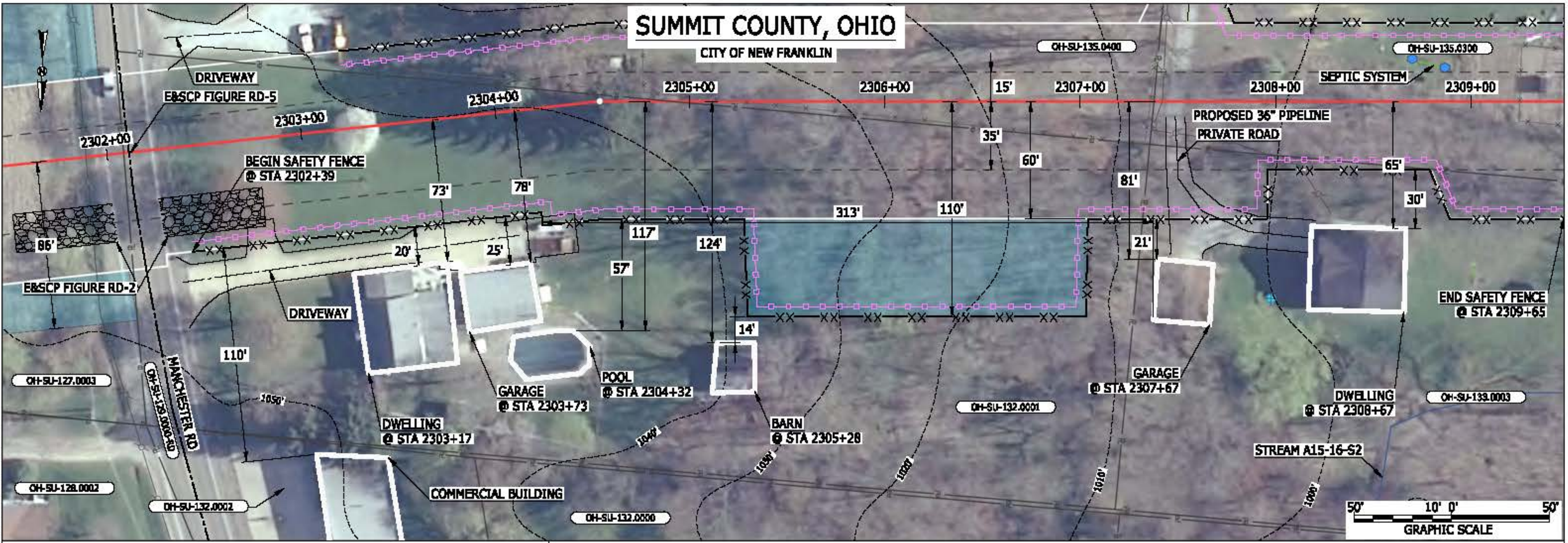
REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC	23FEB16

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 43.59R TO MP 43.74R

LOC.: SUMMIT COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. HANO-P-8073

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER OO-XX-000.0000
MUNICIPALITY LINE
WELL: GAS WATER
OIL UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE FIRE HYDRANT
MICROWAVE TOWER TOWER
TANK

DESCRIPTION:

AT SURVEY STATION 2303+17 THERE IS A DWELLING LOCATED 20' TO THE RIGHT OF THE CWS AND 73' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2303+73 THERE IS A GARAGE LOCATED 25' TO THE RIGHT OF THE CWS AND 78' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2305+28 THERE IS A BARN LOCATED 14' TO THE RIGHT OF THE CWS AND 124' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2307+67 THERE IS A GARAGE LOCATED 21' TO THE RIGHT OF THE CWS AND 81' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2308+67 THERE IS A DWELLING LOCATED 30' TO THE RIGHT OF THE CWS AND 65' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG HANO-P-8073 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1B:

CENTERLINE REROUTED TO AVOID STRUCTURES AND WORKSPACE CONSTRAINTS.
TWS/ATWS AND RESOURCES UPDATED BASED ON UPDATED FIELD SURVEY WETLAND/WATERBODYDATA.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

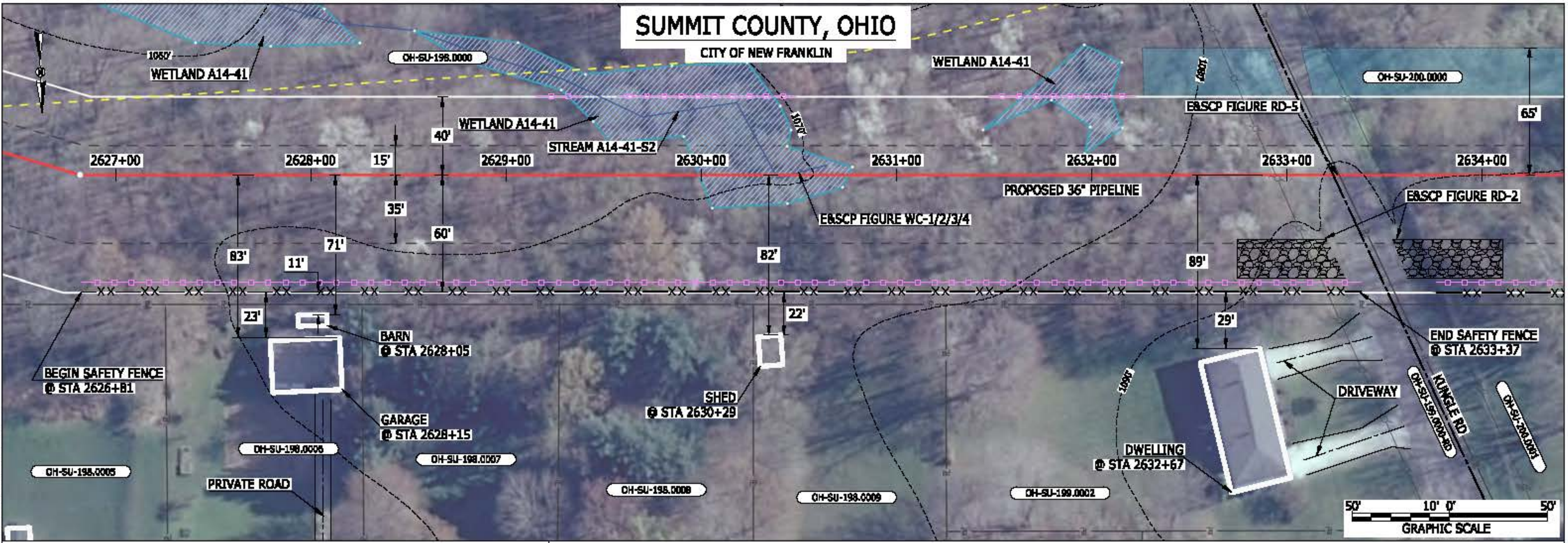
IG.#	REV.#	DESCRIPTION	DATE
	1B	ISSUED FOR FERC	15MAR16
	1A	ISSUED FOR FERC	26FEB16
	1	ISSUED FOR FERC	23FEB16
	0	ISSUED FOR FERC	23FEB16

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 43.59R TO MP 43.74R

LOC.: SUMMIT COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. HANO-P-8074

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

DESCRIPTION:

AT SURVEY STATION 2628+05 THERE IS A BARN LOCATED 11' TO THE RIGHT OF THE CWS AND 71' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2628+15 THERE IS A GARAGE LOCATED 23' TO THE RIGHT OF THE CWS AND 83' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2630+29 THERE IS A SHED LOCATED 22' TO THE RIGHT OF THE CWS AND 82' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2632+67 THERE IS A DWELLING LOCATED 29' TO THE RIGHT OF THE CWS AND 89' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG HANO-P-8076 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1A:

CENTERLINE REROUTED TO AVOID PARALLELING A STREAM.
ASSOCIATED TWS/ATWS AND RESOURCES UPDATED BASED ON FIELD SURVEY WETLAND/WATERBODY DATA.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 9:14am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\ADDITIONAL\HANO-P-8075.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC	23FEB16

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

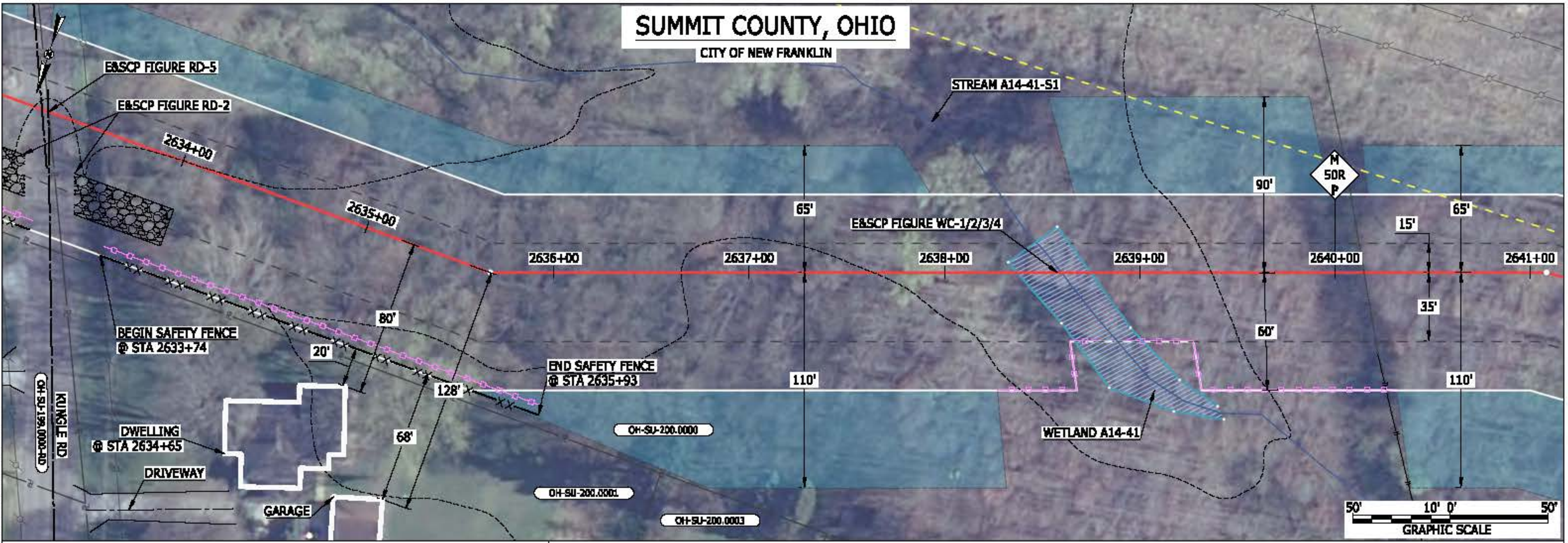
TITLE:

NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 49.74R TO MP 49.89R

LOC.: SUMMIT COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8075

NEXUS GAS TRANSMISSION

IG #:



MES13858 March 14, 2016 9:28am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\ADDITIONAL\HANO-P-8076.DWG

LEGEND

PROPOSED NEXUS PIPELINE	🟥	POWERLINES	—ዕ—ዕ—
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -	CONTOUR LINE	----1200----
INTERCONNECTING PIPELINE	🟪	SILT FENCE	—□—□—
PIPELINE MILEPOST	M 00 P	STRAW BALE	—▥—▥—
CONSTRUCTION LIMIT	═	FOREIGN PIPELINES	—ıı—ıı—
PERMANENT ROW	[- - -]	TELEPHONE	—T—T—
ADDITIONAL TEMPORARY WORKSPACE	🟦	FENCE	—x—x—
STAGING AREA	🟨	RAILROAD TRACK	—+—+—
WAREYARD	🟩	ROAD CL	—— - ——
ROCK ACCESS PAD	▨	WATER PIPELINE	—W—W—
PERMANENT ACCESS ROAD	PAR-0.0	UTILITY LINE	——
TEMPORARY ACCESS ROAD	TAR-0.0	PROPERTY LINE	—— PL ——
DELINEATED WATERBODY BANK		SAFETY FENCE	—XX—XX—
DELINEATED WETLAND BOUNDARY		TRACT NUMBER	OO-XX-000.0000
AGRICULTURAL PEM WETLAND BOUNDARY		MUNICIPALITY LINE	— — —
DELINEATED WATERBODY CENTERLINE		WELL: GAS ⊕ WATER ⊕	
APPROXIMATE WATERBODY BANK		OIL ⊕ UNKNOWN ⊕	
APPROXIMATE WETLAND BOUNDARY		MAINLINE VALVE (MLV)	⋈
APPROXIMATE WATERBODY CENTERLINE		BLOW OFF VALVE	⋈
STRUCTURES		HORIZONTAL DIRECTIONAL DRILLING	⊙
		LIGHT POLE ● FIRE HYDRANT ⊕	
		MICROWAVE TOWER ☒ TOWER ☒	
		TANK	●

DESCRIPTION:

AT SURVEY STATION 2634+65 THERE IS A DWELLING BUILDING LOCATED 20' TO THE RIGHT OF THE CWS AND 80' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES:

1. SEE DWG HANO-P-8075 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1A:

CENTERLINE REROUTED TO AVOID PARALLELING A STREAM.
ASSOCIATED TWS/ATWS AND RESOURCES UPDATED BASED ON FIELD SURVEY WETLAND/WATERBODY DATA.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
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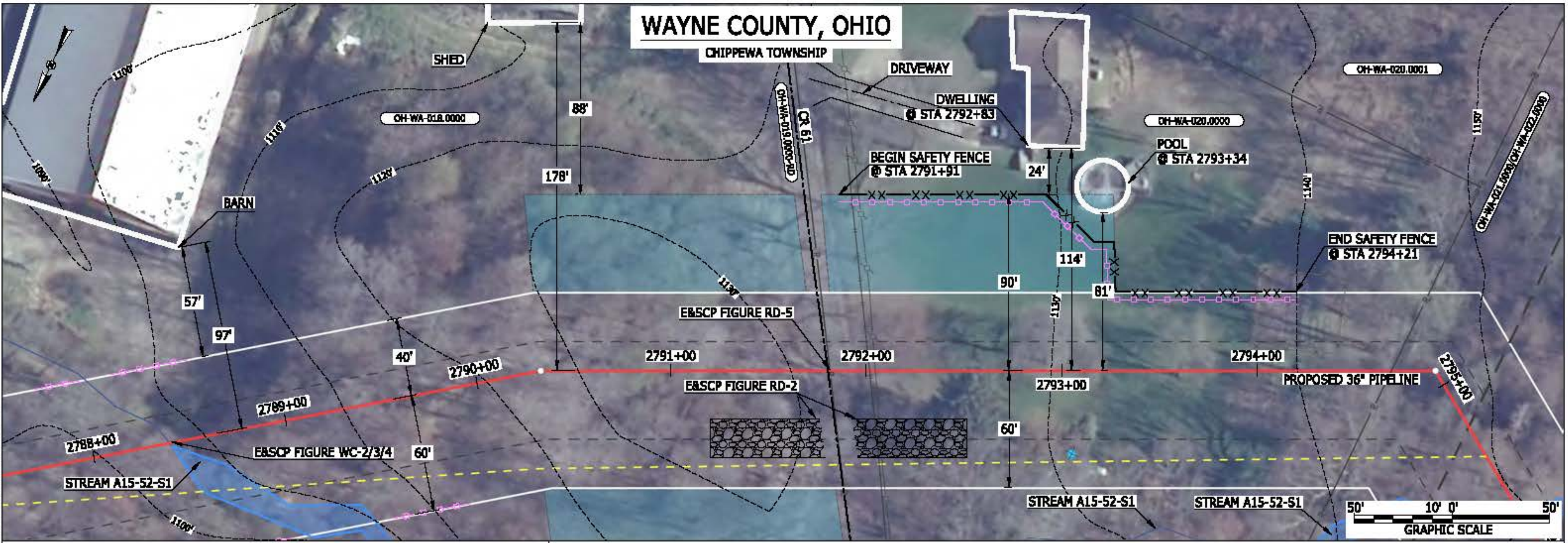
1A	ISSUED FOR FERC	15MAR16		PROJ. ENG. VP	
1	ISSUED FOR FERC	23FEB16		CHECKED BY: DOB	
0	ISSUED FOR FERC	23FEB16		DRAWN BY: RSM	
REV.#	DESCRIPTION	DATE		SCALE: AS SHOWN	DATE

IG #:

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 49.87R TO MP 50.02R

LOC.: SUMMIT COUNTY, OHIO		REV.: 1A
YR.: 2017	W.O.	**DWG.NO.** HANO-P-8076

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	🟥	POWERLINES	—⌀—⌀—
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -	CONTOUR LINE	-----1200'-----
INTERCONNECTING PIPELINE	🟪	SILT FENCE	—□—□—□—
PIPELINE MILEPOST	◇ M 00 P	STRAW BALE	—▯—▯—▯—
		FOREIGN PIPELINES	—+—+—+—
CONSTRUCTION LIMIT	▬	TELEPHONE	—T—T—
PERMANENT ROW	[- - - -]	FENCE	—x—x—
ADDITIONAL TEMPORARY WORKSPACE	▨	RAILROAD TRACK	—+—+—+—
STAGING AREA	🟨	ROAD CL	—— - ——
WAREYARD	🟩	WATER PIPELINE	—W—W—
ROCK ACCESS PAD	▨	UTILITY LINE	——
PERMANENT ACCESS ROAD	PAR-0.0	PROPERTY LINE	—— ℄ ——
TEMPORARY ACCESS ROAD	TAR-0.0	SAFETY FENCE	—XX—XX—
DELINEATED WATERBODY BANK	▨	TRACT NUMBER	00-XX-000.0000
DELINEATED WETLAND BOUNDARY	▨	MUNICIPALITY LINE	— — —
AGRICULTURAL PEM WETLAND BOUNDARY	▨	WELL: GAS ⊕ WATER ⊕	
DELINEATED WATERBODY CENTERLINE	——	OIL ⊕ UNKNOWN ⊕	
APPROXIMATE WATERBODY BANK	▨	MAINLINE VALVE (MLV)	⋈
APPROXIMATE WETLAND BOUNDARY	▨	BLOW OFF VALVE	⋈
APPROXIMATE WATERBODY CENTERLINE	——	HORIZONTAL DIRECTIONAL DRILLING	●
STRUCTURES	▨	LIGHT POLE ● FIRE HYDRANT ⊕	
		MICROWAVE TOWER ☒ TOWER ☒	
		TANK	●

DESCRIPTION:

AT SURVEY STATION 2792+83 THERE IS A DWELLING LOCATED 24' TO THE LEFT OF THE CWS AND 114' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 2793+34 THERE IS A POOL LOCATED ON EDGE OF THE CWS AND 81' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

CENTERLINE REROUTED TO AVOID PARALLELING A STREAM.
ASSOCIATED TWS/ATWS AND RESOURCES UPDATED BASED ON FIELD SURVEY WETLAND/WATERBODY DATA.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588
March 14, 2016 9:58am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\ADDITIONAL\HANO-P-8077.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC	23FEB16

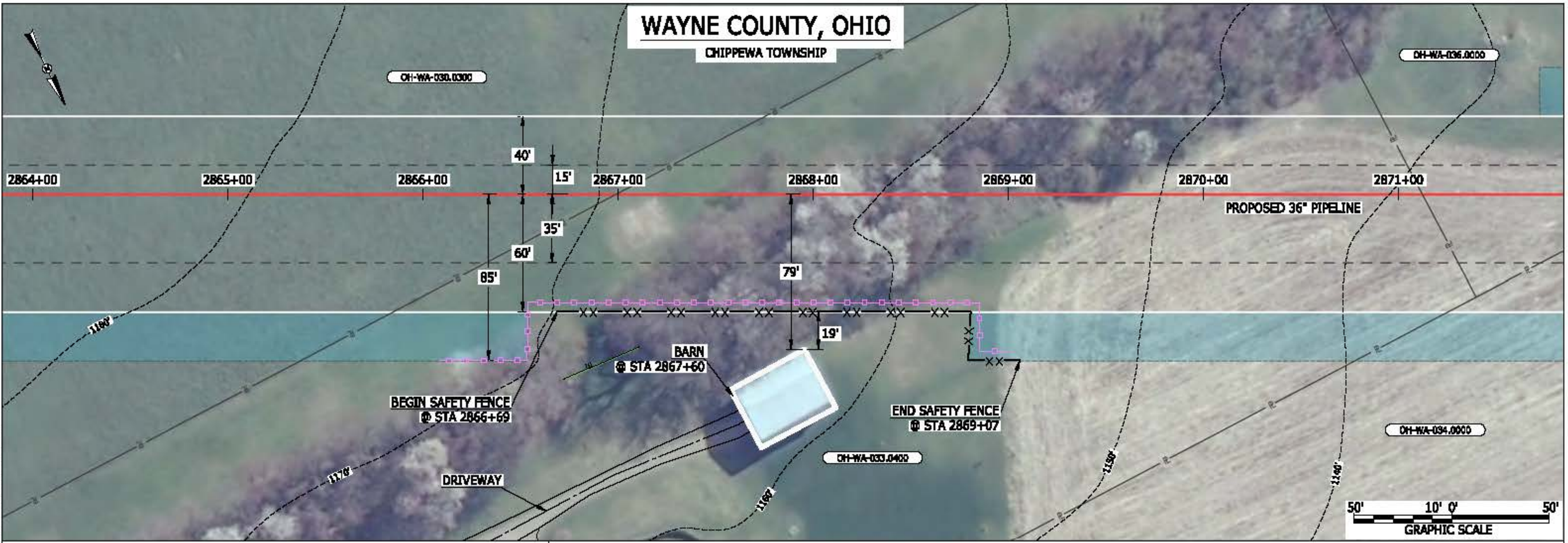
IG #

PROJ. ENG. VP		
CHECKED BY: DOB		
DRAWN BY: RSM		
SCALE: AS SHOWN	DATE	

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 52.8R TO MP 52.95

LOC.: WAYNE COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. HANO-P-8077

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD (PAR-0.0)
TEMPORARY ACCESS ROAD (TAR-0.0)
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER (00-XX-000.0000)
MUNICIPALITY LINE
WELL: GAS, OIL, WATER, UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE
FIRE HYDRANT
MICROWAVE TOWER
TOWER
TANK

DESCRIPTION:

AT SURVEY STATION 2867+60 THERE IS A BARN LOCATED 19' TO THE RIGHT OF THE CWS AND 79' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

CENTERLINE REROUTED PER LANDOWNER REQUEST AND ADJUSTED TO CHANGE THE CROSSING ANGLE OF AN EXISTING PIPELINE.
ASSOCIATED TWS/ATWS ADJUSTED ACCORDINGLY.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588
March 14, 2016 10:00am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\ADDITIONAL\HANO-P-8078.DWG

1A	ISSUED FOR FERC	15MAR16	
1	ISSUED FOR FERC	23FEB16	
0	ISSUED FOR FERC	23FEB16	
REV.#	DESCRIPTION	DATE	

IG#

PROJ. ENG. VP	
CHECKED BY: DOB	
DRAWN BY: RSM	
SCALE: AS SHOWN	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 54.24R TO MP 54.39R

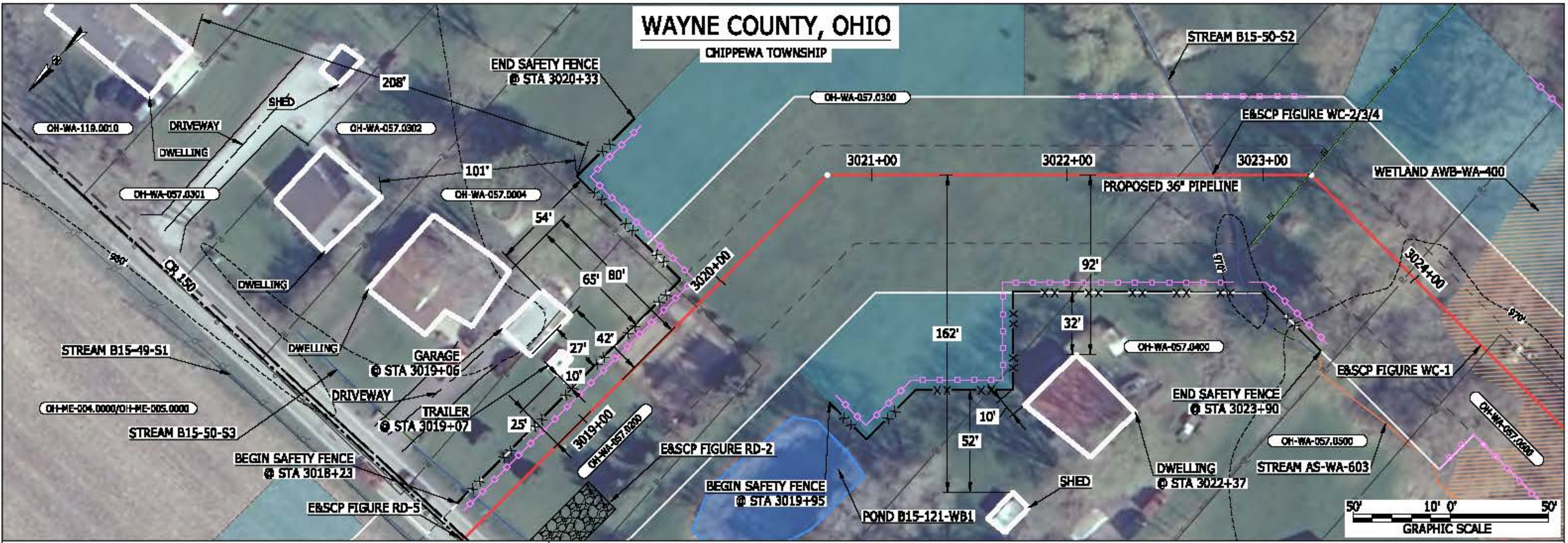
LOC.: WAYNE COUNTY, OHIO | REV.: 1A
YR.: 2017 | W.O. | DWG.NO. HANO-P-8078

NEXUS GAS TRANSMISSION

BEL24588
March 14, 2016 10:02am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\ADDITIONAL\HANO-P-8079.DWG

WAYNE COUNTY, OHIO

CHIPPEWA TOWNSHIP



LEGEND

PROPOSED NEXUS PIPELINE	🟥	POWERLINES	—⌀—⌀—
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -	CONTOUR LINE	----1200'----
INTERCONNECTING PIPELINE	🟪	SILT FENCE	—□—□—□—
PIPELINE MILEPOST	M 00 P	STRAW BALE	—▥—▥—▥—
		FOREIGN PIPELINES	—‖—‖—‖—
CONSTRUCTION LIMIT	═	TELEPHONE	—T—T—
PERMANENT ROW	[- - - -]	FENCE	—x—x—
ADDITIONAL TEMPORARY WORKSPACE	▭	RAILROAD TRACK	+—+—+—+
STAGING AREA	🟨	ROAD CL	—— - ——
WAREYARD	🟩	WATER PIPELINE	—W—W—
ROCK ACCESS PAD	▨	UTILITY LINE	——
PERMANENT ACCESS ROAD	PAR-0.0	PROPERTY LINE	—— PL ——
TEMPORARY ACCESS ROAD	TAR-0.0	SAFETY FENCE	—XX—XX—
DELINEATED WATERBODY BANK		TRACT NUMBER	(00-XX-000.0000)
DELINEATED WETLAND BOUNDARY		MUNICIPALITY LINE	— — —
AGRICULTURAL PEM WETLAND BOUNDARY		WELL: GAS ⊕ WATER ⊕	
DELINEATED WATERBODY CENTERLINE	——	OIL ⊕ UNKNOWN ⊕	
APPROXIMATE WATERBODY BANK		MAINLINE VALVE (MLV)	⋈
APPROXIMATE WETLAND BOUNDARY		BLOW OFF VALVE	⋈
APPROXIMATE WATERBODY CENTERLINE	——	HORIZONTAL DIRECTIONAL DRILLING	⊙
STRUCTURES		LIGHT POLE ● FIRE HYDRANT ⊕	
		MICROWAVE TOWER ☒ TOWER ☒	
		TANK	●

DESCRIPTION:

AT SURVEY STATION 3019+07 THERE IS A TRAILER LOCATED 10' TO THE LEFT OF THE CWS AND 25' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 3019+06 THERE IS A GARAGE LOCATED 27' TO THE LEFT OF THE CWS AND 42' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 3022+37 THERE IS A DWELLING LOCATED 10' TO THE RIGHT OF THE CWS AND 92' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

CENTERLINE REROUTED TO AVOID PARALLELING STATE ROAD EASEMENT.
TWS/ATWS ADJUSTED ACCORDINGLY. RESOURCES UPDATED BASED ON FIELD SURVEY WETLAND/WATERBODY DATA.

NOTES:

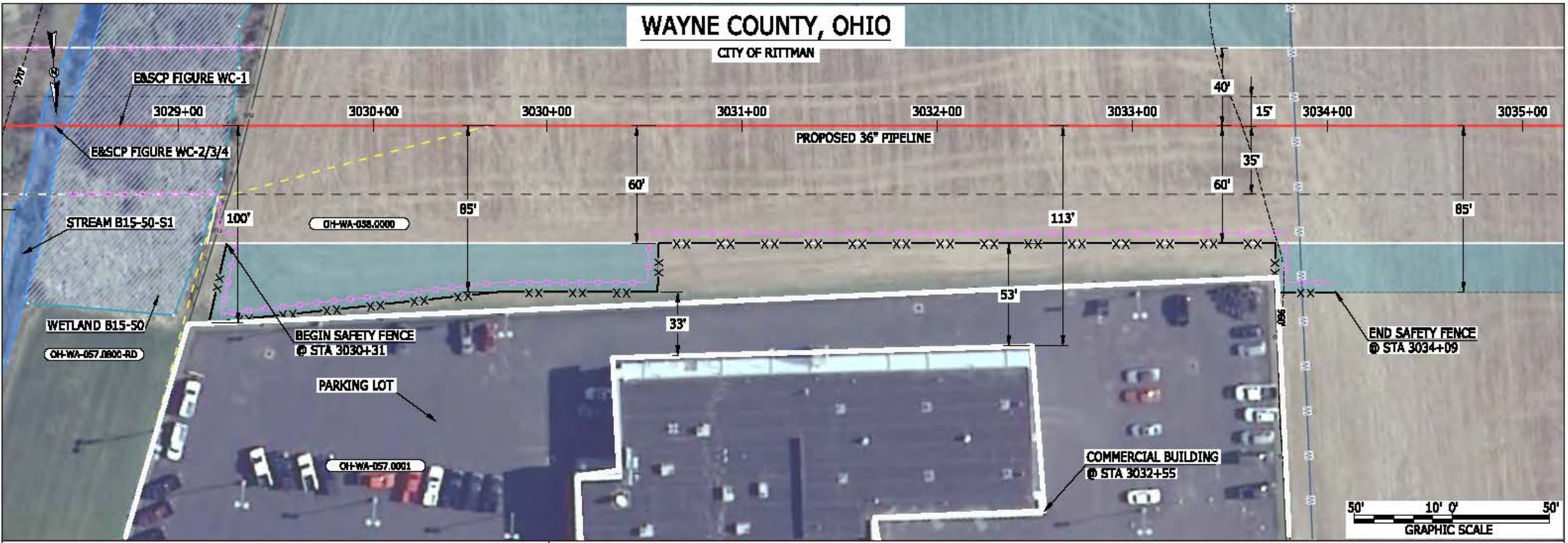
1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

IG #					
	1A	ISSUED FOR FERC	15MAR16	PROJ. ENG. VP	
	1	ISSUED FOR FERC	23FEB16	CHECKED BY: DOB	
	0	ISSUED FOR FERC	23FEB16	DRAWN BY: RSM	
	REV.#	DESCRIPTION	DATE	SCALE: AS SHOWN	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 57.16R TO MP 57.29R

LOC.: WAYNE COUNTY, OHIO		REV.: 1A
YR.: 2017	W.O.	**DWG.NO.** HANO-P-8079

NEXUS GAS TRANSMISSION



MES13858
March 15, 2016 2:45pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\ADDITIONAL\HANO-P-8080.DWG

LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	▬
PIPELINE MILEPOST	◇ M 00 P
CONSTRUCTION LIMIT	▬
PERMANENT ROW	[- - - -]
ADDITIONAL TEMPORARY WORKSPACE	▨
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	▬
DELINEATED WETLAND BOUNDARY	▬
AGRICULTURAL PEM WETLAND BOUNDARY	▬
DELINEATED WATERBODY CENTERLINE	▬
APPROXIMATE WATERBODY BANK	▬
APPROXIMATE WETLAND BOUNDARY	▬
APPROXIMATE WATERBODY CENTERLINE	▬
STRUCTURES	▬

POWERLINES	—o—o—
CONTOUR LINE	- - - - 1200 - - - -
SILT FENCE	—□—□—□—
STRAW BALE	—□□—□□—
FOREIGN PIPELINES	—+—+—+—
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	—+—+—+—
ROAD CL	—— - ——
WATER PIPELINE	—W—W—
UTILITY LINE	——
PROPERTY LINE	—— PL ——
SAFETY FENCE	—XX—XX—
TRACT NUMBER	(00-XX-000.0000)
MUNICIPALITY LINE	— — —
WELL: GAS	●
WATER	●
OIL	●
UNKNOWN	●
MAINLINE VALVE (MLV)	⋈
BLOW OFF VALVE	⋈
HORIZONTAL DIRECTIONAL DRILLING	●
LIGHT POLE	●
FIRE HYDRANT	●
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

DESCRIPTION:

AT SURVEY STATION 3032+55 THERE IS A COMMERCIAL BUILDING LOCATED 33' TO THE RIGHT OF THE CWS AND 113' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

CENTERLINE REROUTED TO AVOID PARALLELING STATE ROAD EASEMENT.
TWS/ATWS ADJUSTED ACCORDINGLY. RESOURCES UPDATED BASED ON FIELD SURVEY WETLAND/WATERBODY DATA.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

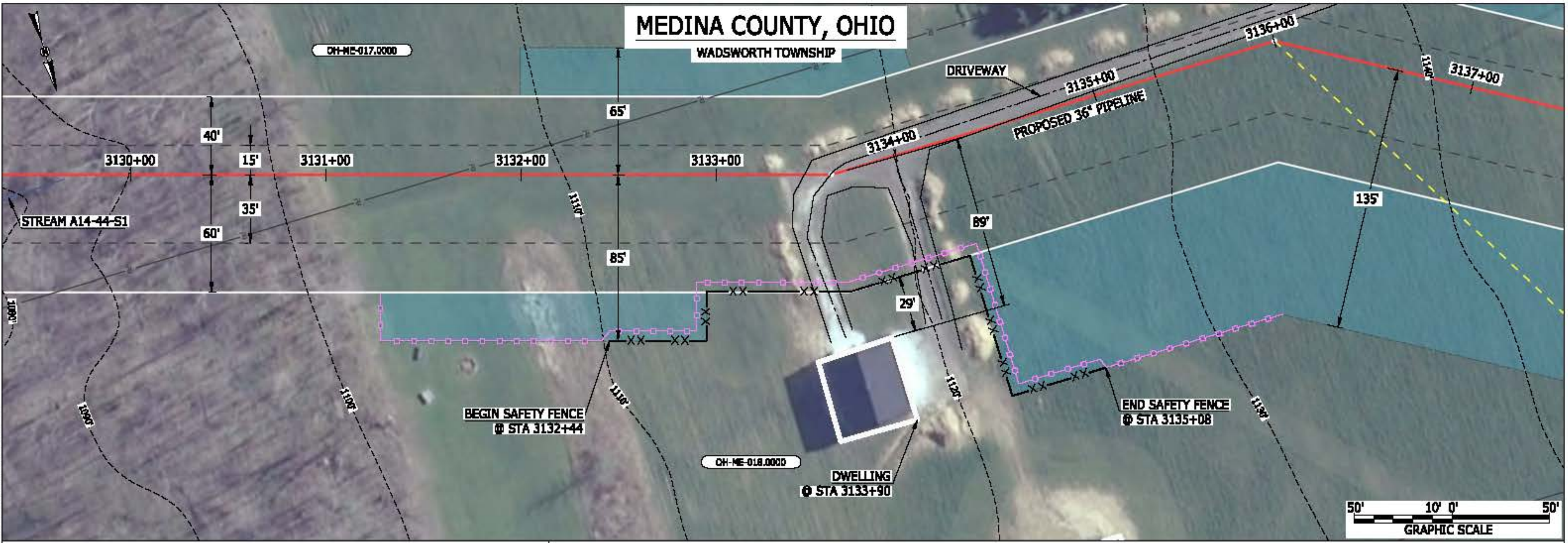
1A	ISSUED FOR FERC	15MAR16		PROJ. ENG. VP	
1	ISSUED FOR FERC	23FEB16		CHECKED BY: DOB	
0	ISSUED FOR FERC	23FEB16		DRAWN BY: RSM	
REV.#	DESCRIPTION	DATE		SCALE: AS SHOWN	DATE

IG #

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 57.35R TO MP 57.49

LOC.: WAYNE COUNTY, OHIO REV.: 1A
YR.: 2017 W.O. **DWG.NO.** HANO-P-8080

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	◇ M 00 P
CONSTRUCTION LIMIT	▬
PERMANENT ROW	[- - - -]
ADDITIONAL TEMPORARY WORKSPACE	🟦
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	—
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	—
STRUCTURES	

POWERLINES	
CONTOUR LINE	- - - 1200' - - -
SILT FENCE	—□—□—□—
STRAW BALE	
FOREIGN PIPELINES	
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	—+—+—+—
ROAD CL	
WATER PIPELINE	—W—W—
UTILITY LINE	
PROPERTY LINE	—— PL ——
SAFETY FENCE	—XX—XX—
TRACT NUMBER	(00-XX-000.0000)
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
WELL: OIL	⊕
WATER	⊕
UNKNOWN	⊕
MAINLINE VALVE (MLV)	
BLOW OFF VALVE	
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

DESCRIPTION:

AT SURVEY STATION 3133+90 THERE IS A DWELLING LOCATED 29' TO THE RIGHT OF THE CWS AND 89' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

CENTERLINE REROUTED DUE TO LANDOWNER REQUEST. TWS/ATWS UPDATED ACCORDINGLY.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588
March 14, 2016 10:05am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\ADDITIONAL\HANO-P-8081.DWG

IG #	1A	ISSUED FOR FERC	15MAR16	
	1	ISSUED FOR FERC	23FEB16	
	0	ISSUED FOR FERC	23FEB16	
	REV.#	DESCRIPTION	DATE	

PROJ. ENG. VP	
CHECKED BY: DOB	
DRAWN BY: RSM	
SCALE: AS SHOWN	DATE

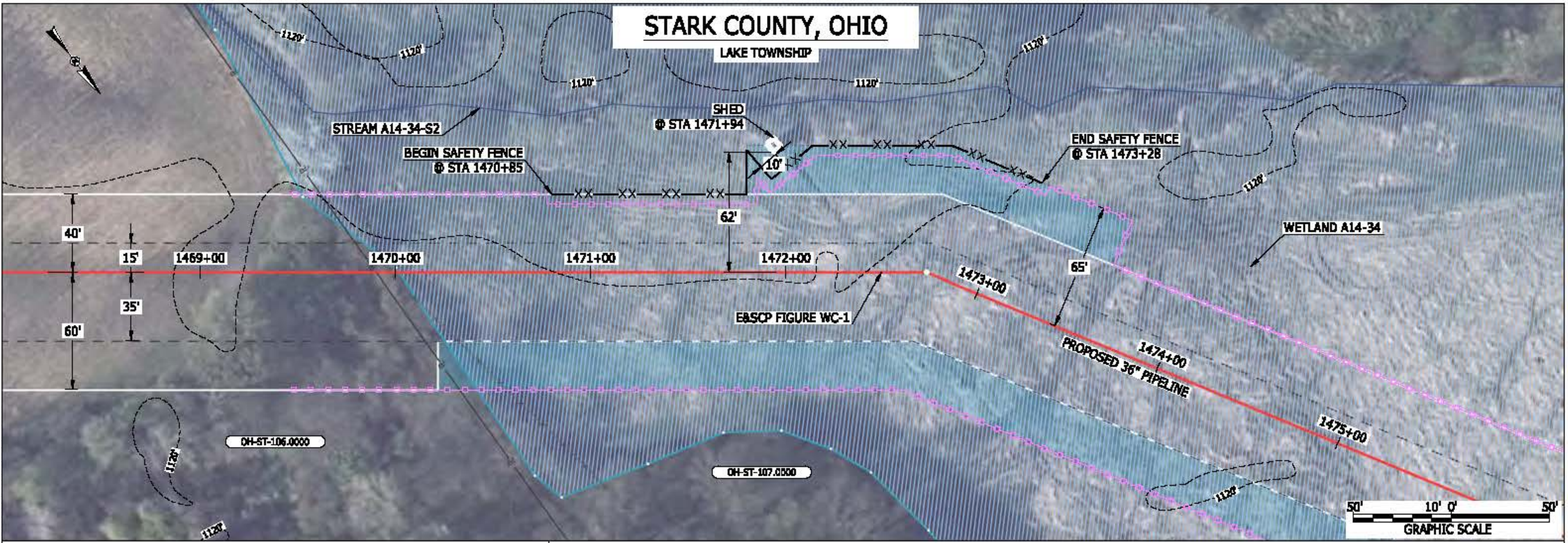
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 59.27 TO MP 59.42R

LOC.: MEDINA COUNTY, OHIO		REV.: 1A
YR.: 2017	W.O.	**DWG.NO.** HANO-P-8081

NEXUS
GAS TRANSMISSION

STARK COUNTY, OHIO

LAKE TOWNSHIP



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST ◇ M 00 P
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE ------1200------
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE —T—T—
FENCE —X—X—
RAILROAD TRACK
ROAD CL
WATER PIPELINE —W—W—
UTILITY LINE
PROPERTY LINE — PL —
SAFETY FENCE —XX—XX—
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING ⊙
LIGHT POLE ● FIRE HYDRANT ⊕
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

DESCRIPTION:

AT SURVEY STATION 1471+94 THERE IS A SHED LOCATED INSIDE OF THE CWS AND 62' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

STRUCTURE HAS BEEN UPDATED BASED ON UPDATED FIELD SURVEY CIVIL DATA.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

IG #				
	1A	ISSUED FOR FERC	15MAR16	
	1	ISSUED FOR FERC	23FEB16	
	0	ISSUED FOR FERC	23FEB16	
	REV.#	DESCRIPTION	DATE	

PROJ. ENG. VP	
CHECKED BY: DOB	
DRAWN BY: RSM	
SCALE: AS SHOWN	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 27.8 TO MP 27.96

LOC.: STARK COUNTY, OHIO		REV.: 1A
YR.: 2017	W.O.	**DWG.NO.** HANO-P-8082

NEXUS GAS TRANSMISSION

GENERAL

IN GENERAL, THE FOLLOWING MEASURES WILL BE TAKEN ON RESIDENTIAL PROPERTIES:

- LOCAL RESIDENTS WILL BE NOTIFIED OF THE PROPOSED CONSTRUCTION SCHEDULE IN ADVANCE OF CONSTRUCTION ACTIVITIES.
- SAFETY FENCE WILL BE INSTALLED ALONG THE EDGE OF THE CONSTRUCTION WORKSPACE (CWS) FOR A MINIMUM OF 100 FEET ON BOTH SIDES OF RESIDENCES, TO MAINTAIN EQUIPMENT, MATERIAL AND SPOIL WITHIN THE CWS.
- PRESERVE ALL MATURE TREES AND LANDSCAPING WHERE PRACTICAL, CONSISTENT WITH CONSTRUCTION SAFETY. UNLESS OTHERWISE AGREED WITH THE LANDOWNER.
- COMPLETE INSTALLATION OF WELDED PIPELINE SECTIONS AS QUICKLY AS REASONABLY POSSIBLE, CONSISTENT WITH PRUDENT PIPELINE CONSTRUCTION PRACTICES, TO MINIMIZE CONSTRUCTION TIME AFFECTING RESIDENCES.
- BACKFILL THE TRENCH AS SOON AS THE PIPELINE IS INSTALLED OR PLACE TEMPORARY STEEL PLATES OVER THE TRENCH TO MAINTAIN LAND OWNER ACCESS, AS NECESSARY.
- COMPLETE FINAL CLEANUP (INCLUDING FINAL GRADING) AND INSTALLATION OF PERMANENT EROSION CONTROL MEASURES WITHIN 10 DAYS AFTER THE TRENCH IS BACKFILLED, WEATHER CONDITIONS PERMITTING.
- CONFIGURE USE OF CWS TO PROVIDE ACCESS FOR EMERGENCY VEHICLES AND TO RESIDENTIAL DRIVEWAYS, INCLUDING MATERIALS AVAILABLE ON SITE TO PROVIDE TEMPORARY BRIDGING ACROSS THE PIPELINE TRENCH IF NECESSARY.
- ACCESS TO HOMES WILL BE MAINTAINED DURING CONSTRUCTION EXCEPT FOR THE BRIEF PERIOD ESSENTIAL FOR LAYING THE NEW PIPELINE, IN WHICH CASE HOME OWNERS WILL BE NOTIFIED IN ADVANCE.
- WHERE THE PIPELINE FACILITIES CROSS RESIDENTIAL PROPERTIES, TOPSOIL WILL BE STRIPPED AND STOCKPILED SEPARATELY FROM THE SUBSOIL DURING GRADING WITHIN THE CONSTRUCTION WORKSPACE.
- DISTURBED RESIDENTIAL LAWNS WILL BE RESEEDED WITH A SEED MIXTURE ACCEPTABLE TO LANDOWNER OR COMPARABLE TO THE ADJOINING LAWN.
- FOR EROSION AND SEDIMENTATION TYPICAL FIGURES REFER TO DWG ES-0001 THRU DWG ES-0038.

CONSTRUCTION TECHNIQUES

- EXCAVATION OF THE PIPELINE TRENCH WILL NOT BE INITIATED UNTIL THE PIPE IS READY FOR INSTALLATION IN LOCATIONS WHERE THE PIPELINE CENTERLINE IS WITHIN 25 FEET OF A RESIDENCE. 1A
- ONE OF THE FOLLOWING TECHNIQUES SHALL BE UTILIZED FOR A LONGITUDINAL DISTANCE OF 100 FEET EITHER SIDE OF AN OCCUPIED RESIDENTIAL STRUCTURE LOCATED WITHIN 50 FEET OF THE CWS:
    - STOVE-PIPE CONSTRUCTION TECHNIQUE - THIS TECHNIQUE IS TYPICALLY USED WHEN THE PIPELINE IS TO BE INSTALLED IN VERY CLOSE PROXIMITY TO AN EXISTING STRUCTURE AND AN OPEN TRENCH WOULD HAVE AN ADVERSE EFFECT. THE TECHNIQUE INVOLVES INSTALLING ONE JOINT OF PIPE AT A TIME, IN WHICH THE WELDING, WELD INSPECTION, AND COATING ACTIVITIES ARE ALL PERFORMED IN THE OPEN TRENCH, THEREBY REDUCING THE WIDTH OF THE CONSTRUCTION ROW.
    - DRAG SECTION TECHNIQUE - THIS TECHNIQUE IS ANOTHER METHOD THAT REDUCES THE WIDTH OF THE CONSTRUCTION ROW AND IS NORMALLY PREFERRED OVER THE STOVE-PIPE METHOD. THIS TECHNIQUE INVOLVES TRENCHING, INSTALLATION OF A PREFABRICATED LENGTH OF PIPE CONTAINING SEVERAL SEGMENTS, AND BACKFILLING, ALL IN ONE DAY.

WORKSPACE RESTRICTIONS

- EXISTING STRUCTURES INCLUDING BUT NOT LIMITED TO; FENCES, SHEDS, SWING-SETS, TRAMPOLINES, SHRUBBERY, TREES, GARDENS, FLOWERBEDS, POOLS WILL BE REMOVED FROM THE CWS. LANDOWNERS WILL BE MADE AWARE OF WHAT WILL BE RELOCATED DURING NEGOTIATIONS FOR TEMPORARY WORKSPACE AND DAMAGES.
- STRUCTURES WITHIN THE EXISTING PERMANENT EASEMENT AREA WILL BE ALLOWED TO BE RETURNED TO THE EXISTING PERMANENT EASEMENT PROVIDED THEY ARE NOT IN VIOLATION OF NEXUS' EXISTING PERMANENT EASEMENT RIGHTS THAT WILL BE MADE AVAILABLE TO LANDOWNERS UNLESS OTHERWISE AGREED WITH THE LAND OWNER.
- STRUCTURES OUTSIDE OF THE EXISTING PERMANENT EASEMENT; HOWEVER, WITHIN THE CONSTRUCTION WORKSPACE, WILL BE REPLACED AS CLOSE TO AS PRACTICABLE TO THEIR PREVIOUS LOCATIONS.
- REMOVAL AND REPLACEMENT RESPONSIBILITIES WILL BE ISSUES THAT ARE NEGOTIATED WITH EACH LANDOWNER.

ANTICIPATED CONSTRUCTION SCHEDULE

- PIPELINE CONSTRUCTION WORK IS TYPICALLY SCHEDULED TO TAKE ADVANTAGE OF DAYLIGHT HOURS, GENERALLY STARTING AT 7:00 A.M. AND COMPLETING AT 6:00 P.M. (6 DAYS A WEEK).
- AFFECTED LANDOWNERS WILL BE NOTIFIED IMMEDIATELY IF CONSTRUCTION WORK EXTENDS BEYOND THESE WORK HOURS.

PUBLIC SAFETY CONSIDERATIONS

- TRAFFIC CONTROL WILL CONSIST OF DEVICES OUTLINED IN STATE AND LOCAL CODES ACCOMPANIED BY LOCAL LAW ENFORCEMENT DETAILS AND QUALIFIED FLAGMEN TO SAFELY COORDINATE TRANSPORT OF PIPELINE CONSTRUCTION PERSONNEL, EQUIPMENT AND MATERIAL. CONSTRUCTION ACTIVITIES WILL NOT UNDULY OBSTRUCT OR RESTRICT TRAFFIC FLOW ON PUBLICALLY USED ROADS. 1A
- SITE SECURITY WILL BE EVALUATED ON A CASE BY CASE BASIS, EMPLOYING DAILY AND/OR 24 HOUR QUALIFIED SECURITY SERVICES AS REQUIRED. NEXUS WILL STAFF A LANDOWNER HOTLINE TO RECEIVE LANDOWNER CONSTRUCTION CONCERNS. THE TOLL-FREE LANDOWNER HOTLINE IS (844) 589-3655. THE LANDOWNER HOTLINE WILL BE STAFFED MONDAY THROUGH FRIDAY FROM 7 A.M. TO 5 P.M. AND ON SATURDAY FROM 7 A.M. TO 12 P.M. BY NEXUS RIGHT OF WAY PERSONNEL. OUTSIDE OF THESE HOURS, A CALL FORWARDING SYSTEM WILL BE AVAILABLE TO RECEIVE CALLS AND PAGE THE COMPLAINT RESOLUTION COORDINATOR. ALL CALLS WILL BE RETURNED WITHIN 24 HOURS OF RECEIPT.

OTHER CONSIDERATIONS

- FUGITIVE DUST WILL RESULT FROM LAND CLEARING, GRADING, EXCAVATION, CONCRETE WORK, AND VEHICLE TRAFFIC ON PAVED AND UNPAVED ROADS. THE AMOUNT OF DUST GENERATED WILL BE A FUNCTION OF CONSTRUCTION ACTIVITY, SOIL TYPE, SOIL MOISTURE CONTENT, WIND SPEED, PRECIPITATION, VEHICLE TRAFFIC, VEHICLE TYPES, AND ROADWAY CHARACTERISTICS. NEXUS WILL EMPLOY PROVEN CONSTRUCTION RELATED PRACTICES TO CONTROL FUGITIVE DUST SUCH AS APPLICATION OF WATER OR OTHER COMMERCIALLY AVAILABLE DUST CONTROL AGENTS ON UNPAVED AREAS SUBJECT TO FREQUENT VEHICLE TRAFFIC.
- NOISE MITIGATION MEASURES TO BE EMPLOYED DURING CONSTRUCTION INCLUDE USE OF SOUND MUFFLING DEVICES THAT ARE PROVIDED AS STANDARD EQUIPMENT BY THE CONSTRUCTION EQUIPMENT MANUFACTURERS. THE CONTRACTOR WILL KEEP THESE SOUND MUFFLING DEVICES IN GOOD WORKING ORDER DURING CONSTRUCTION.
- THE STORAGE OF HAZARDOUS MATERIALS INCLUDING CHEMICALS, FUELS, AND LUBRICATING OILS AND THE REFUELING OF CONSTRUCTION EQUIPMENT IS PROHIBITED WITHIN A 100 FEET OF ALL WATERBODIES, WETLANDS OR DESIGNATED MUNICIPAL WATERSHED AREAS IDENTIFIED IN THE RESIDENTIAL DRAWINGS. IF THE 100-FOOT SETBACK CANNOT BE MET, THIS ACTIVITY MAY BE PERFORMED WITHIN THE 100-FOOT SETBACK WITH ENVIRONMENT INSPECTOR APPROVAL, IF DONE IN ACCORDANCE WITH THE SPILL PREVENTION CONTROL AND COUNTERMEASURE (SPCC) PLAN/PREPAREDNESS, PREVENTION, AND CONTINGENCY (PPC) PLAN.
- ALL BLASTING SHALL BE PERFORMED IN ACCORDANCE WITH NEXUS BLASTING PLAN. NEXUS SHALL CONDUCT PRE-BLAST SURVEYS, WITH LANDOWNER PERMISSION, TO ASSESS THE CONDITIONS OF STRUCTURES, WELLS, SPRINGS, AND UTILITIES WITHIN 150 FEET OF THE PROPOSED CONSTRUCTION RIGHT-OF-WAY. WHERE THIS ENGINEERING ASSESSMENT INDICATES THAT THE RISK TO THE FRAGILE SENSTIVE ELEMENT IS TOO HIGH FOR BLASTING, ALTERNATE HARD-ROCK EXCAVATION METHODS WILL BE USED.

1A

REVISION 1A:
WATER FEATURES IDENTIFIED BY CIVIL SURVEY FIELD CREWS INDICATED BY LIGHT BLUE LINES ON THE RESIDENTIAL DRAWINGS FILED IN NOVEMBER HAVE BEEN REMOVED FROM THE REVISION 1 RESIDENTIAL DRAWINGS TO AVOID CONFUSION WITH JURISDICTIONAL RESOURCES.

MES13858
March 15, 2016 12:40pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\S4NX-P-8036.DWG

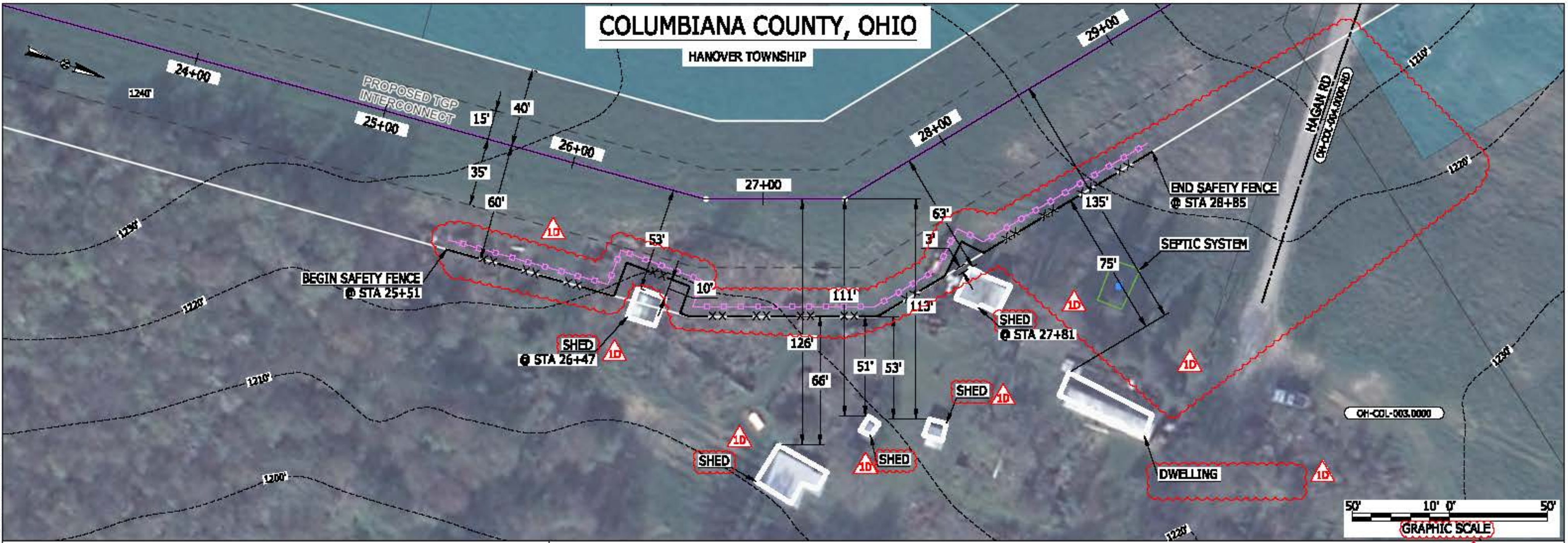
REV.#	DESCRIPTION	DATE			DATE
1A	ISSUED FOR FERC	15MAR16		PROJ. ENG. VP	
1	ISSUED FOR FERC	23FEB16		CHECKED BY: DOB	
0	ISSUED FOR FERC FILING	03NOV15		DRAWN BY: RSM	
				SCALE: NTS	

IG #

TITLE:
NEXUS GAS TRANSMISSION PROJECT
NOTES FOR SITE SPECIFIC
RESIDENTIAL DRAWINGS

LOC.: N/A
REV.: 1A
YR.: 2017
W.O.
DWG.NO. S4NX-P-8036

NEXUS
GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD (PAR-0.0)
TEMPORARY ACCESS ROAD (TAR-0.0)
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER (00-XX-000.0000)
MUNICIPALITY LINE
WELL: GAS; OIL; WATER; UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE
FIRE HYDRANT
MICROWAVE TOWER
TOWER
TANK

DESCRIPTION:

AT SURVEY STATION 26+47 THERE IS A SHED LOCATED INSIDE OF THE CWS AND 53' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 27+81 THERE IS A SHED LOCATED 3' TO THE RIGHT OF THE CWS AND 63' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1B:

ATWS, PROPERTY BOUNDARIES, UTILITY LINES, SAFETY FENCE AND WELLS UPDATED BASED ON UPDATED FIELD SURVEY DATA.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. SEPTIC SYSTEM CALL OUT ADDED FOR REFERENCE.
ATWS UPDATED BASED ON COMMERCIAL BUILDING REMOVED FROM PARCEL OH-COL-003.0000. BUILDING NOT WITHIN 50 FEET OF CWS.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1D	ISSUED FOR FERC	18MAR16
1C	ISSUED FOR FERC	17MAR16
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 0.44 TO MP 0.55

LOC.: COLUMBIANA COUNTY, OHIO
REV.: 1D
YR.: 2017
W.O.
DWG.NO. TGPI-P-8001

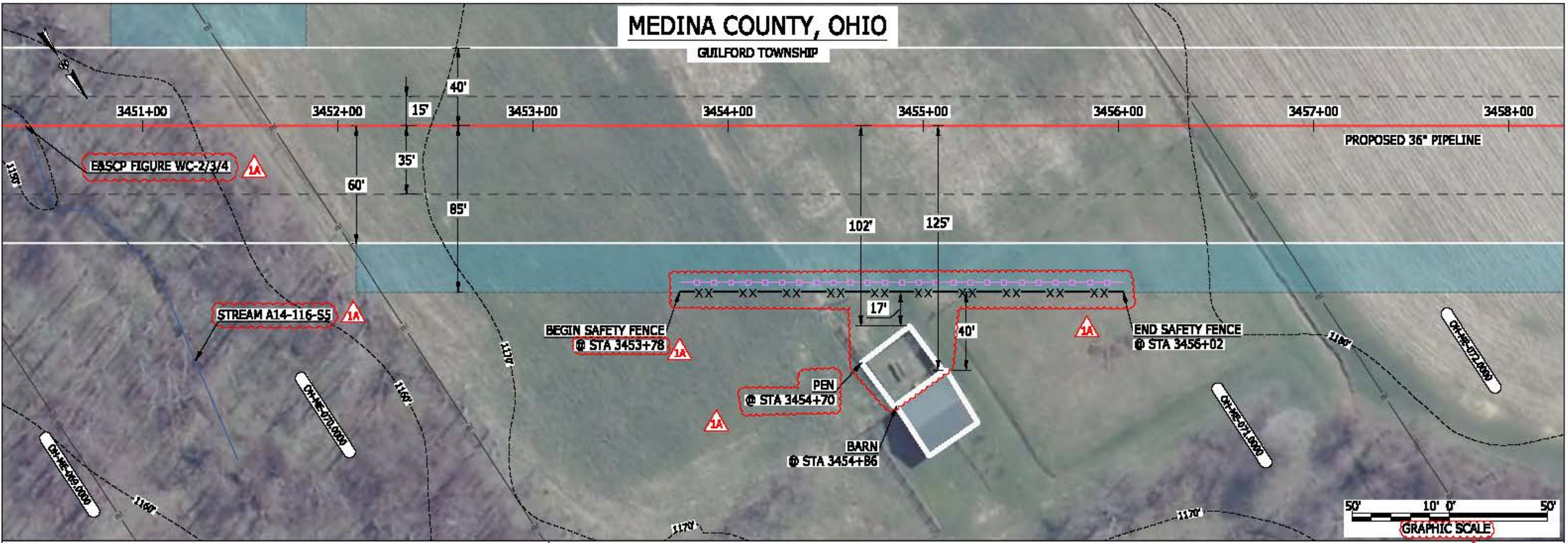
NEXUS GAS TRANSMISSION

IG #:

BEL24588
March 18, 2016 8:20am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\TGP\TGPI-P-8001.DWG

MEDINA COUNTY, OHIO

GUILFORD TOWNSHIP



LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	◇ M 00 P
CONSTRUCTION LIMIT	▬
PERMANENT ROW	[- - - -]
ADDITIONAL TEMPORARY WORKSPACE	🟦
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	🟦
DELINEATED WETLAND BOUNDARY	🟦
AGRICULTURAL PEM WETLAND BOUNDARY	🟪
DELINEATED WATERBODY CENTERLINE	―
APPROXIMATE WATERBODY BANK	🟧
APPROXIMATE WETLAND BOUNDARY	🟧
APPROXIMATE WATERBODY CENTERLINE	―
STRUCTURES	▭

1A

POWERLINES	—ᴓ—ᴓ—
CONTOUR LINE	- - - 1200 - - -
SILT FENCE	—□—□—□—□—
STRAW BALE	—▯—▯—▯—▯—
FOREIGN PIPELINES	—‖—‖—‖—‖—
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	—+—+—+—+—
ROAD CL	—— - ——
WATER PIPELINE	—W—W—
UTILITY LINE	――
PROPERTY LINE	—— PL ——
SAFETY FENCE	—XX—XX—
TRACT NUMBER	(00-XX-000.0000)
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
WATER	⊕
OIL	⊕
UNKNOWN	⊕
MAINLINE VALVE (MLV)	⋈
BLOW OFF VALVE	⋈
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A

DESCRIPTION:

AT SURVEY STATION 3454+86 THERE IS A BARN LOCATED 40' TO THE RIGHT OF THE CWS AND 125' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 3454+70 THERE IS A PEN LOCATED 17' TO THE RIGHT OF THE CWS AND 102' RIGHT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES AND UPDATED FIGURE CALL OUT TO MATCH E&SCP.
RESOURCES UPDATED BASED ON UPDATED FIELD SURVEY WATERBODY DATA.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
STRUCTURE AND SAFETY FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES: 1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 9:59am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8001.DWG

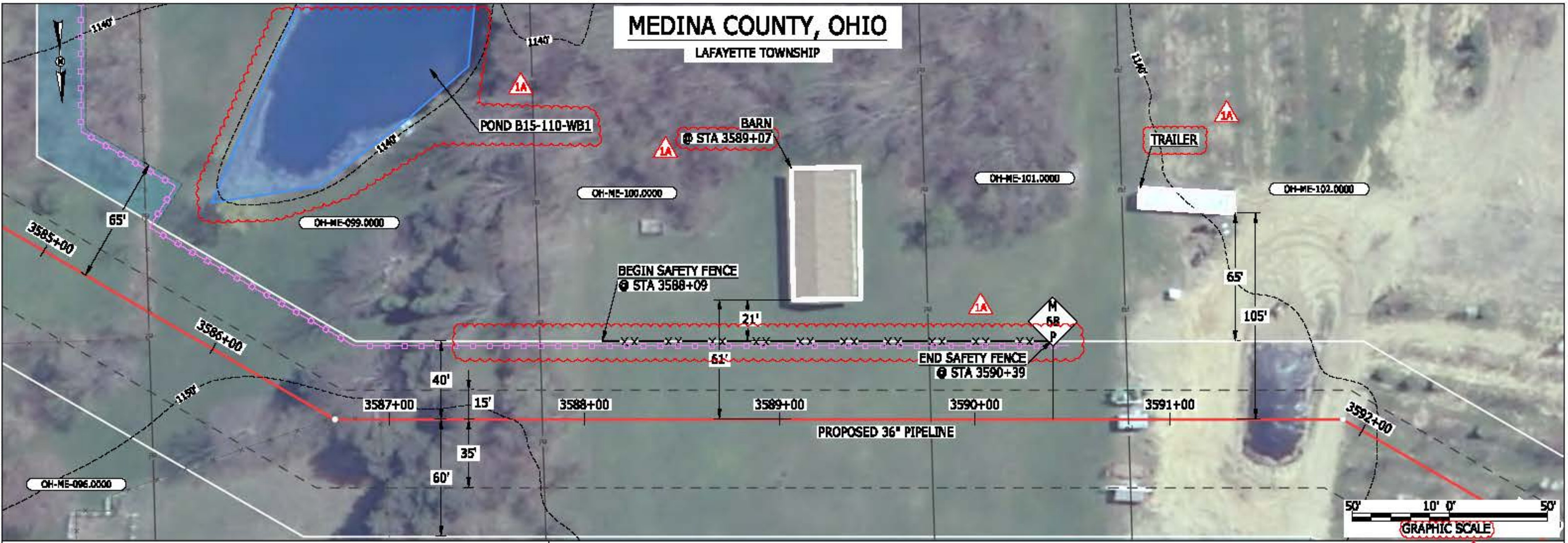
IG#	REV.#	DESCRIPTION	DATE
	1A	ISSUED FOR FERC	15MAR16
	1	ISSUED FOR FERC	23FEB16
	0	ISSUED FOR FERC FILING	21OCT15

PROJ. ENG.	VP
CHECKED BY:	DOB
DRAWN BY:	RSM 1A
SCALE:	AS SHOWN
DATE	

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 65.35 TO MP 65.5

LOC.: MEDINA COUNTY, OHIO — REV.: 1A
YR.: 2017 — W.O. — DWG.NO. WADS-P-8001

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - - -
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	◇ M 00 P
CONSTRUCTION LIMIT	▬
PERMANENT ROW	[- - - -]
ADDITIONAL TEMPORARY WORKSPACE	🟦
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	—
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	—
STRUCTURES	

1A 1A

POWERLINES	
CONTOUR LINE	- - - 1200 - - -
SILT FENCE	—□—□—□—□—
STRAW BALE	—▥—▥—▥—▥—
FOREIGN PIPELINES	—‖—‖—‖—‖—
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	—+—+—+—+—
ROAD CL	
WATER PIPELINE	—W—W—
UTILITY LINE	
PROPERTY LINE	— PL —
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
WATER	⊕
OIL	⊕
UNKNOWN	⊕
MAINLINE VALVE (MLV)	⋈
BLOW OFF VALVE	⋈
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A

DESCRIPTION:

1A

AT SURVEY STATION 3589+07 THERE IS A BARN LOCATED 21' TO THE LEFT OF THE CWS AND 61' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES.
TWS AND RESOURCES UPDATED BASED ON WETLAND/WATERBODY FIELD SURVEY.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE	
1A	ISSUED FOR FERC	15MAR16	
1	ISSUED FOR FERC	23FEB16	
0	ISSUED FOR FERC FILING	21OCT15	

IG #

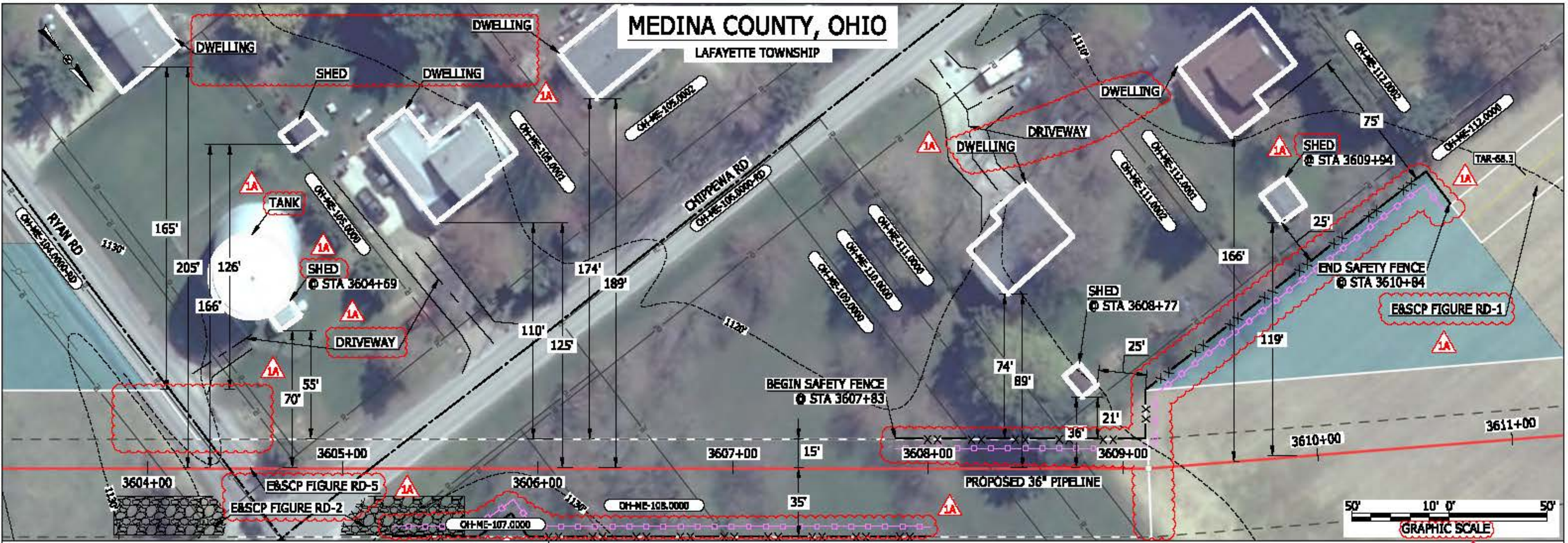
PROJ. ENG. VP	
CHECKED BY: DOB	
DRAWN BY: RSM 1A	
SCALE: AS SHOWN	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 67.89 TO MP 68.05

LOC.: MEDINA COUNTY, OHIO — REV.: 1A
YR.: 2017 — W.O. — DWG.NO. WADS-P-8002

NEXUS GAS TRANSMISSION

BEL24588
March 12, 2016 2:11pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8002.DWG



BEL24588
March 14, 2016 9:54am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8003.DWG

LEGEND

PROPOSED NEXUS PIPELINE		POWERLINES	
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE		CONTOUR LINE	1200
INTERCONNECTING PIPELINE		SILT FENCE	
PIPELINE MILEPOST	M 00 P	STRAW BALE	
		FOREIGN PIPELINES	
CONSTRUCTION LIMIT		TELEPHONE	T T
PERMANENT ROW		FENCE	x x
ADDITIONAL TEMPORARY WORKSPACE		RAILROAD TRACK	
STAGING AREA	🟨	ROAD CL	
WAREYARD	🟩	WATER PIPELINE	W W
ROCK ACCESS PAD		UTILITY LINE	
PERMANENT ACCESS ROAD	PAR-0.0	PROPERTY LINE	PL
TEMPORARY ACCESS ROAD	TAR-0.0	SAFETY FENCE	XX XX
DELINEATED WATERBODY BANK		TRACT NUMBER	00-XX-000.0000
DELINEATED WETLAND BOUNDARY		MUNICIPALITY LINE	
AGRICULTURAL PEM WETLAND BOUNDARY		WELL: GAS	⊕
DELINEATED WATERBODY CENTERLINE		WATER	⊕
APPROXIMATE WATERBODY BANK		OIL	⊕
APPROXIMATE WETLAND BOUNDARY		UNKNOWN	⊕
APPROXIMATE WATERBODY CENTERLINE		MAINLINE VALVE (MLV)	
STRUCTURES		BLOW OFF VALVE	
		HORIZONTAL DIRECTIONAL DRILLING	⊙
		LIGHT POLE	●
		FIRE HYDRANT	⊕
		MICROWAVE TOWER	☒
		TOWER	☒
		TANK	●

1A

DESCRIPTION:

AT SURVEY STATION 3608+77 THERE IS A SHED LOCATED 21' TO THE LEFT OF THE CWS AND 36' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 3609+94 THERE IS A SHED LOCATED 25' TO THE LEFT OF THE CWS AND 119' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. NOMINAL 100-FT WIDE ROW HAS BEEN PROVIDED AND SHOWS THE WORKSPACE LOCATED 2-FT FROM THE RESIDENTIAL BUILDING.
2. HOWEVER, IN THIS LOCATION IT IS THE INTENT OF NEXUS TO BORE PAST THIS RESIDENCE STARTING FROM THE SOUTHEAST CORNER OF THE INTERSECTION OF CHIPPEWA RD AND RYAN RD. THE EXIT PIT FROM THE BORE WOULD BE LOCATED 2 LOTS OR FURTHER TO THE WEST WITH THESPOIL FROM THE EXIT PIT BEING MOVED TO THE ADJACENT CULTIVATED FIELD TO THE WEST.
3. RYAN ROAD AND CHIPPEWA ROAD TO BE INSTALLED BY ONE CONVENTIONAL BORE.
4. SEE DWG WADS-P-8004 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

1A

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES AND UPDATED FIGURE CALL OUT TO MATCH E&SCP.
SAFETY FENCE AND PROPERTY BOUNDARIES AND STRUCTURE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE. TWS ADJUSTED TO ALIGN WITH PROPERTY BOUNDARY BASED ON UPDATED CIVIL SURVEY.
ADDED DRIVEWAY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

1A

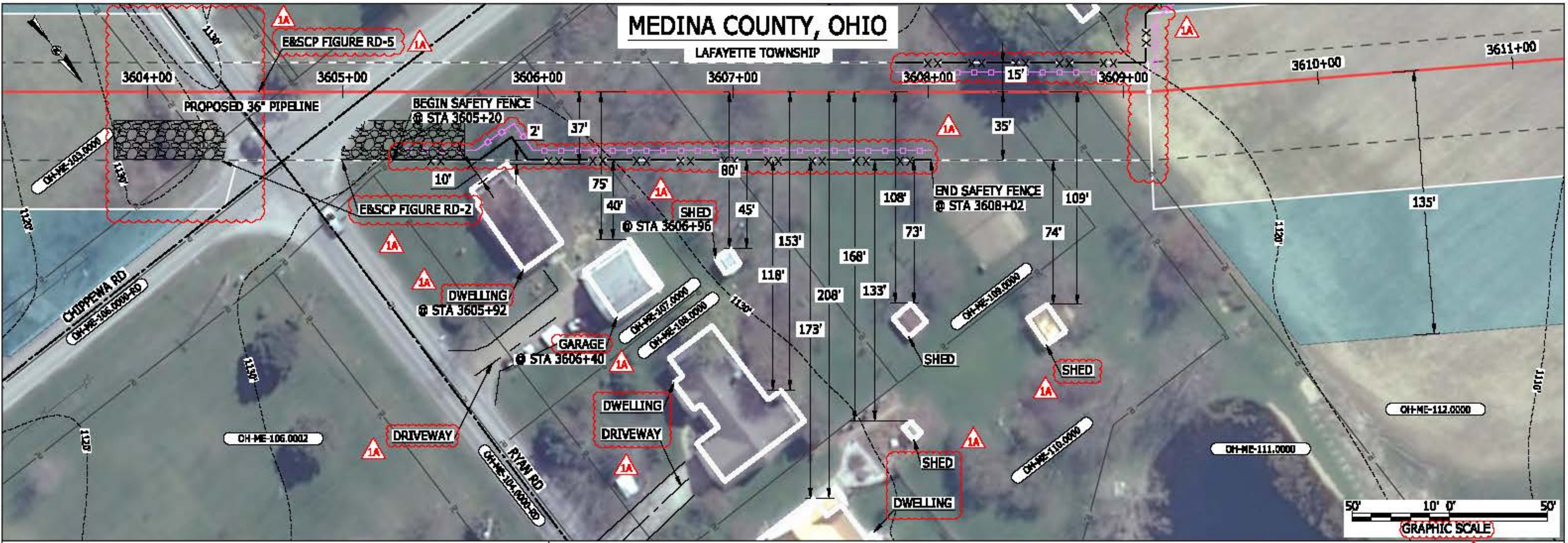
1A	ISSUED FOR FERC	15MAR16	PROJ. ENG. VP			
1	ISSUED FOR FERC	23FEB16	CHECKED BY: DOB			
0	ISSUED FOR FERC FILING	21OCT15	DRAWN BY: RSM 1A			
REV.#	DESCRIPTION	DATE	SCALE: AS SHOWN	DATE		

IG #

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 68.24 TO MP 68.39

LOC.: MEDINA COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8003

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	
INTERCONNECTING PIPELINE	
PIPELINE MILEPOST	M 00 P
CONSTRUCTION LIMIT	
PERMANENT ROW	
ADDITIONAL TEMPORARY WORKSPACE	
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	
STRUCTURES	

1A

POWERLINES	
CONTOUR LINE	----1200----
SILT FENCE	
STRAW BALE	
FOREIGN PIPELINES	
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	
ROAD CL	
WATER PIPELINE	—W—W—
UTILITY LINE	
PROPERTY LINE	— PL —
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
OIL	⊕
WATER	⊕
UNKNOWN	⊕
MAINLINE VALVE (MLV)	
BLOW OFF VALVE	
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A

DESCRIPTION:

AT SURVEY STATION 3605+92 THERE IS A DWELLING LOCATED 2' TO THE RIGHT OF THE CWS AND 37' RIGHT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 3606+40 THERE IS A GARAGE LOCATED 40' TO THE RIGHT OF THE CWS AND 75' RIGHT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 3606+96 THERE IS A SHED LOCATED 45' TO THE RIGHT OF THE CWS AND 80' RIGHT OF THE PROPOSED 36" PIPELINE.

1A

SPECIAL NOTES :

1. NOMINAL 100-FT WIDE ROW HAS BEEN PROVIDED AND SHOWS THE WORKSPACE LOCATED 2-FT FROM THE RESIDENTIAL BUILDING.
2. HOWEVER, IN THIS LOCATION IT IS THE INTENT OF NEXUS TO BORE PAST THIS RESIDENCE STARTING FROM THE SOUTHEAST CORNER OF THE INTERSECTION OF CHIPPEWA RD AND RYAN RD. THE EXIT PIT FROM THE BORE WOULD BE LOCATED 2 LOTS OR FURTHER TO THE WEST WITH THESPOIL FROM THE EXIT PIT BEING MOVED TO THE ADJACENT CULTIVATED FIELD TO THE WEST.
3. RYAN ROAD AND CHIPPEWA ROAD TO BE INSTALLED BY ONE CONVENTIONAL BORE.
4. SEE DWG WADS-P-8003 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

1A

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES AND UPDATED FIGURE CALL OUT TO MATCH E&SCP. SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
TWS AND PROPERTY BOUNDARIES ADJUSTED TO ALIGN WITH PROPERTY BOUNDARY BASED ON UPDATED CIVIL SURVEY.
ADDED DRIVEWAY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

IG #

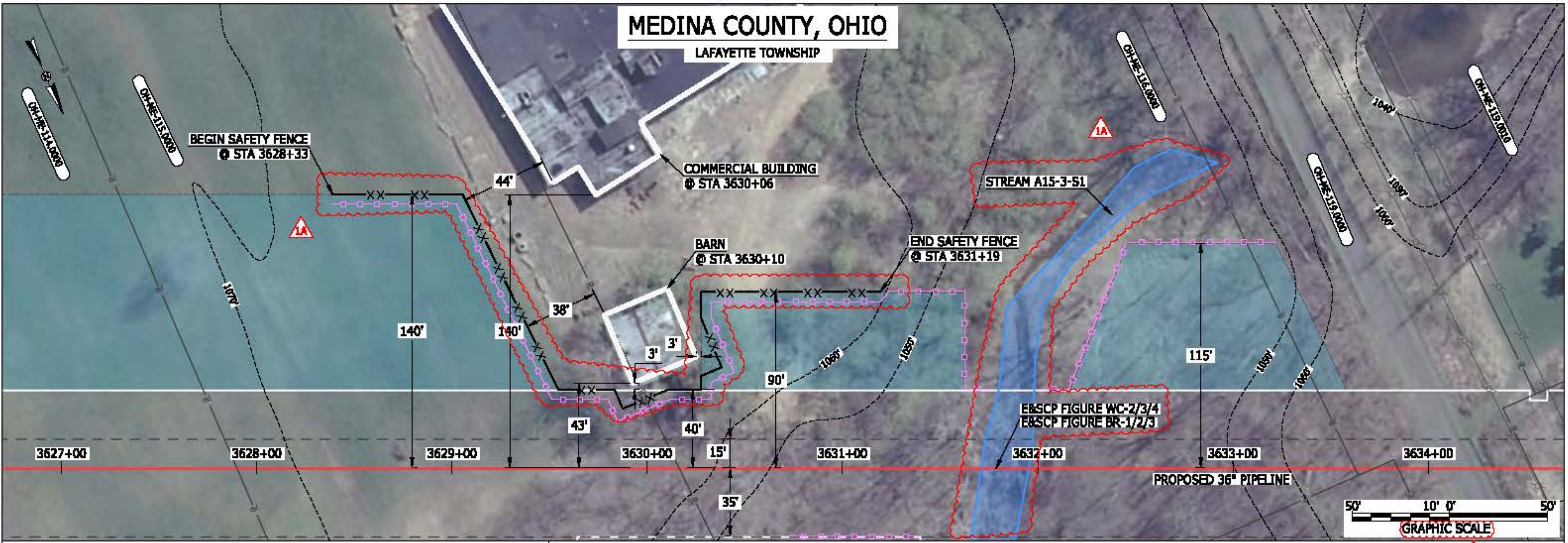
PROJ. ENG.	VP
CHECKED BY:	DOB
DRAWN BY:	RSM
SCALE:	AS SHOWN
DATE	

1A

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 68.24 TO MP 68.39

LOC.: MEDINA COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8004

BEL24588
March 14, 2016 9:52am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8004.DWG



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, WATER, OIL, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 3630+06 THERE IS A COMMERCIAL BUILDING LOCATED 44' TO THE LEFT OF THE CWS AND 140' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 3630+10 THERE IS A BARN LOCATED 3' TO THE LEFT OF THE CWS AND 43' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
RESOURCES UPDATED BASED ON WETLAND/WATERBODY SURVEY.
WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 68.69 TO MP 68.84

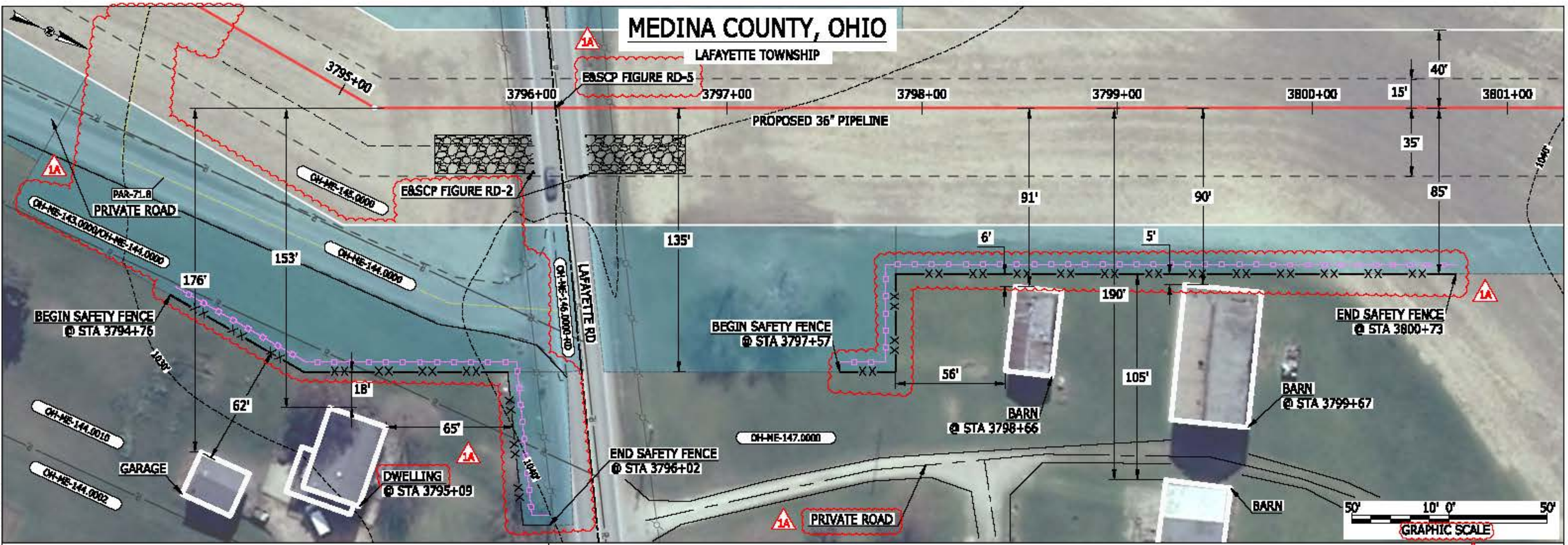
LOC.: MEDINA COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8005

NEXUS GAS TRANSMISSION

IG #

BEL24588 March 12, 2016 2:59pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8005.DWG

BEL24588
March 14, 2016 9:49am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WADS\WADS-P-8007.DWG



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD — PAR-0.0
TEMPORARY ACCESS ROAD — TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES
POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER — 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS, OIL, WATER, UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE
FIRE HYDRANT
MICROWAVE TOWER
TOWER
TANK

1A

DESCRIPTION:

AT SURVEY STATION 3795+09 THERE IS A DWELLING LOCATED 18' TO THE RIGHT OF THE CWS AND 153' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 3798+66 THERE IS A BARN LOCATED 6' TO THE RIGHT OF THE CWS AND 91' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 3799+67 THERE IS A BARN LOCATED 5' TO THE RIGHT OF THE CWS AND 90' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES AND UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE UPDATED FOR EROSION CONTROL MEASURE.
MAINLINE VALVE 6 AND ASSOCIATED PAR 71.8 ADJUSTED TO ALLOW FOR BETTER ACCESS. ATWS ADJUSTED TO ALIGN WITH PROPERTY BOUNDARY BASED ON UPDATED CIVIL SURVEY. ATWS ADDED AT HYDROSTATIC TEST WATER SOURCE.
ADDED PRIVATE ROAD CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 71.86 TO MP 71.99

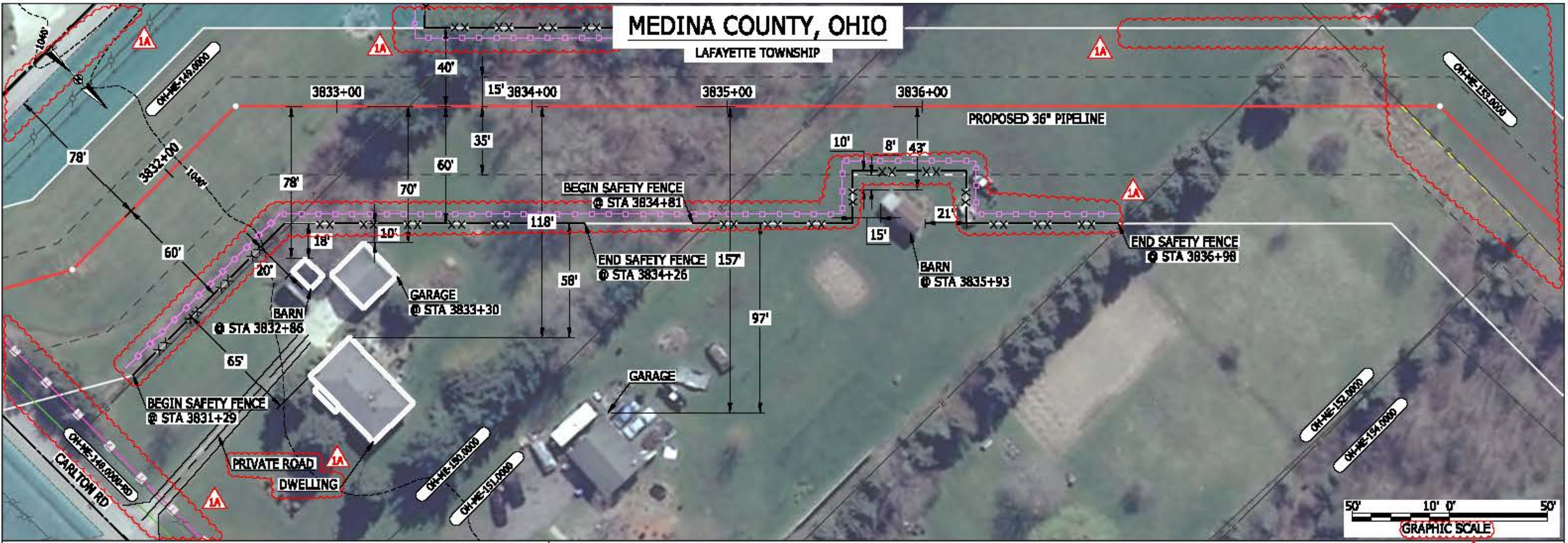
LOC.: MEDINA COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8007

NEXUS GAS TRANSMISSION

IG #

MEDINA COUNTY, OHIO

LAFAYETTE TOWNSHIP



LEGEND

PROPOSED NEXUS PIPELINE	POWERLINES
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	CONTOUR LINE
INTERCONNECTING PIPELINE	SILT FENCE
PIPELINE MILEPOST	STRAW BALE
CONSTRUCTION LIMIT	FOREIGN PIPELINES
PERMANENT ROW	TELEPHONE
ADDITIONAL TEMPORARY WORKSPACE	FENCE
STAGING AREA	RAILROAD TRACK
WAREYARD	ROAD CL
ROCK ACCESS PAD	WATER PIPELINE
PERMANENT ACCESS ROAD (PAR-0.0)	UTILITY LINE
TEMPORARY ACCESS ROAD (TAR-0.0)	PROPERTY LINE
DELINEATED WATERBODY BANK	SAFETY FENCE
DELINEATED WETLAND BOUNDARY	TRACT NUMBER (00-XX-000.0000)
AGRICULTURAL PEM WETLAND BOUNDARY	MUNICIPALITY LINE
DELINEATED WATERBODY CENTERLINE	WELL: GAS / OIL / WATER / UNKNOWN
APPROXIMATE WATERBODY BANK	MAINLINE VALVE (MLV)
APPROXIMATE WETLAND BOUNDARY	BLOW OFF VALVE
APPROXIMATE WATERBODY CENTERLINE	HORIZONTAL DIRECTIONAL DRILLING
STRUCTURES	LIGHT POLE / FIRE HYDRANT
	MICROWAVE TOWER / TOWER
	TANK

1A

DESCRIPTION:

AT SURVEY STATION 3832+86 THERE IS A BARN LOCATED 18' TO THE RIGHT OF THE CWS AND 78' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 3833+30 THERE IS A GARAGE LOCATED 10' TO THE RIGHT OF THE CWS AND 70' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 3835+93 THERE IS A BARN LOCATED 8' TO THE RIGHT OF THE CWS AND 43' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG WADS-P-8009 FOR THE CONTINUATION OF THE RESIDENTIAL AREA. 1A

REVISION 1A:

CENTERLINE SHIFTED DUE TO UPDATED CIVIL SURVEY. TWS/ATWS AND RESOURCES ADJUSTED/UPDATED ACCORDINGLY.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES.
PROPERTY BOUNDARIES AND UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE. ADDED PRIVATE ROAD CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS. 1A

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BAN26537 March 14, 2016 10:50am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WADS\WADS-P-8008.DWG

1A	ISSUED FOR FERC	15MAR16	PROJ. ENG. VP	
1	ISSUED FOR FERC	23FEB16	CHECKED BY: DOB	
0	ISSUED FOR FERC FILING	21OCT15	DRAWN BY: RSM 1A	
REV.#	DESCRIPTION	DATE	SCALE: AS SHOWN	DATE

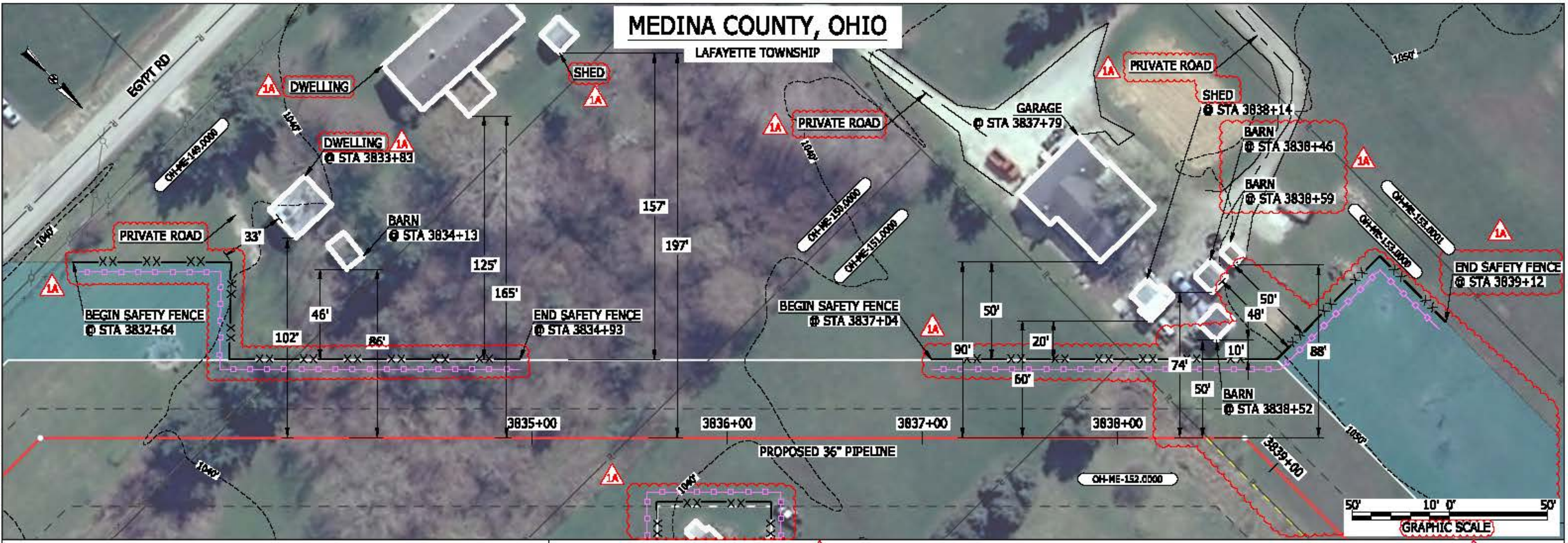
IG #

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 72.76 TO MP 72.92R 1A

LOC.: MEDINA COUNTY, OHIO | REV.: 1A
YR.: 2017 | W.O. | DWG.NO. WADS-P-8008

NEXUS GAS TRANSMISSION

MEDINA COUNTY, OHIO
LAFAYETTE TOWNSHIP



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
1A
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
1A
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ● WATER ●
OIL ● UNKNOWN ●
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING ●
LIGHT POLE ● FIRE HYDRANT ●
MICROWAVE TOWER ☒ TOWER ☒
TANK ● 1A

DESCRIPTION: 1A

AT SURVEY STATION 3833+83 THERE IS A DWELLING LOCATED 33' TO THE LEFT OF THE CWS AND 102' LEFT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 3834+13 THERE IS A BARN LOCATED 46' TO THE LEFT OF THE CWS AND 86' LEFT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 3837+79 THERE IS A GARAGE LOCATED 50' TO THE LEFT OF THE CWS AND 90' LEFT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 3838+14 THERE IS A SHED LOCATED 20' TO THE LEFT OF THE CWS AND 60' LEFT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 3838+52 THERE IS A BARN LOCATED 10' TO THE LEFT OF THE CWS AND 50' LEFT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 3838+46 THERE IS A BARN LOCATED 48' TO THE LEFT OF THE CWS AND 74' LEFT OF THE PROPOSED 36" PIPELINE.
AT SURVEY STATION 3838+59 THERE IS A BARN LOCATED 50' TO THE LEFT OF THE CWS AND 88' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG WADS-P-8008 FOR THE CONTINUATION OF THE RESIDENTIAL AREA. 1A

REVISION 1A:

CENTERLINE SHIFTED DUE TO UPDATED CIVIL SURVEY. TWS/ATWS AND RESOURCES ADJUSTED/UPDATED ACCORDINGLY.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. ADDED PRIVATE ROAD CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.
PROPERTY BOUNDARIES, SAFETY FENCE, AND LANDOWNER FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA. SILT FENCE ADDED FOR EROSION CONTROL MEASURE. 1A

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BAN26537 March 14, 2016 10:52am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8009.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

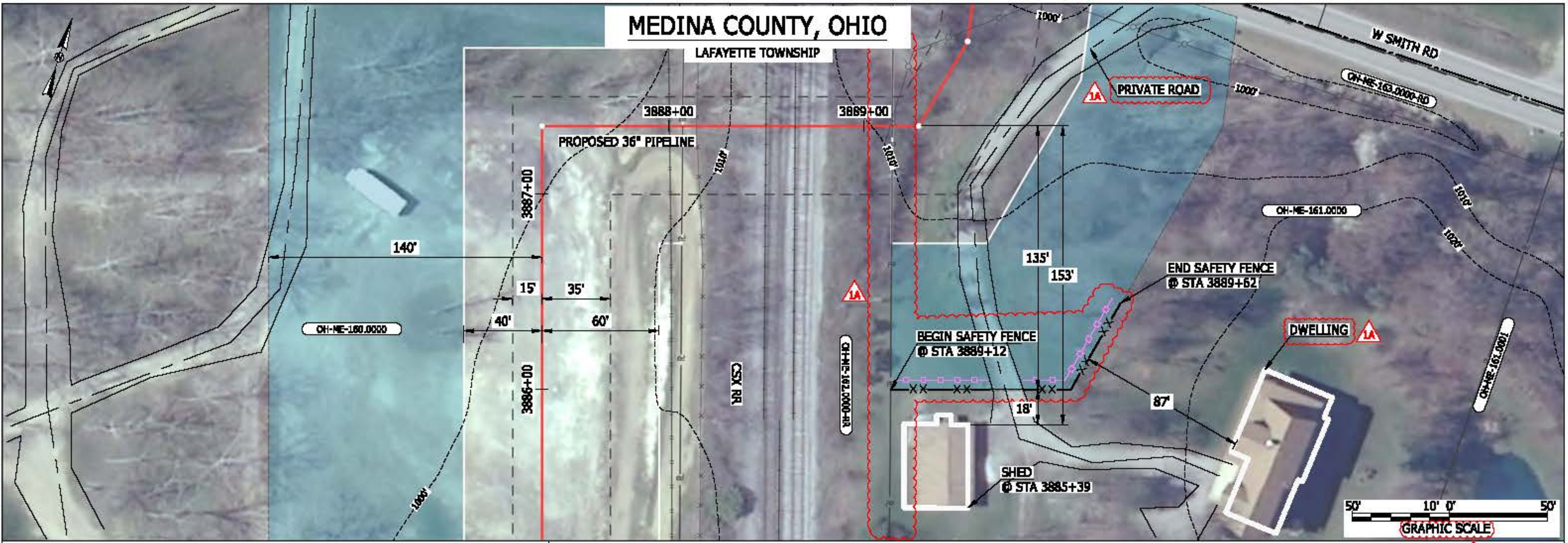
PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 72.58 TO MP 72.71R 1A

LOC.: MEDINA COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8009

NEXUS GAS TRANSMISSION

IG #



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 3885+39 THERE IS A SHED LOCATED 18' TO THE RIGHT OF THE CWS AND 153' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

TWS/ATWS ADJUSTED AT CROSSING OF EXISTING RAILROAD EASEMENT.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE. ADDED PRIVATE ROAD CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858
March 15, 2016 9:37am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WADS\WADS-P-8010.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

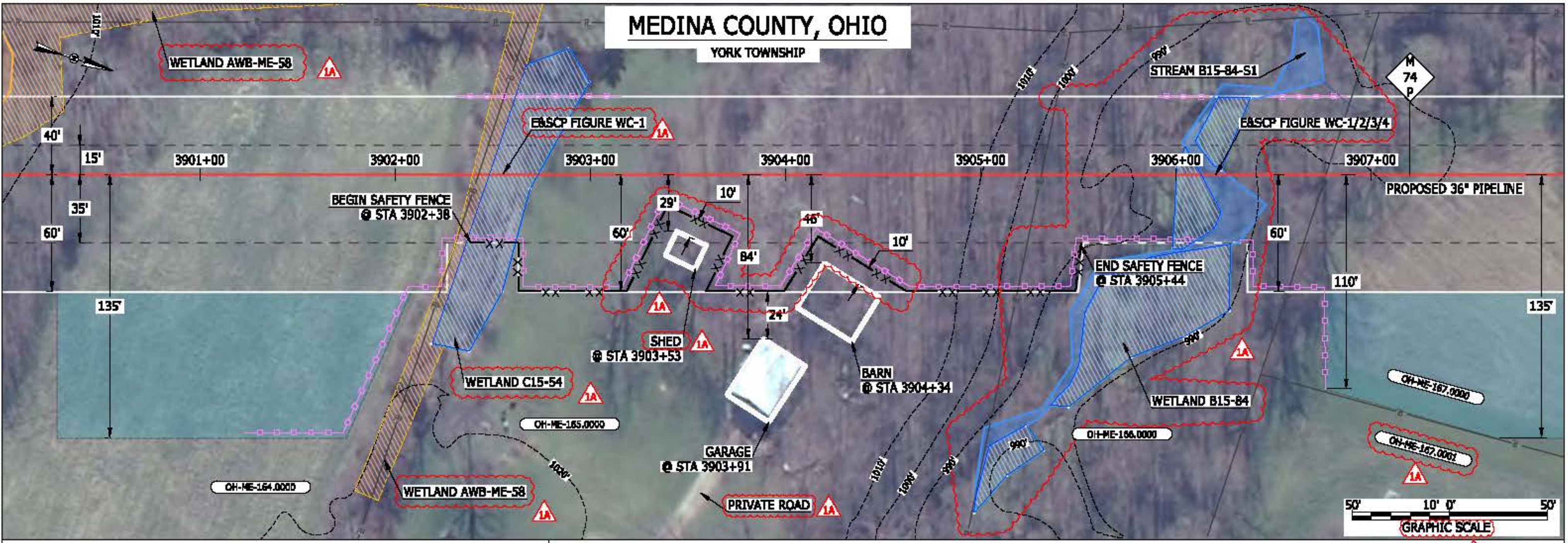
IG#

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 73.58 TO MP 73.67

LOC.: MEDINA COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8010

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
1A
PIPELINE MILEPOST M 00 P
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
1A
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE 1200
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE —T—T—
FENCE —x—x—
RAILROAD TRACK
ROAD CL
WATER PIPELINE —W—W—
UTILITY LINE
PROPERTY LINE
SAFETY FENCE —XX—XX—
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS WATER
OIL UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE FIRE HYDRANT
MICROWAVE TOWER TOWER
TANK
1A

DESCRIPTION:

1A

AT SURVEY STATION 3903+53 THERE IS A SHED LOCATED INSIDE OF THE CWS AND 29' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 3903+91 THERE IS A GARAGE LOCATED 24' TO THE RIGHT OF THE CWS AND 84' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 3904+34 THERE IS A BARN LOCATED INSIDE OF THE CWS AND 46' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

TWS AND RESOURCES UPDATED BASED ON FIELD SURVEY WETLAND/WATERBODY DATA.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADJUSTED FOR EROSION CONTROL MEASURE. ADDED PRIVATE ROAD CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

IG #	REV.#	DESCRIPTION	DATE
	1A	ISSUED FOR FERC	15MAR16
	1	ISSUED FOR FERC	23FEB16
	0	ISSUED FOR FERC FILING	21OCT15

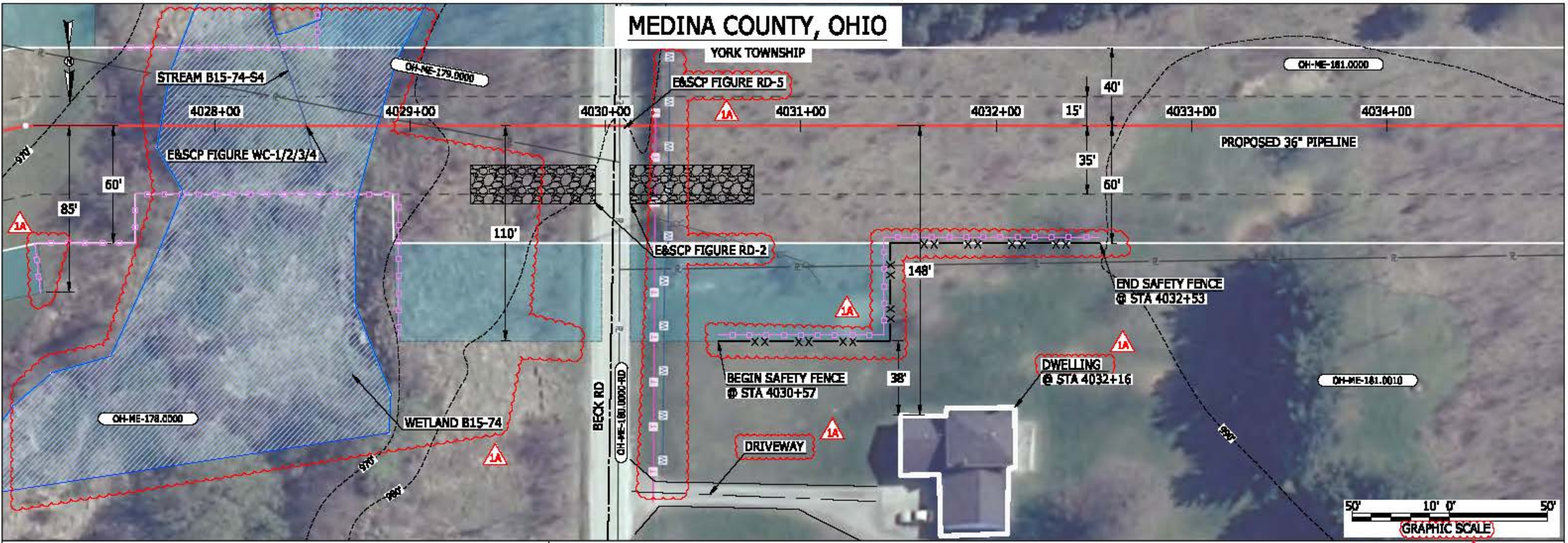
PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 73.86 TO MP 74.01

LOC.: MEDINA COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8011

NEXUS GAS TRANSMISSION

MEDINA COUNTY, OHIO



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 4032+16 THERE IS A DWELLING LOCATED 38' TO THE RIGHT OF THE CWS AND 148' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

ATWS/TWS AND RESOURCES UPDATED BASED ON FIELD SURVEY WETLAND/WATERBODY DATA.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUT.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588
March 14, 2016 9:45am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8012.DWG

1A	ISSUED FOR FERC	15MAR16	
1	ISSUED FOR FERC	23FEB16	
0	ISSUED FOR FERC FILING	21OCT15	
REV.#	DESCRIPTION	DATE	

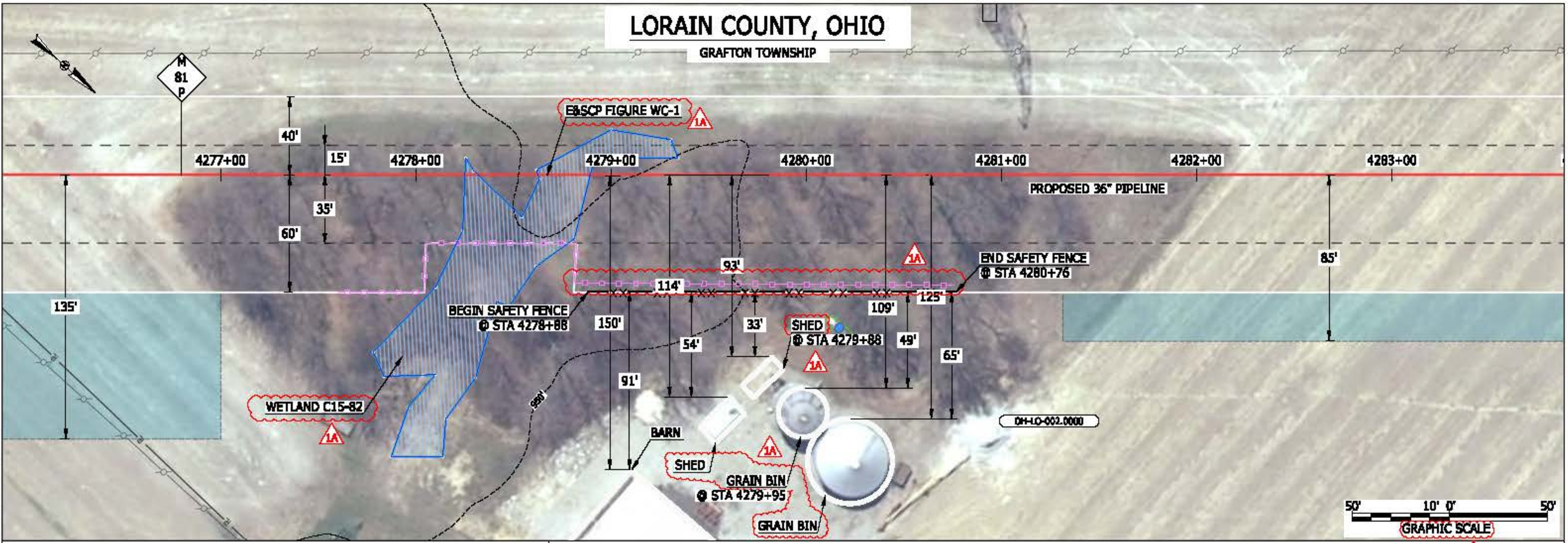
IG #

PROJ. ENG. VP	
CHECKED BY: DOB	
DRAWN BY: RSM	
SCALE: AS SHOWN	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 76.27 TO MP 76.42

LOC.: MEDINA COUNTY, OHIO — REV.: 1A
YR.: 2017 — W.O. — DWG.NO. WADS-P-8012

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS WATER
OIL UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE FIRE HYDRANT
MICROWAVE TOWER TOWER
TANK

1A

DESCRIPTION:

AT SURVEY STATION 4279+88 THERE IS A SHED LOCATED 33' TO THE RIGHT OF THE CWS AND 93' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 4279+95 THERE IS A GRAIN BIN LOCATED 49' TO THE RIGHT OF THE CWS AND 109' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 15, 2016 9:45am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8013.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

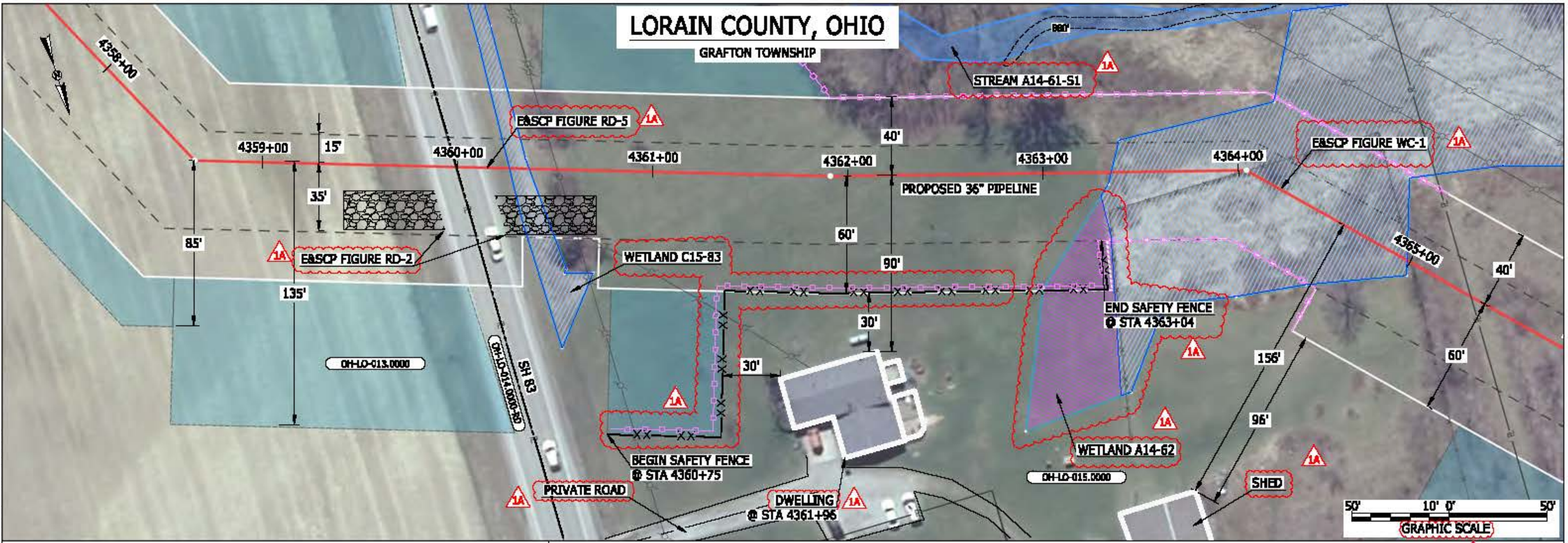
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 80.98 TO MP 81.13

LOC.: LORAIN COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8013

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE —T—T—
FENCE —x—x—
RAILROAD TRACK
ROAD CL
WATER PIPELINE —W—W—
UTILITY LINE
PROPERTY LINE —PL—
SAFETY FENCE —XX—XX—
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING ●
LIGHT POLE ● FIRE HYDRANT ⊕
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

DESCRIPTION:

AT SURVEY STATION 4361+96 THERE IS A DWELLING LOCATED 30' TO THE RIGHT OF THE CWS AND 90' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

RESOURCES RECLASSIFIED TO AG-PEM WETLAND AND TWS ADJUSTED ACCORDINGLY. APPROXIMATED RESOURCES UPDATED.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED PRIVATE ROAD CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588 March 14, 2016 9:43am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8014.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

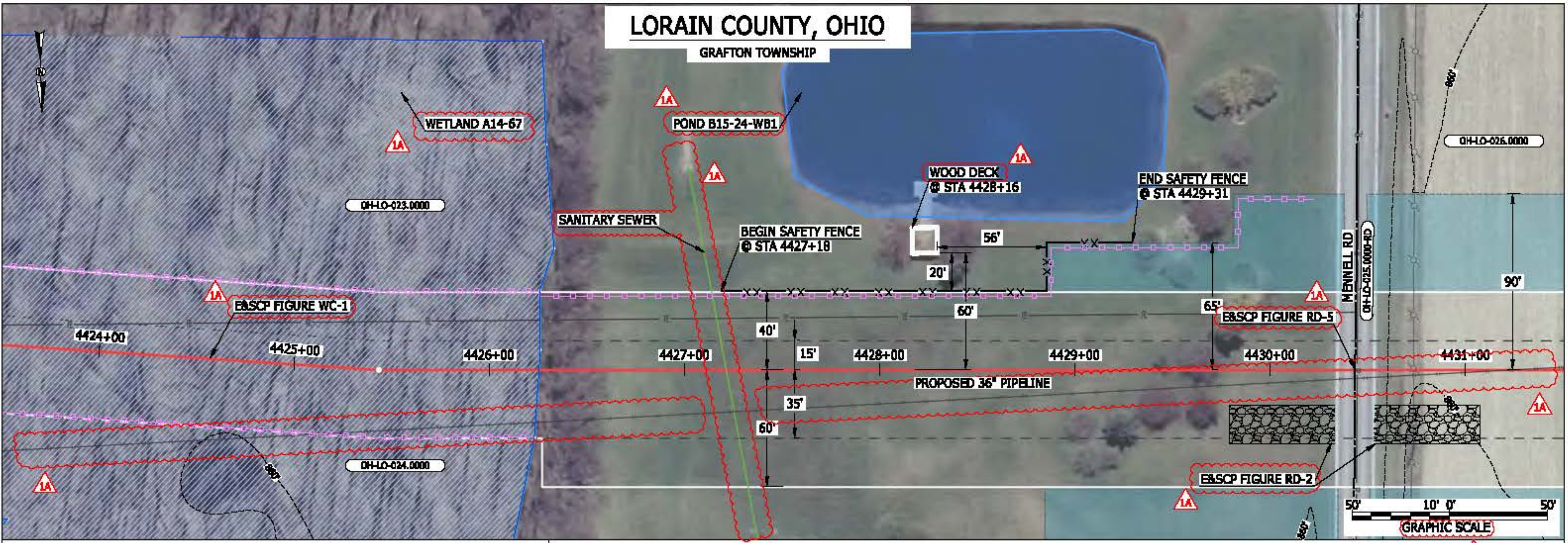
IG#

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 82.53 TO MP 82.69

LOC.: LORAIN COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8014

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST (M 00 P)
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS ● WATER ●
- OIL ● UNKNOWN ●
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE ● FIRE HYDRANT
- MICROWAVE TOWER ☒ TOWER ☒
- TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 4428+16 THERE IS A WOOD DECK LOCATED 20' TO THE LEFT OF THE CWS AND 60' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES, UTILITY LINES, POWERLINES, FOREIGN PIPELINES, AND WATERBODY UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE. SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED UTILITY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUT.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588 March 14, 2016 9:41am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8015.DWG

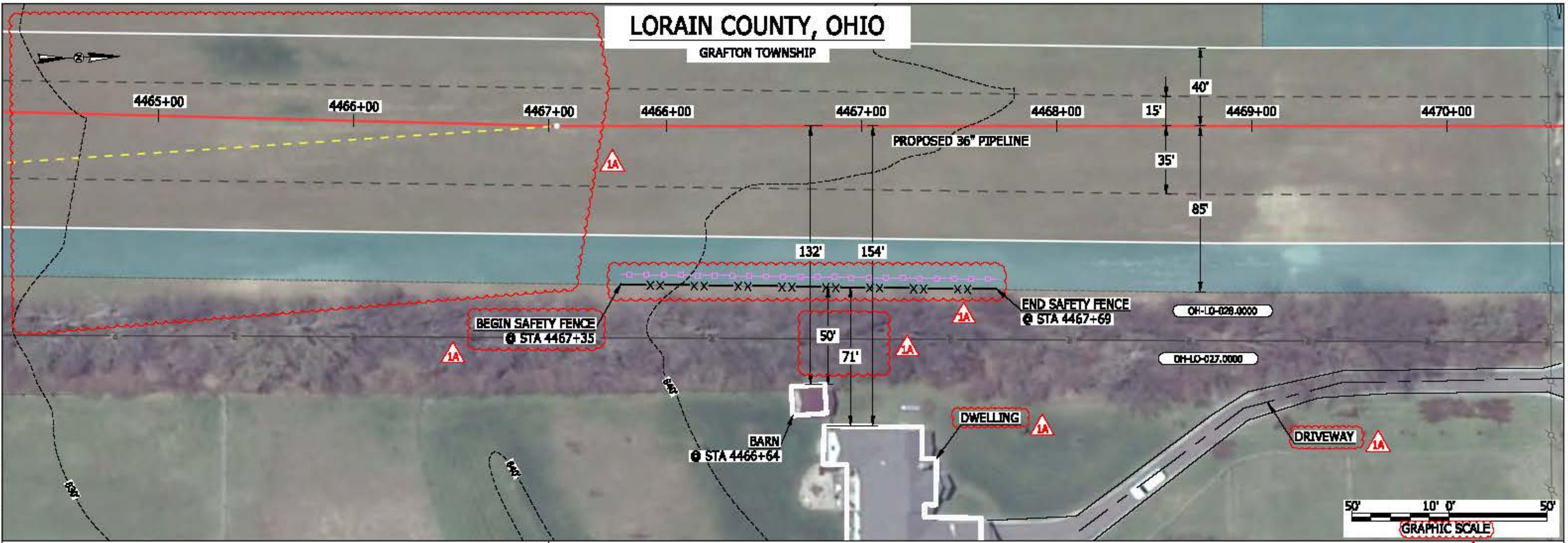
1A	ISSUED FOR FERC	15MAR16	PROJ. ENG. VP	
1	ISSUED FOR FERC	23FEB16	CHECKED BY: DOB	
0	ISSUED FOR FERC FILING	21OCT15	DRAWN BY: RSM	
REV.#	DESCRIPTION	DATE	SCALE: AS SHOWN	DATE

IG #

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 83.78 TO MP 83.93

LOC.: LORAIN COUNTY, OHIO — REV.: 1A
YR.: 2017 — W.O. — DWG.NO. WADS-P-8015

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE		POWERLINES	
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE		CONTOUR LINE	
INTERCONNECTING PIPELINE		SILT FENCE	
PIPELINE MILEPOST	M 00 P	STRAW BALE	
		FOREIGN PIPELINES	
		TELEPHONE	—T—T—
CONSTRUCTION LIMIT		FENCE	—x—x—
PERMANENT ROW		RAILROAD TRACK	
ADDITIONAL TEMPORARY WORKSPACE		ROAD CL	
STAGING AREA		WATER PIPELINE	—W—W—
WAREYARD		UTILITY LINE	
ROCK ACCESS PAD		PROPERTY LINE	— PL —
PERMANENT ACCESS ROAD	PAR-0.0	SAFETY FENCE	—XX—XX—
TEMPORARY ACCESS ROAD	TAR-0.0	TRACT NUMBER	00-XX-000.0000
DELINEATED WATERBODY BANK		MUNICIPALITY LINE	
DELINEATED WETLAND BOUNDARY		WELL: GAS / WATER	
AGRICULTURAL PEM WETLAND BOUNDARY		OIL / UNKNOWN	
DELINEATED WATERBODY CENTERLINE		MAINLINE VALVE (MLV)	
APPROXIMATE WATERBODY BANK		BLOW OFF VALVE	
APPROXIMATE WETLAND BOUNDARY		HORIZONTAL DIRECTIONAL DRILLING	
APPROXIMATE WATERBODY CENTERLINE		LIGHT POLE / FIRE HYDRANT	
STRUCTURES		MICROWAVE TOWER / TOWER	
		TANK	●

1A

DESCRIPTION:

AT SURVEY STATION 4466+64 THERE IS A BARN LOCATED 50' TO THE RIGHT OF THE CWS AND 132' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

CENTERLINE SHIFTED TO AVOID OVERLAP WITH EXISTING UTILITY EASEMENT. ASSOCIATED WORKSPACES ADJUSTED ACCORDINGLY.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED STRUCTURE CALL OUT.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588 March 14, 2016 10:53am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WADS\WADS-P-8016.DWG

1A	ISSUED FOR FERC	15MAR16	PROJ. ENG. VP	
1	ISSUED FOR FERC	23FEB16	CHECKED BY: DOB	
0	ISSUED FOR FERC FILING	21OCT15	DRAWN BY: RSM	
REV.#	DESCRIPTION	DATE	SCALE: AS SHOWN	DATE

IG #:

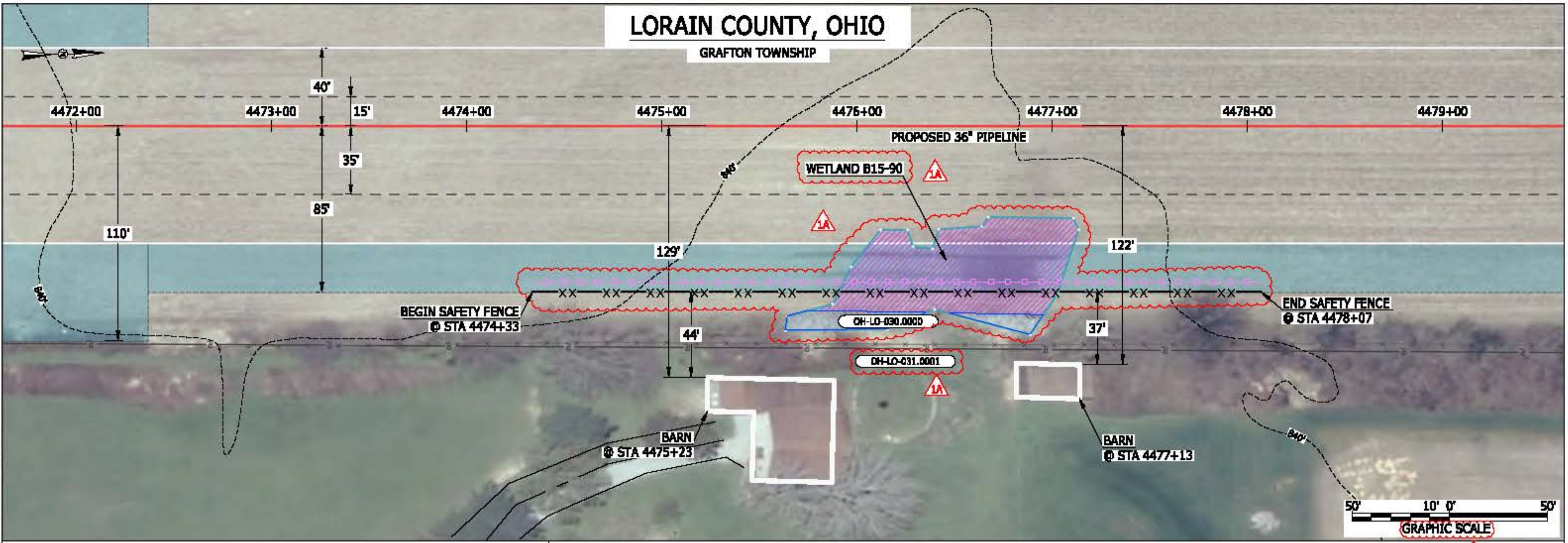
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 84.55R TO MP 84.67

LOC.: LORAIN COUNTY, OHIO | REV.: 1A
YR.: 2017 | W.O. | DWG.NO. WADS-P-8016

NEXUS GAS TRANSMISSION

LORAIN COUNTY, OHIO

GRAFTON TOWNSHIP



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS ⊕ WATER ⊕
- OIL ⊕ UNKNOWN ⊕
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE ● FIRE HYDRANT
- MICROWAVE TOWER ☒ TOWER ☒
- TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 4475+23 THERE IS A BARN LOCATED 44' TO THE RIGHT OF THE CWS AND 129' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 4477+13 THERE IS A BARN LOCATED 37' TO THE RIGHT OF THE CWS AND 122' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

RESOURCE ADDED BASED ON UPDATED FIELD SURVEY DATA.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588
March 14, 2016 9:35am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WADS\WADS-P-8017.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

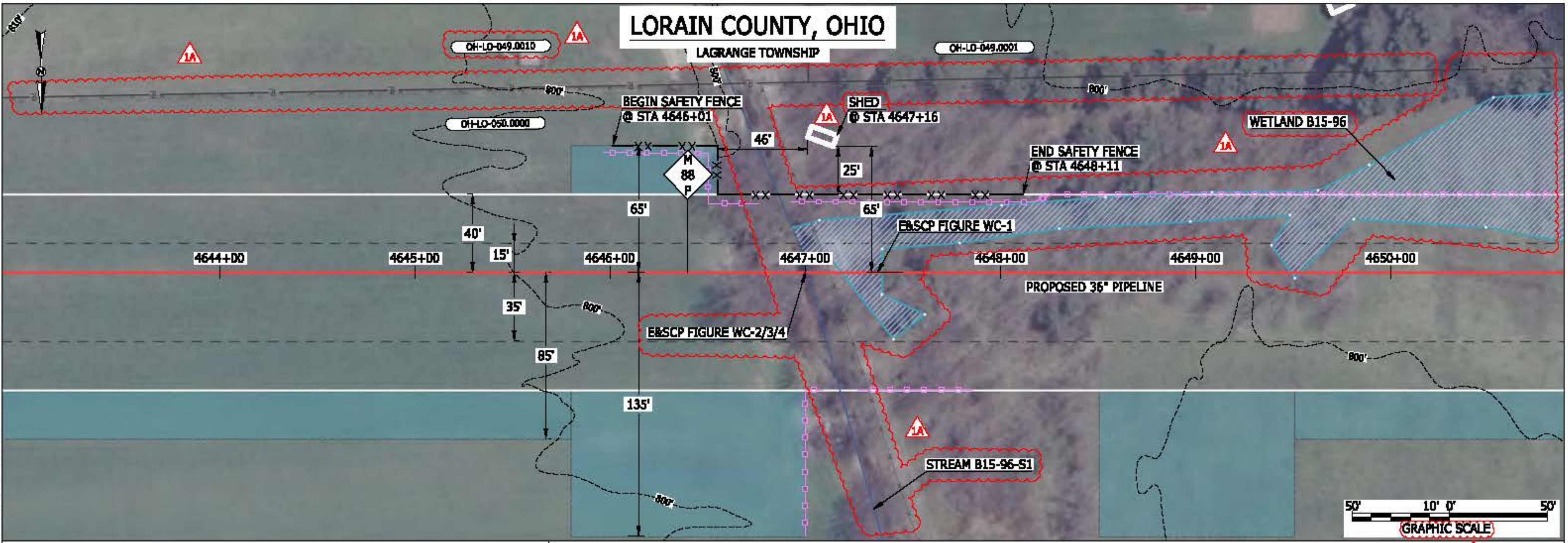
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 84.69 TO MP 84.84

LOC.: LORAIN COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8017

NEXUS GAS TRANSMISSION

LORAIN COUNTY, OHIO

LAGRANGE TOWNSHIP



LEGEND

PROPOSED NEXUS PIPELINE		POWERLINES	
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE		CONTOUR LINE	
INTERCONNECTING PIPELINE		SILT FENCE	
PIPELINE MILEPOST	M 00 P	STRAW BALE	
		FOREIGN PIPELINES	
CONSTRUCTION LIMIT		TELEPHONE	—T—T—
PERMANENT ROW		FENCE	—x—x—
ADDITIONAL TEMPORARY WORKSPACE		RAILROAD TRACK	
STAGING AREA	🟨	ROAD CL	
WAREYARD	🟩	WATER PIPELINE	—W—W—
ROCK ACCESS PAD		UTILITY LINE	
PERMANENT ACCESS ROAD	PAR-0.0	PROPERTY LINE	ℙ
TEMPORARY ACCESS ROAD	TAR-0.0	SAFETY FENCE	—XX—XX—
DELINEATED WATERBODY BANK		TRACT NUMBER	00-XX-000.0000
DELINEATED WETLAND BOUNDARY		MUNICIPALITY LINE	
AGRICULTURAL PEM WETLAND BOUNDARY		WELL: GAS ⊕ WATER ⊕	
DELINEATED WATERBODY CENTERLINE		OIL ⊕ UNKNOWN ⊕	
APPROXIMATE WATERBODY BANK		MAINLINE VALVE (MLV)	
APPROXIMATE WETLAND BOUNDARY		BLOW OFF VALVE	
APPROXIMATE WATERBODY CENTERLINE		HORIZONTAL DIRECTIONAL DRILLING	●
STRUCTURES		LIGHT POLE ● FIRE HYDRANT ⊕	
		MICROWAVE TOWER ☒ TOWER ☒	
		TANK ●	

1A 1A 1A

DESCRIPTION:

1A

AT SURVEY STATION 4647+16 THERE IS A SHED LOCATED 25' TO THE LEFT OF THE CWS AND 65' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:
RESOURCES UPDATED BASED ON NEW SURVEY.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND LANDOWNER FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

FAJ10410
March 12, 2016 1:50pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8018.DWG

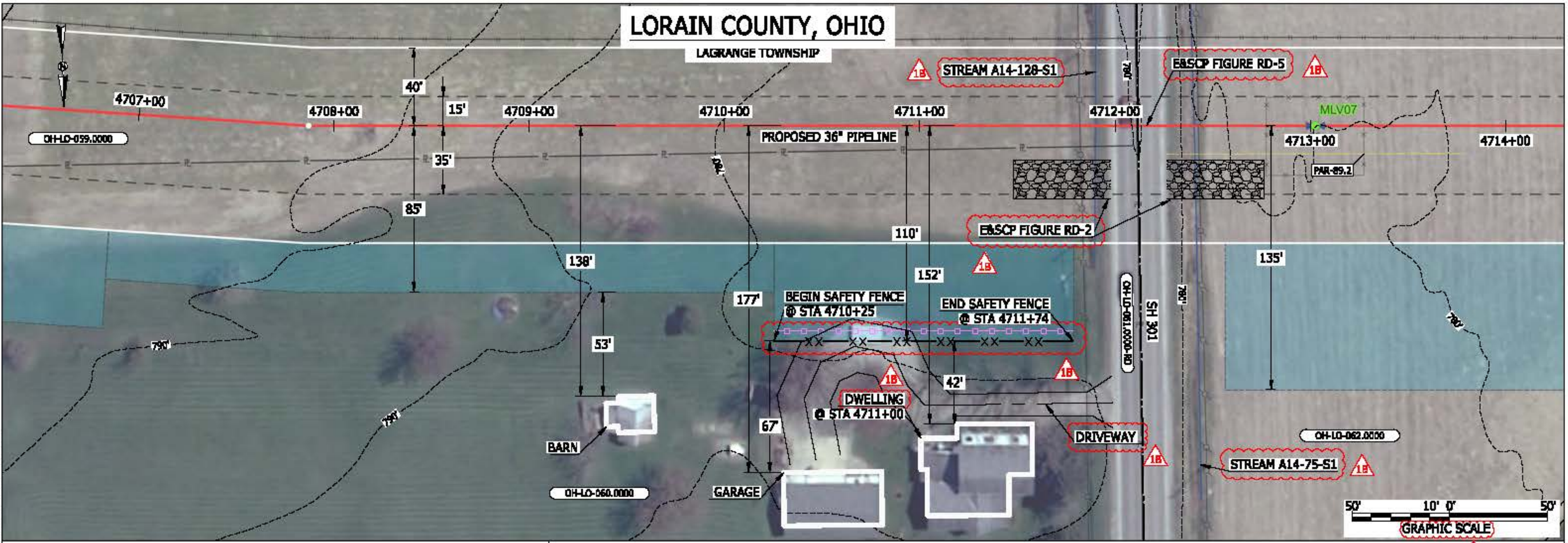
REV.#	DESCRIPTION	DATE		
1A	ISSUED FOR FERC	15MAR16	PROJ. ENG. VP	
1	ISSUED FOR FERC	23FEB16	CHECKED BY: DOB	
0	ISSUED FOR FERC FILING	21OCT15	DRAWN BY: RSM 1A	
			SCALE: AS SHOWN	DATE

IG #

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 87.93 TO MP 88.08

LOC.: LORAIN COUNTY, OHIO REV.: 1A
YR.: 2017 W.O. DWG.NO. WADS-P-8018

NEXUS GAS TRANSMISSION



BEL24588 March 14, 2016 9:32am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8019.DWG

LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS WATER
OIL UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE FIRE HYDRANT
MICROWAVE TOWER TOWER
TANK

1B

DESCRIPTION:

AT SURVEY STATION 4711+00 THERE IS A DWELLING LOCATED 42' TO THE RIGHT OF THE CWS AND 152' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1B:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUT.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

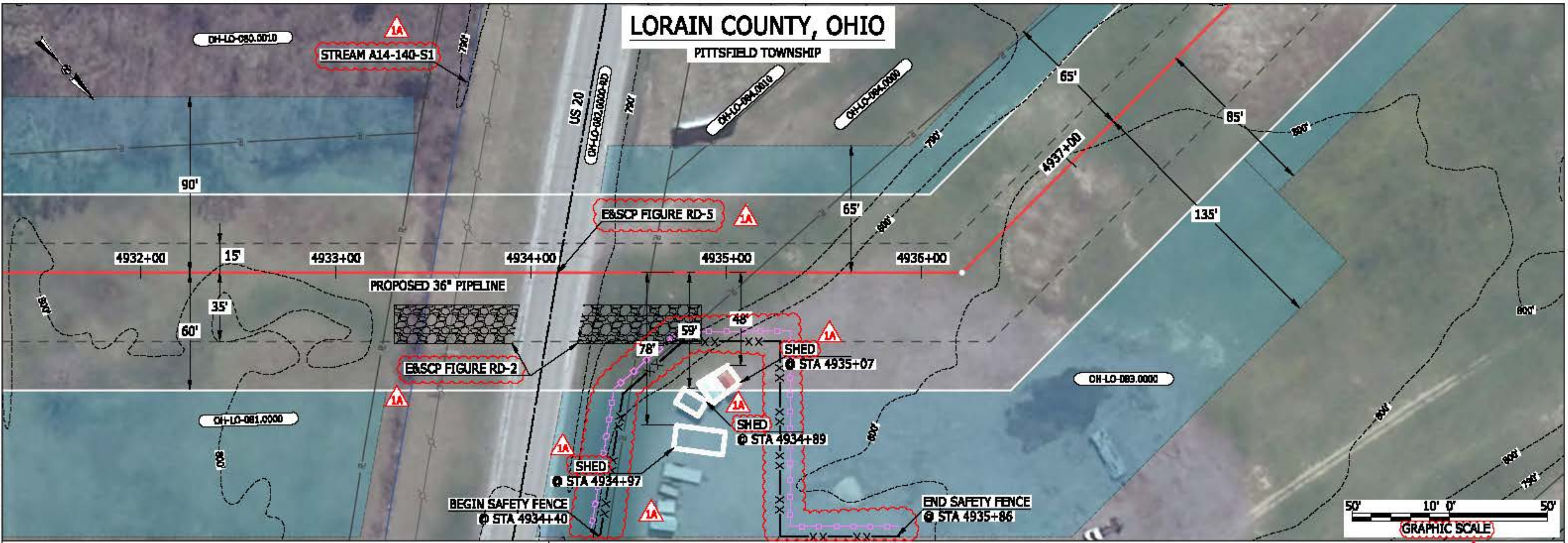
IG #	REV.#	DESCRIPTION	DATE
	1B	ISSUED FOR FERC	15MAR16
	1A	ISSUED FOR FERC	26FEB16
	1	ISSUED FOR FERC	23FEB16
	0	ISSUED FOR FERC FILING	21OCT15

PROJ. ENG.	VP
CHECKED BY:	DOB
DRAWN BY:	RSM
SCALE:	AS SHOWN
DATE	

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 89.14 TO MP 89.28

LOC.: LORAIN COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. WADS-P-8019

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	M 00 P
CONSTRUCTION LIMIT	▬
PERMANENT ROW	[- - - -]
ADDITIONAL TEMPORARY WORKSPACE	🟦
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	
STRUCTURES	
POWERLINES	
CONTOUR LINE	----1200----
SILT FENCE	—□—□—□—
STRAW BALE	—▥—▥—▥—
FOREIGN PIPELINES	—+—+—+—
TELEPHONE	—T—T—
FENCE	—x——x—
RAILROAD TRACK	—+—+—+—
ROAD CL	——-——
WATER PIPELINE	—W—W—
UTILITY LINE	——
PROPERTY LINE	—— PL ——
SAFETY FENCE	—XX——XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
WELL: OIL	⊕
WELL: WATER	⊕
WELL: UNKNOWN	⊕
MAINLINE VALVE (MLV)	⋈
BLOW OFF VALVE	⋈
HORIZONTAL DIRECTIONAL DRILLING	◉
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A

DESCRIPTION:

AT SURVEY STATION 4934+97 THERE IS A SHED LOCATED INSIDE OF THE CWS AND 78' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 4934+89 THERE IS A SHED LOCATED INSIDE OF THE CWS AND 59' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 4935+07 THERE IS A SHED LOCATED INSIDE OF THE CWS AND 48' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

PROJ. ENG.	VP
CHECKED BY:	DOB
DRAWN BY:	RSM
SCALE: AS SHOWN	DATE

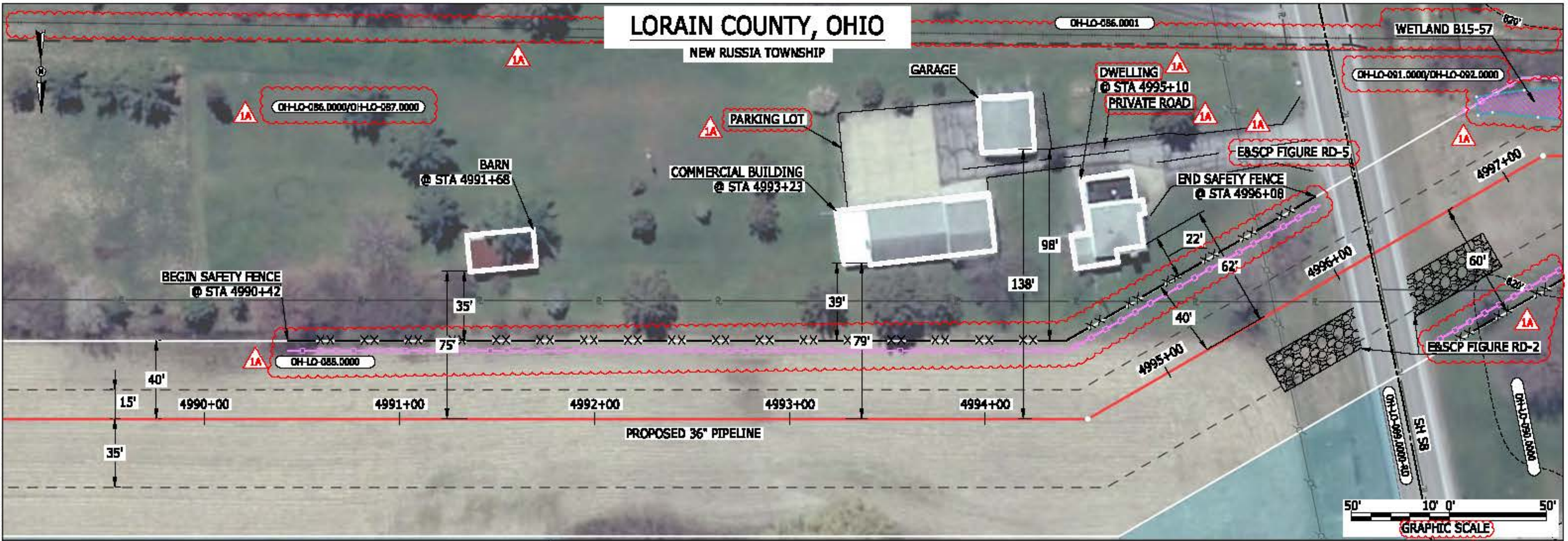
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 93.4 TO MP 93.53

LOC.: LORAIN COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8020

NEXUS GAS TRANSMISSION

IG #

BEL24588
March 14, 2016 9:30am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8020.DWG



LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	🟨
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	M 00 P
CONSTRUCTION LIMIT	
PERMANENT ROW	
ADDITIONAL TEMPORARY WORKSPACE	
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	
STRUCTURES	
POWERLINES	
CONTOUR LINE	1200'
SILT FENCE	
STRAW BALE	
FOREIGN PIPELINES	
TELEPHONE	T T
FENCE	x x
RAILROAD TRACK	
ROAD CL	
WATER PIPELINE	W W
UTILITY LINE	
PROPERTY LINE	PL
SAFETY FENCE	XX XX
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	
WELL: GAS	⊕
WELL: OIL	⊕
WELL: WATER	⊕
WELL: UNKNOWN	⊕
MAINLINE VALVE (MLV)	
BLOW OFF VALVE	
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A

DESCRIPTION:

AT SURVEY STATION 4991+68 THERE IS A BARN LOCATED 35' TO THE LEFT OF THE CWS AND 75' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 4993+23 THERE IS A COMMERCIAL BUILDING LOCATED 39' TO THE LEFT OF THE CWS AND 79' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 4995+10 THERE IS A DWELLING LOCATED 22' TO THE LEFT OF THE CWS AND 62' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG WADS-P-8022 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1A:

RESOURCES RECLASSIFIED TO AG-PEM WETLANDS. TWS/ATWS ADJUSTED ACCORDINGLY.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND FOREIGN PIPELINE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE. SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED PRIVATE ROAD AND PARKING LOT CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588
March 14, 2016 9:28am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WADS\WADS-P-8021.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

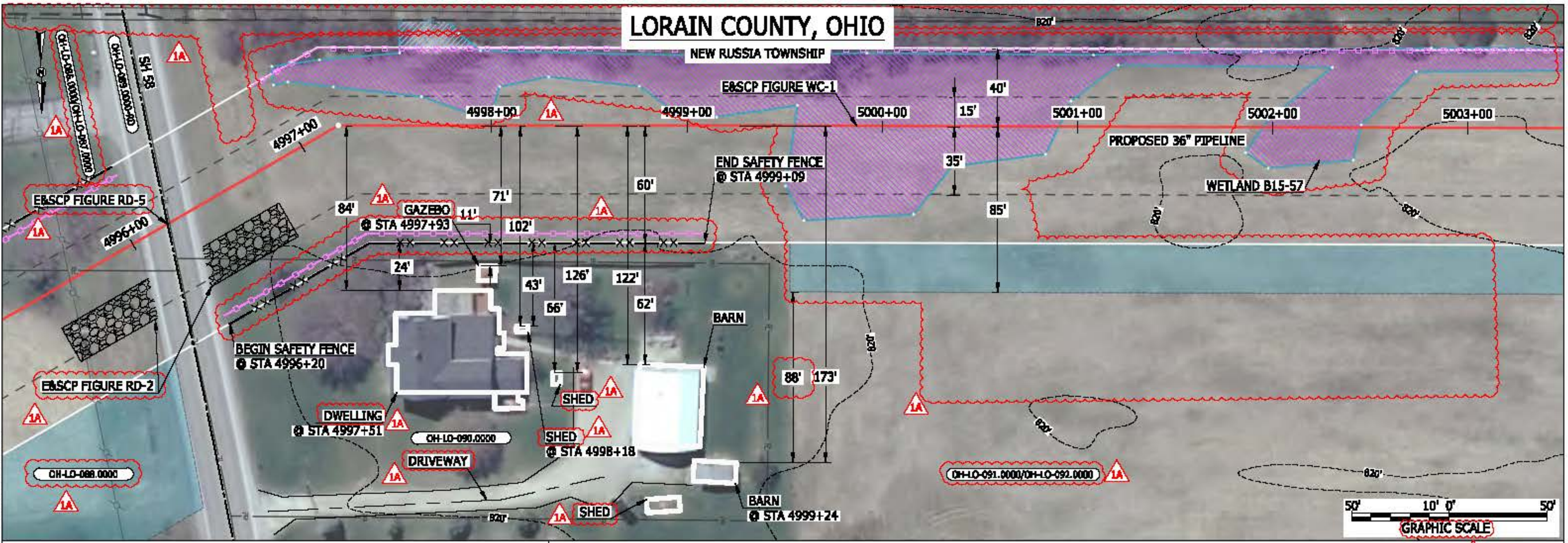
IG.#

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 94.49 TO MP 94.65

LOC.: LORAIN COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8021

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST MP 00 P
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE —T—T—
FENCE —x—x—
RAILROAD TRACK
ROAD CL
WATER PIPELINE —W—W—
UTILITY LINE
PROPERTY LINE — PL —
SAFETY FENCE —XX—XX—
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 4997+51 THERE IS A DWELLING LOCATED 24' TO THE RIGHT OF THE CWS AND 84' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 4997+93 THERE IS A GAZEBO LOCATED 11' TO THE RIGHT OF THE CWS AND 71' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 4998+18 THERE IS A SHED LOCATED 43' TO THE RIGHT OF THE CWS AND 102' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG WADS-P-8021 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1A:

RESOURCES RECLASSIFIED TO AG-PEM WETLANDS. TWS/ATWS ADJUSTED ACCORDINGLY.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND FOREIGN PIPELINE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE. SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588
March 14, 2016 9:25am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8022.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

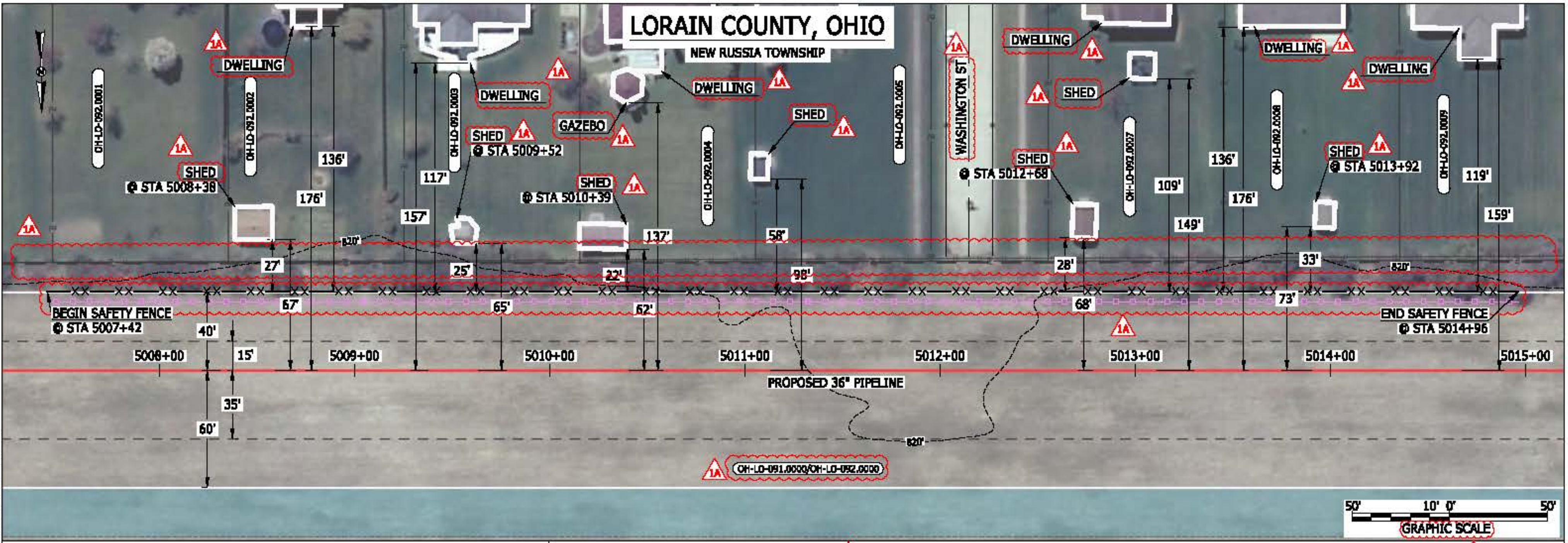
PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 94.61 TO MP 94.76

LOC.: LORAIN COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8022

IG #

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST M 00 P
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES
1A
1A

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE —T—T—
FENCE —x—x—
RAILROAD TRACK
ROAD CL
WATER PIPELINE —W—W—
UTILITY LINE
PROPERTY LINE —PL—
SAFETY FENCE —XX—XX—
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING ⊙
LIGHT POLE ● FIRE HYDRANT ⊕
MICROWAVE TOWER ☒ TOWER ☒
TANK ● 1A

DESCRIPTION: 1A 1A

AT SURVEY STATION 5008+38 THERE IS A SHED LOCATED 27' TO THE LEFT OF THE CWS AND 67' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 5009+52 THERE IS A SHED LOCATED 25' TO THE LEFT OF THE CWS AND 65' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 5010+39 THERE IS A SHED LOCATED 22' TO THE LEFT OF THE CWS AND 62' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 5012+68 THERE IS A SHED LOCATED 28' TO THE LEFT OF THE CWS AND 68' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 5013+92 THERE IS A SHED LOCATED 33' TO THE LEFT OF THE CWS AND 73' LEFT OF THE PROPOSED 36" PIPELINE.

1A 1A 1A 1A 1A

REVISION 1A:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES.
PROPERTY BOUNDARIES AND FOREIGN PIPELINE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED ROAD NAME AND UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES: 1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588
March 14, 2016 9:22am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WADS\WADS-P-8023.DWG

IG #					
	1A	ISSUED FOR FERC	15MAR16	PROJ. ENG. VP	
	1	ISSUED FOR FERC	23FEB16	CHECKED BY: DOB	
	0	ISSUED FOR FERC FILING	21OCT15	DRAWN BY: RSM 1A	
	REV.#	DESCRIPTION	DATE	SCALE: AS SHOWN	DATE

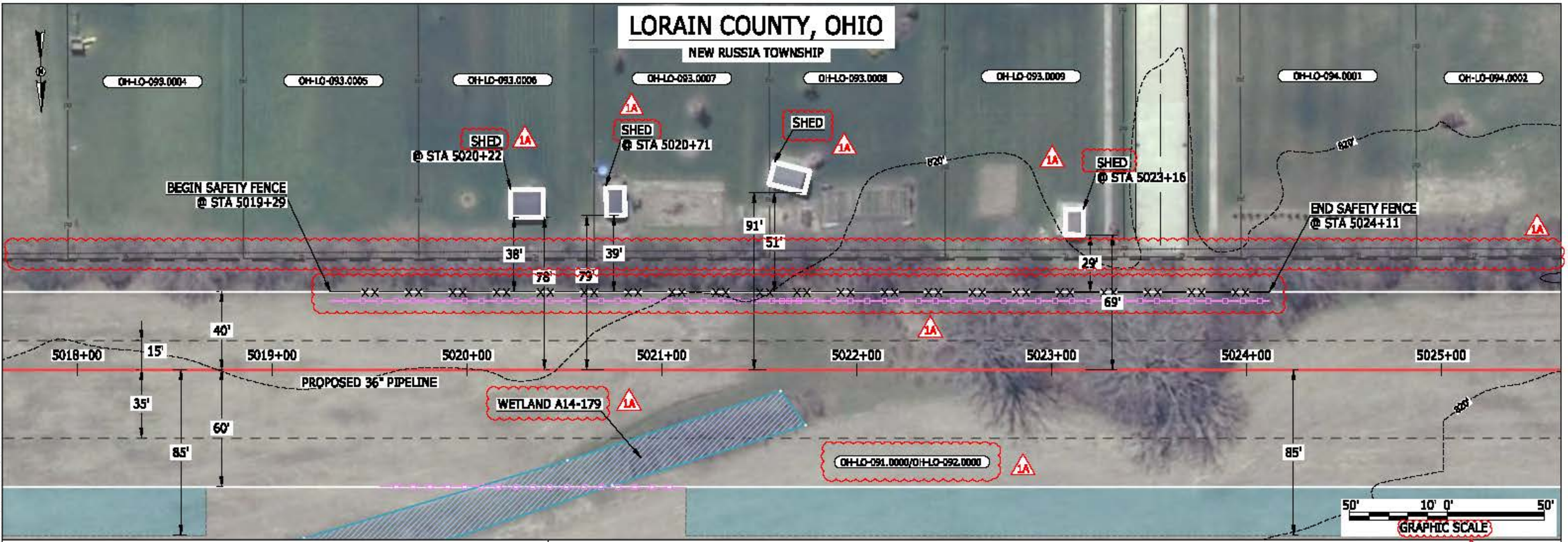
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 94.83 TO MP 94.98

LOC.: LORAIN COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8023

NEXUS GAS TRANSMISSION

LORAIN COUNTY, OHIO

NEW RUSSIA TOWNSHIP



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST (M 00 P)
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 5020+22 THERE IS A SHED LOCATED 38' TO THE LEFT OF THE CWS AND 78' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 5020+71 THERE IS A SHED LOCATED 39' TO THE LEFT OF THE CWS AND 79' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 5023+16 THERE IS A SHED LOCATED 29' TO THE LEFT OF THE CWS AND 69' LEFT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES.
FOREIGN PIPELINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 95.03 TO MP 95.18

LOC.: LORAIN COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8024

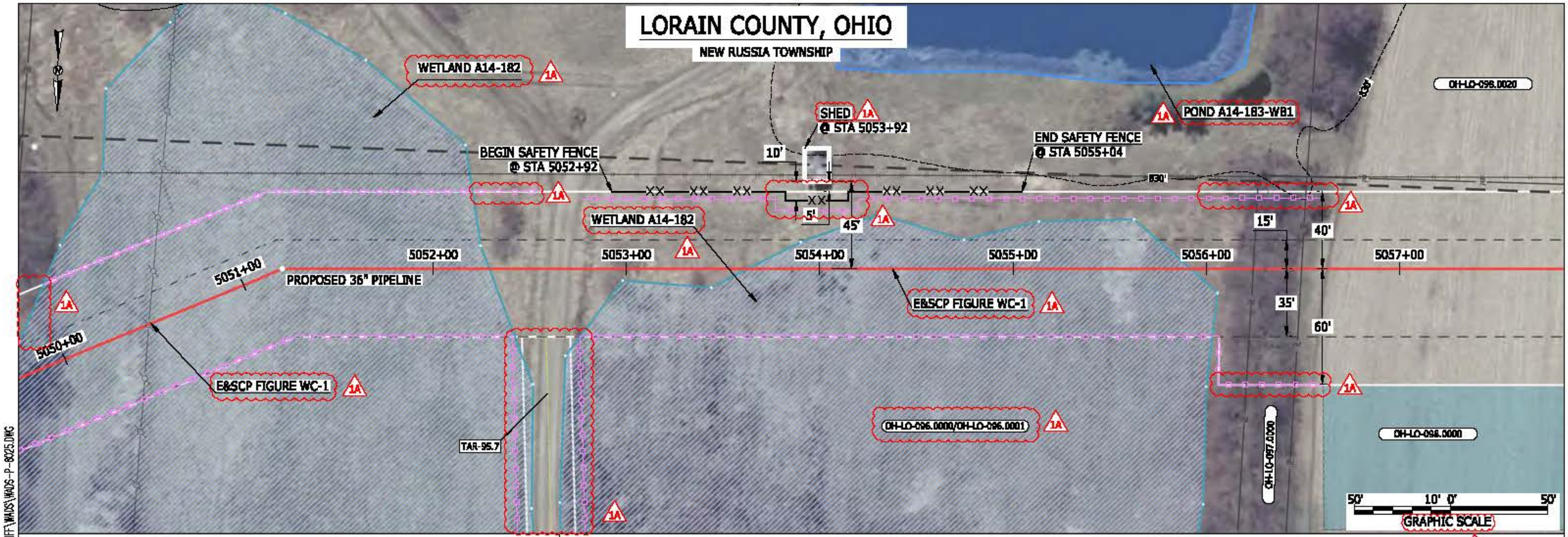
NEXUS GAS TRANSMISSION

MES13858 March 14, 2016 12:30pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WADS\WADS-P-8024.DWG

IG.#

LORAIN COUNTY, OHIO

NEW RUSSIA TOWNSHIP



LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	🟨
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	M 00 P
CONSTRUCTION LIMIT	▬
PERMANENT ROW	▭
ADDITIONAL TEMPORARY WORKSPACE	▭
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	🟦
DELINEATED WETLAND BOUNDARY	🟦
AGRICULTURAL PEM WETLAND BOUNDARY	🟦
DELINEATED WATERBODY CENTERLINE	—
APPROXIMATE WATERBODY BANK	🟧
APPROXIMATE WETLAND BOUNDARY	🟧
APPROXIMATE WATERBODY CENTERLINE	—
STRUCTURES	▭
POWERLINES	—ϙ—ϙ—
CONTOUR LINE	- - - 1200' - - -
SILT FENCE	—□—□—□—□—
STRAW BALE	—▯—▯—▯—▯—
FOREIGN PIPELINES	—+—+—+—+—
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	+—+—+—+—+
ROAD CL	—— - ——
WATER PIPELINE	—W—W—
UTILITY LINE	——
PROPERTY LINE	—— PL ——
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
WELL: OIL	⊕
WELL: WATER	⊕
WELL: UNKNOWN	⊕
MAINLINE VALVE (MLV)	⋈
BLOW OFF VALVE	⋈
HORIZONTAL DIRECTIONAL DRILLING	◉
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A

1A

1A

DESCRIPTION:

1A

AT SURVEY STATION 5053+92 THERE IS A SHED LOCATED 5' TO THE LEFT OF THE CWS AND 45' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

RESOURCE ADDED BASED ON UPDATED FIELD SURVEY WETLAND DATA. PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA. LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP. WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE. SILT FENCE ADDED FOR EROSION CONTROL MEASURE. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BAN26537 March 14, 2016 9:38am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8025.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	06NOV15

IG.#

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

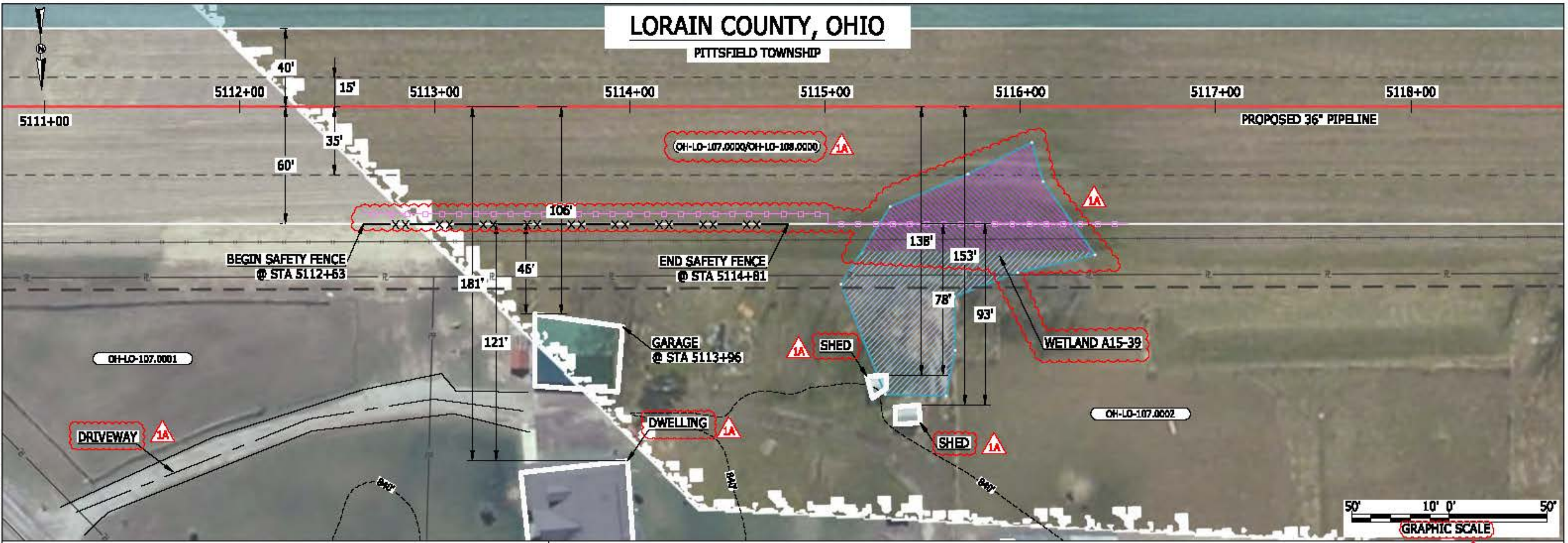
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 95.64 TO MP 95.79

LOC.: LORAIN COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8025

NEXUS GAS TRANSMISSION

LORAIN COUNTY, OHIO

PITTSFIELD TOWNSHIP



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD PAR-0.0
- TEMPORARY ACCESS ROAD TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER 00-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS ⊕ WATER ⊕ OIL ⊕ UNKNOWN ⊕
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE ● FIRE HYDRANT
- MICROWAVE TOWER ☒ TOWER ☒
- TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 5113+96 THERE IS A GARAGE LOCATED 46' TO THE RIGHT OF THE CWS AND 106' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

RESOURCE PARTIALLY RECLASSIFIED TO AG-PEM WETLAND.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE. SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BAN26537
March 14, 2016 9:44am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8026.DWG

IG #:

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

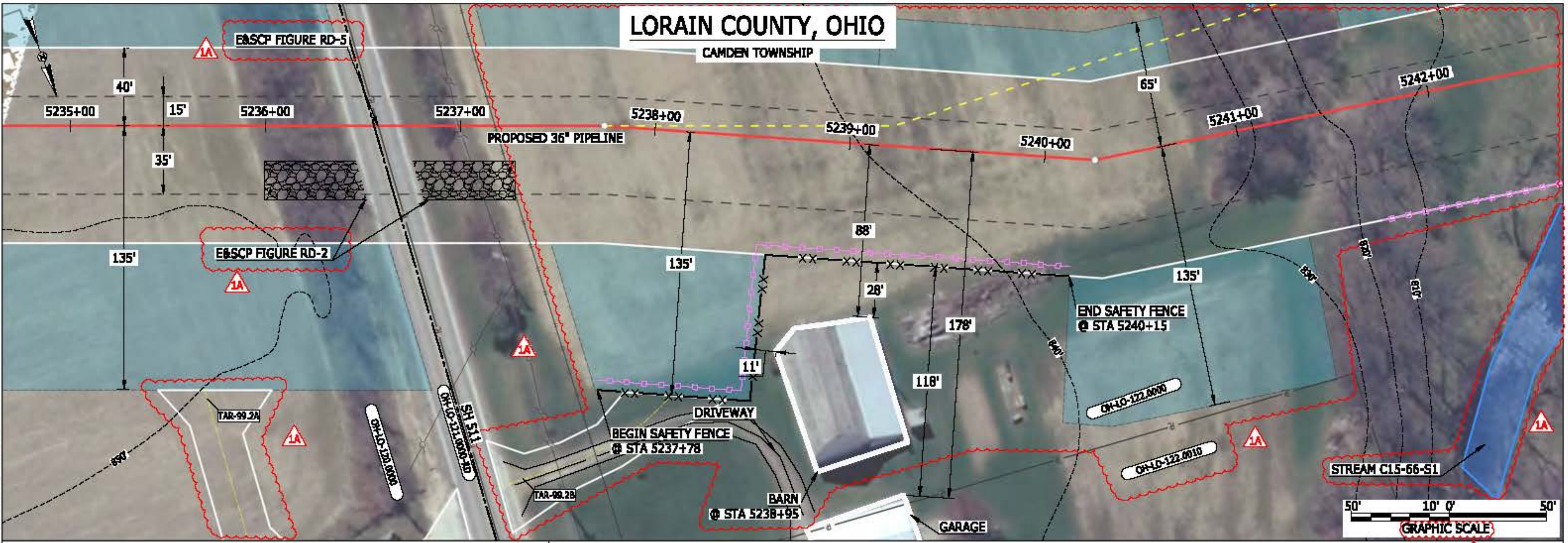
PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 96.8 TO MP 96.95

LOC.: LORAIN COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8026

NEXUS GAS TRANSMISSION

MES13858
March 14, 2016 10:49am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WADS\WADS-P-8029.DWG



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 5238+95 THERE IS A BARN LOCATED 11' TO THE RIGHT OF THE CWS AND 88' RIGHT OF THE PROPOSED 36" PIPELINE. 1A

REVISION 1A:

CENTERLINE AND TWS/ATWS ADJUSTED TO AVOID A WATER WELL AND NATURAL GROUND SPRING. TARS ADDED DUE TO THE TERRAIN NEAR STATE ROUTE 511.
RESOURCES UPDATED DUE TO UPDATED FIELD SURVEY DATA.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND SILT FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT.

NOTES:

1A

1. ~~FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.~~
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

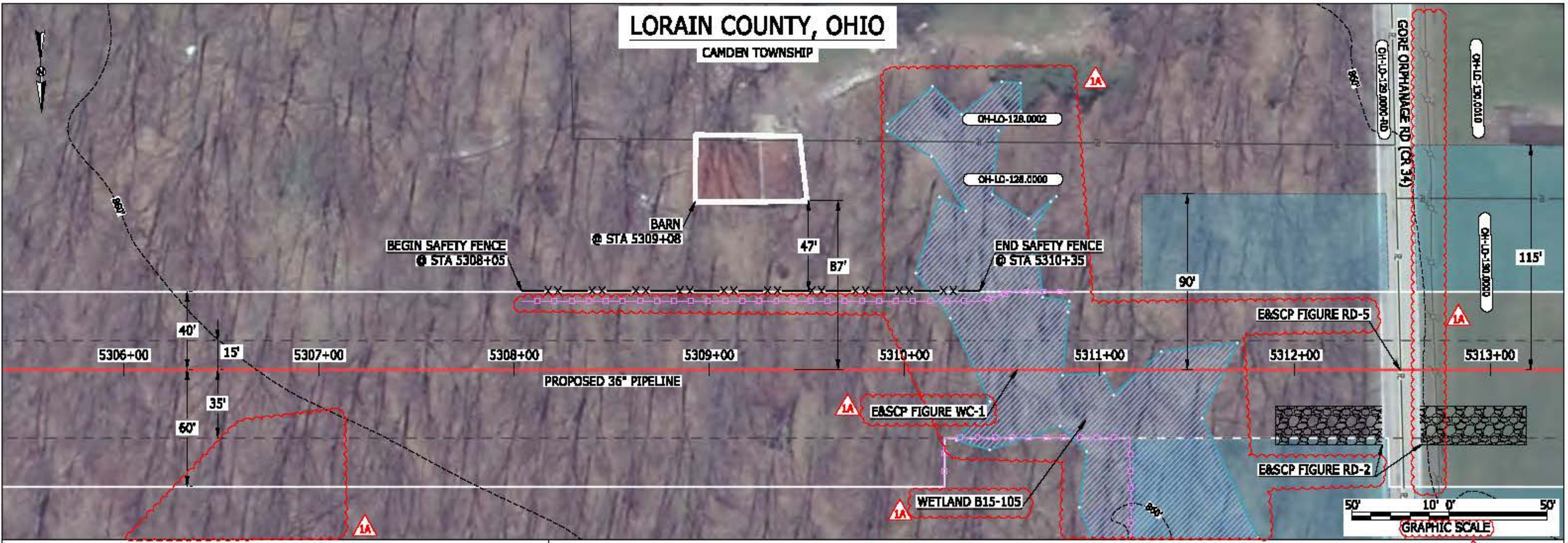
IG.#	REV.#	DESCRIPTION	DATE
	1A	ISSUED FOR FERC	15MAR16
	1	ISSUED FOR FERC	23FEB16
	0	ISSUED FOR FERC FILING	21OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 99.14 TO MP 99.29R 1A

LOC.: LORAIN COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8029

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD (PAR-0.0)
TEMPORARY ACCESS ROAD (TAR-0.0)
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER (00-XX-000.0000)
MUNICIPALITY LINE
WELL: GAS, OIL, WATER, UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE
FIRE HYDRANT
MICROWAVE TOWER
TOWER
TANK

1A

DESCRIPTION:

AT SURVEY STATION 5309+08 THERE IS A BARN LOCATED 47' TO THE LEFT OF THE CWS AND 87' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

APPROXIMATED RESOURCE REMOVED AND ADDITIONAL RESOURCE ADDED BASED ON UPDATED FIELD SURVEY DATA.
RESOURCES UPDATED DUE TO UPDATED FIELD SURVEY DATA.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
POWER LINE ADDED BASED ON UPDATED FIELD SURVEY.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 5:00pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8030.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

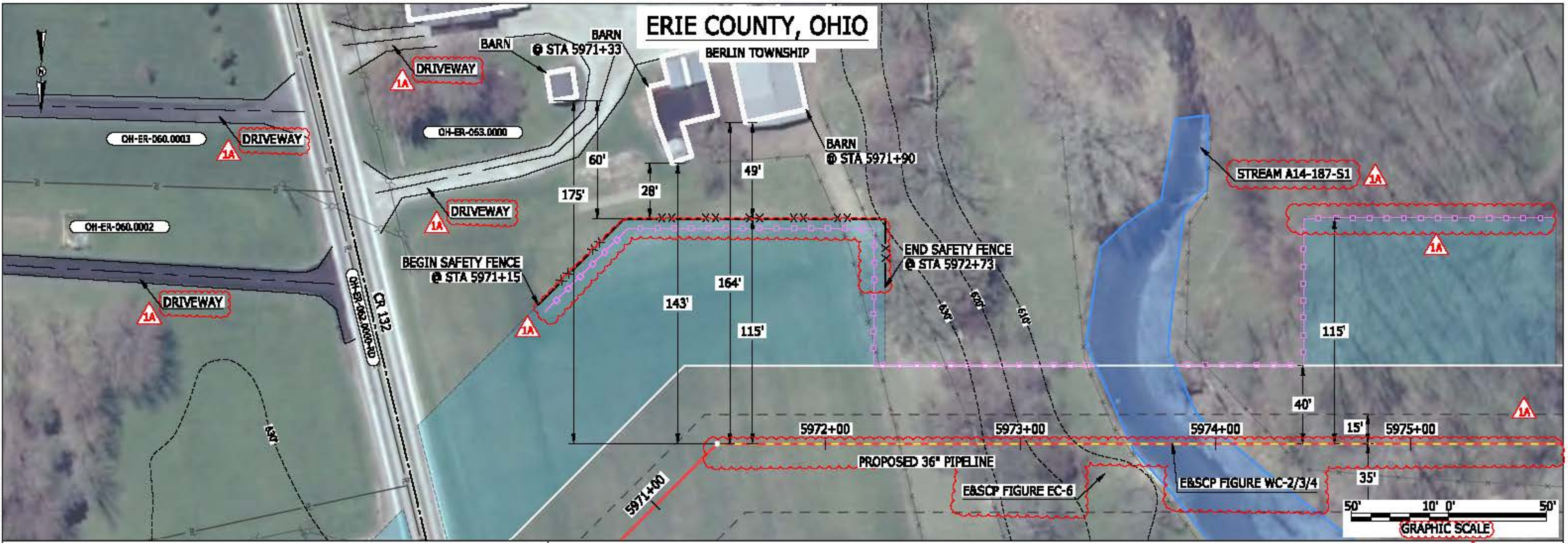
PROJ. ENG.: VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 100.48 TO MP 100.63

LOC.: LORAIN COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8030

IG#

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
1A
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
1A
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT ⊕
MICROWAVE TOWER ☒ TOWER ☒
TANK ● 1A

DESCRIPTION:

AT SURVEY STATION 5971+33 THERE IS A BARN LOCATED 28' TO THE LEFT OF THE CWS AND 143' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 5971+90 THERE IS A BARN LOCATED 49' TO THE LEFT OF THE CWS AND 164' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

CENTERLINE SHIFTED AND TWS/ATWS ADJUSTED TO AVOID OVERLAP WITH EXISTING UTILITY EASEMENT.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8038.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

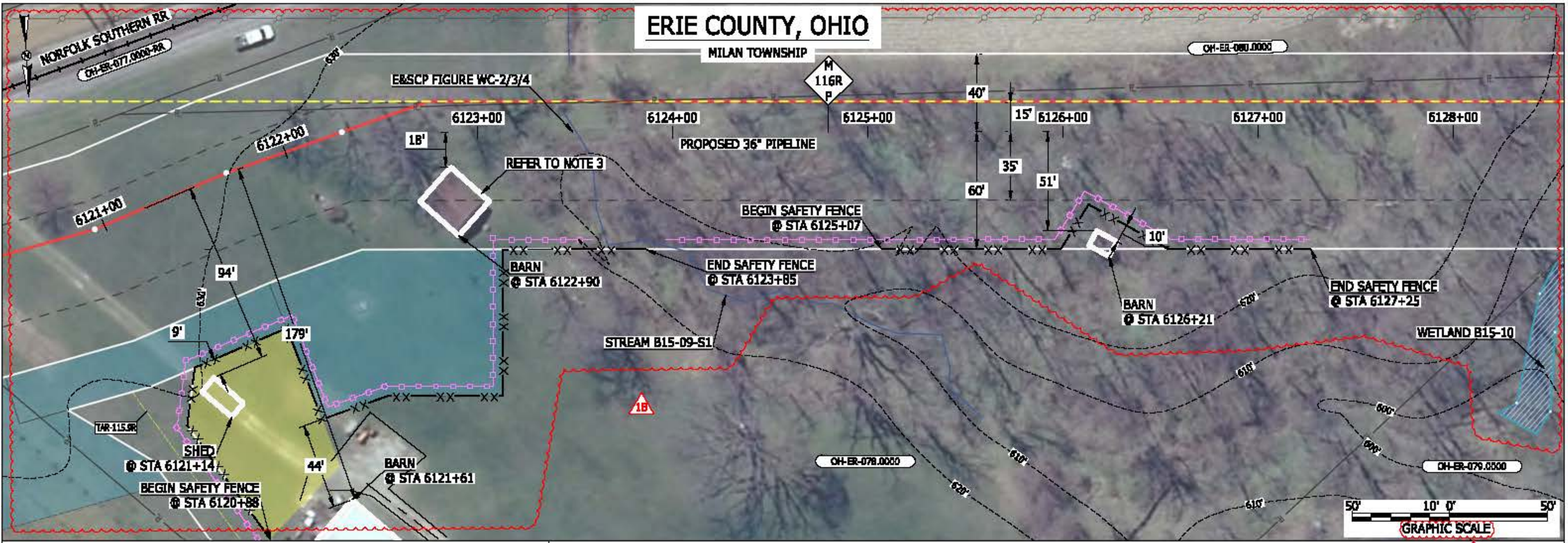
MES13858 March 14, 2016 5:22pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WADS\WADS-P-8032.DWG

IG.#	REV.#	DESCRIPTION	DATE
	1A	ISSUED FOR FERC	15MAR16
	1	ISSUED FOR FERC	23FEB16
	0	ISSUED FOR FERC FILING	21OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 113.08 TO MP 113.18R 1A
LOC.: ERIE COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8032

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD PAR-0.0
- TEMPORARY ACCESS ROAD TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER 00-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1B

DESCRIPTION:

AT SURVEY STATION 6121+14 THERE IS A SHED LOCATED 9' TO THE RIGHT OF THE CWS AND 94' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 6121+61 THERE IS A BARN LOCATED 44' TO THE RIGHT OF THE CWS AND 179' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 6122+90 THERE IS A BARN LOCATED INSIDE OF THE CWS AND 18' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 6126+21 THERE IS A BARN LOCATED INSIDE OF THE CWS AND 51' RIGHT OF THE PROPOSED 36" PIPELINE.

1B

REVISION 1B:

THE CENTERLINE WAS REROUTED TO PROVIDE BETTER CROSSING ANGLE ACROSS RAILROAD EASEMENT AND TO AVOID AN OVERLAP WITH AN EXISTING UTILITY'S EASEMENT.
TWS/ATWS ADJUSTED ACCORDINGLY.
TAR ADJUSTED AND NEW STAGING AREA LAYOUT BASED ON LANDOWNER REQUEST.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE. POWER LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA. UPDATED TYPE OF STRUCTURE CALL OUTS.

1B

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BAN26537 March 14, 2016 10:05am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8033.DWG

REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	03MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

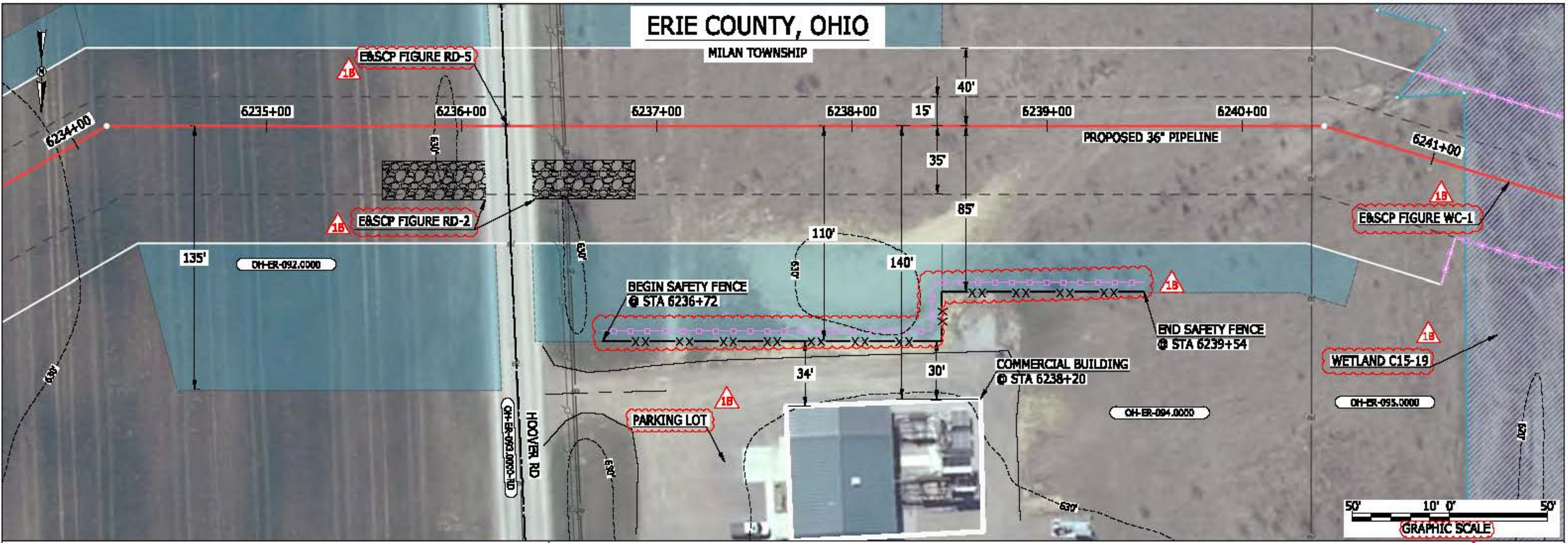
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1B
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 115.92R TO MP 116.07R 1B

LOC.: ERIE COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. WADS-P-8033

NEXUS GAS TRANSMISSION



MES13858
March 14, 2016 5:08pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WADS\WADS-P-8034.DWG

LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES
1B

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ● WATER ●
OIL ● UNKNOWN ●
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING ●
LIGHT POLE ● FIRE HYDRANT ●
MICROWAVE TOWER ☒ TOWER ☒
TANK ●
1B

DESCRIPTION:

AT SURVEY STATION 6238+20 THERE IS A COMMERCIAL BUILDING LOCATED 30' TO THE RIGHT OF THE CWS AND 140' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1B:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA. WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED PARKING LOT CALL OUT.

NOTES:

1B

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

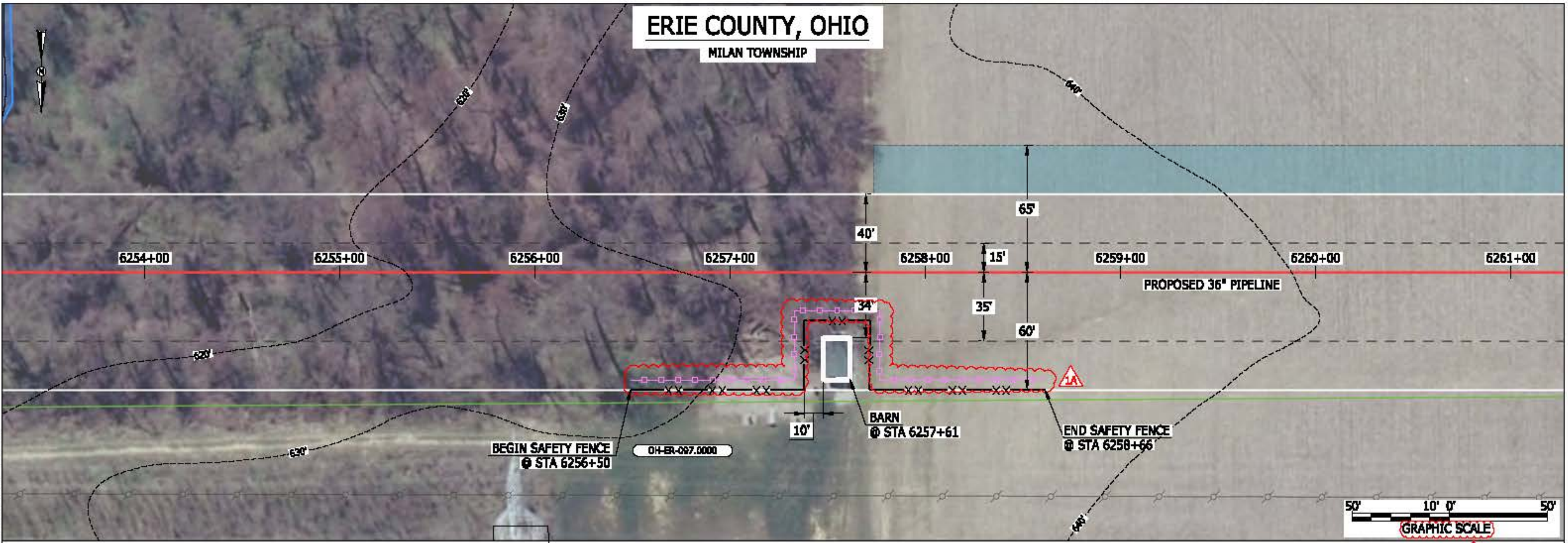
1B	ISSUED FOR FERC	15MAR16			
1A	ISSUED FOR FERC	26FEB16		PROJ. ENG. VP	
1	ISSUED FOR FERC	23FEB16		CHECKED BY: DOB	
0	ISSUED FOR FERC FILING	21OCT15		DRAWN BY: RSM 1B	
REV.#	DESCRIPTION	DATE		SCALE: AS SHOWN	DATE

IG #

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 118.06 TO MP 118.21

LOC.: ERIE COUNTY, OHIO REV.: 1B
YR.: 2017 W.O. DWG.NO. WADS-P-8034

NEXUS GAS TRANSMISSION



MES13858 March 14, 2016 5:09pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WADS\WADS-P-8035.DWG

LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, WATER, OIL, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

DESCRIPTION:

AT SURVEY STATION 6257+61 THERE IS A BARN LOCATED INSIDE OF THE CWS AND 34' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

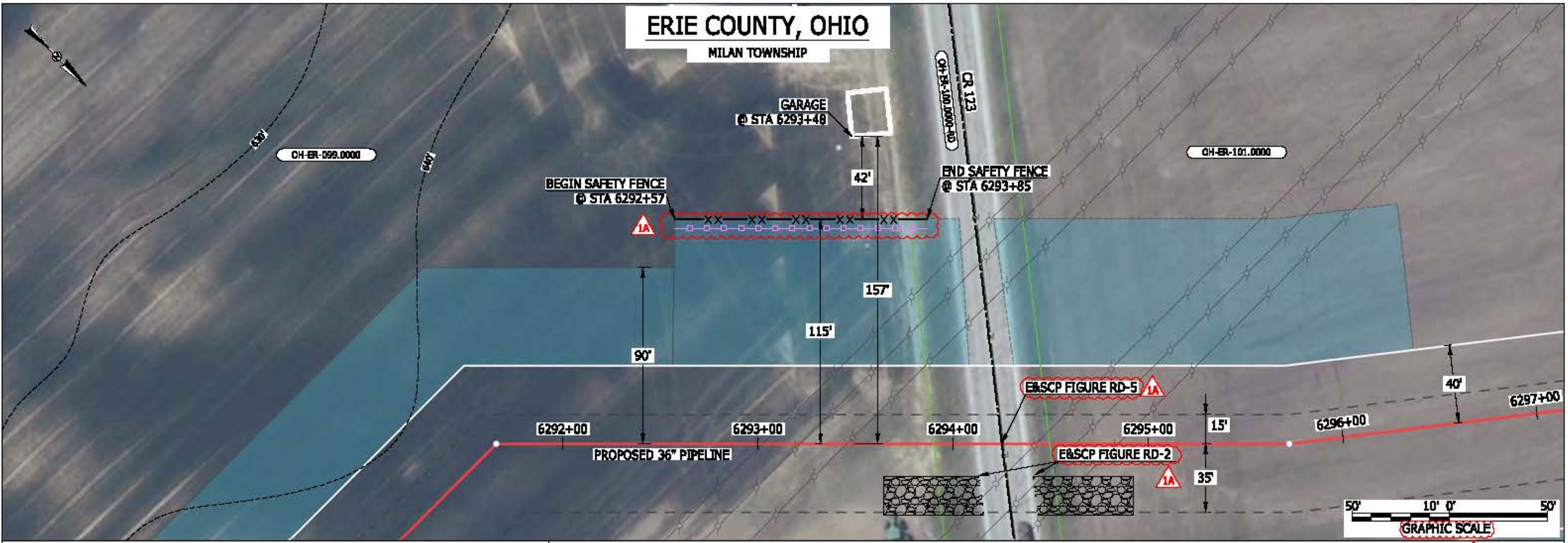
IG.#

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 118.43 TO MP 118.58

LOC.: ERIE COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8035

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST (M 00 P)
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, WATER, OIL, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 6293+48 THERE IS A GARAGE LOCATED 42' TO THE LEFT OF THE CWS AND 157' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA. SILT FENCE ADDED FOR EROSION CONTROL MEASURE.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	21OCT15

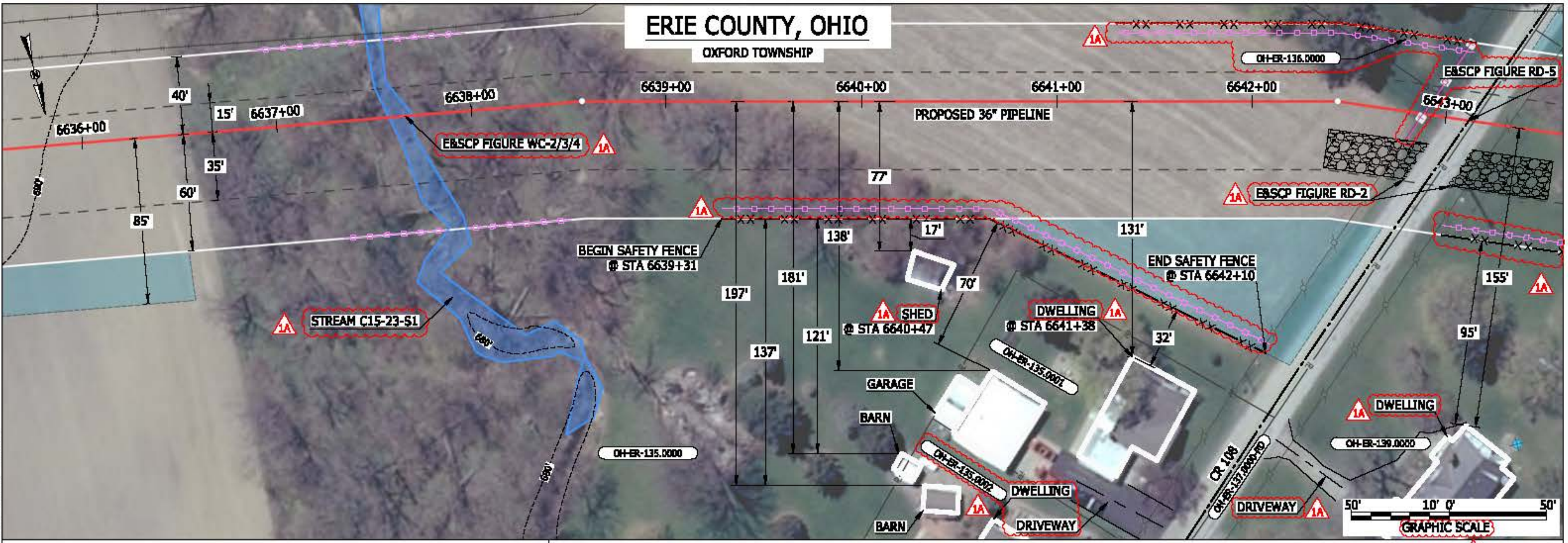
PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 119.15 TO MP 119.26

LOC.: ERIE COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8036

NEXUS GAS TRANSMISSION

IG #
MES13858
March 14, 2016
5:10pm
Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8036.DWG



LEGEND

PROPOSED NEXUS PIPELINE	━○━
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	– – –
INTERCONNECTING PIPELINE	━○━
PIPELINE MILEPOST	M 00 P
CONSTRUCTION LIMIT	═
PERMANENT ROW	[- - - -]
ADDITIONAL TEMPORARY WORKSPACE	▭
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	━
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	━
STRUCTURES	

1A

POWERLINES	
CONTOUR LINE	- - - -120'- - - -
SILT FENCE	—□—□—□—□—
STRAW BALE	—◫—◫—◫—◫—
FOREIGN PIPELINES	—‖—‖—‖—‖—
TELEPHONE	—T——T—
FENCE	—x——x—
RAILROAD TRACK	—+—+—+—+—
ROAD CL	—— - ——
WATER PIPELINE	—W——W—
UTILITY LINE	——
PROPERTY LINE	—— PL ——
SAFETY FENCE	—XX——XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
WELL: WATER	⊕
WELL: OIL	⊕
WELL: UNKNOWN	⊕
MAINLINE VALVE (MLV)	⋈
BLOW OFF VALVE	⋈
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A

DESCRIPTION:

1A

AT SURVEY STATION 6641+38 THERE IS A DWELLING LOCATED 32' TO THE RIGHT OF THE CWS AND 131' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 6640+47 THERE IS A SHED LOCATED 17' TO THE RIGHT OF THE CWS AND 77' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG WADS-P-8038 & WADS-P-8039 FOR THE CONTINUATION OF THE RESIDENTIAL AREA. 1A

REVISION 1A:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE. SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BAN26537 March 14, 2016 10:15am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8037.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

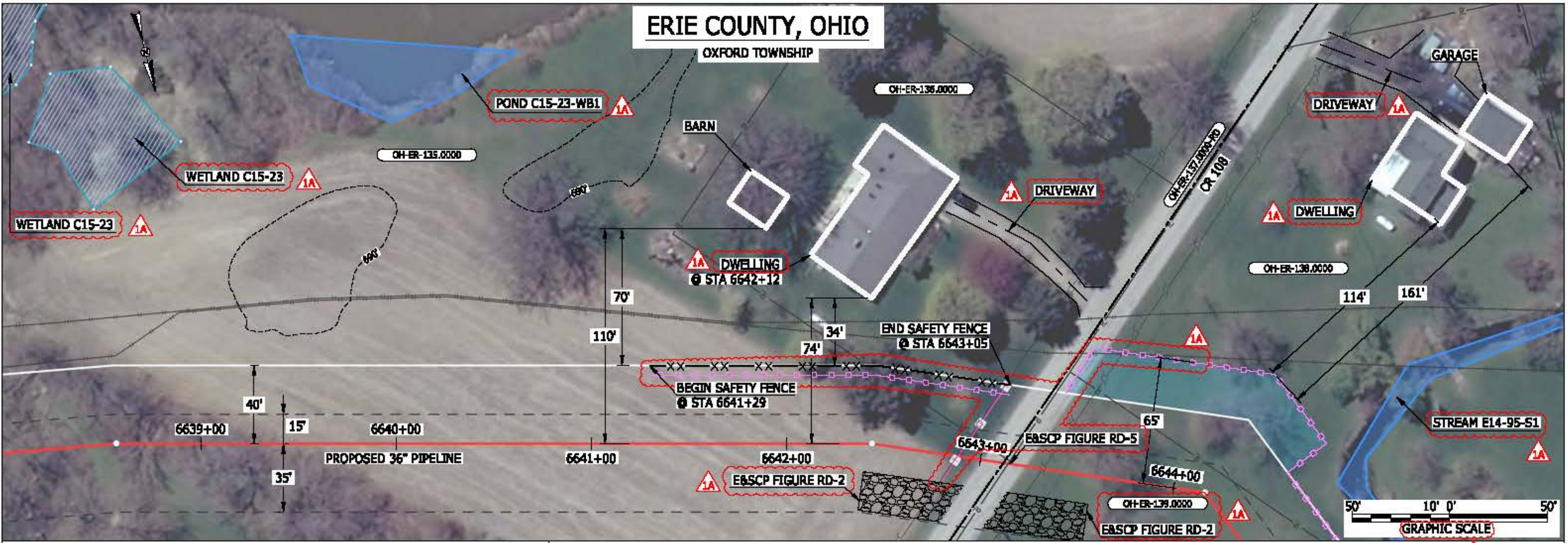
IG.#

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 125.68 TO MP 125.83

LOC.: ERIE COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8037

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	🟥	POWERLINES	
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	🟨	CONTOUR LINE	
INTERCONNECTING PIPELINE	🟪	SILT FENCE	
PIPELINE MILEPOST	M 00 P	STRAW BALE	
CONSTRUCTION LIMIT		FOREIGN PIPELINES	
PERMANENT ROW		TELEPHONE	T
ADDITIONAL TEMPORARY WORKSPACE		FENCE	x
STAGING AREA	🟨	RAILROAD TRACK	
WAREYARD	🟩	ROAD CL	
ROCK ACCESS PAD		WATER PIPELINE	W
PERMANENT ACCESS ROAD	PAR-0.0	UTILITY LINE	
TEMPORARY ACCESS ROAD	TAR-0.0	PROPERTY LINE	PL
DELINEATED WATERBODY BANK		SAFETY FENCE	XX
DELINEATED WETLAND BOUNDARY		TRACT NUMBER	00-XX-000.0000
AGRICULTURAL PEM WETLAND BOUNDARY		MUNICIPALITY LINE	
DELINEATED WATERBODY CENTERLINE		WELL: GAS	●
APPROXIMATE WATERBODY BANK		OIL	●
APPROXIMATE WETLAND BOUNDARY		WATER	●
APPROXIMATE WATERBODY CENTERLINE		UNKNOWN	●
STRUCTURES		MAINLINE VALVE (MLV)	
		BLOW OFF VALVE	
		HORIZONTAL DIRECTIONAL DRILLING	●
		LIGHT POLE	●
		FIRE HYDRANT	●
		MICROWAVE TOWER	☒
		TOWER	☒
		TANK	●

1A

1A

1A

DESCRIPTION:

1A

AT SURVEY STATION 6642+12 THERE IS A DWELLING LOCATED 34' TO THE LEFT OF THE CWS AND 74' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG WADS-P-8037 & WADS-P-8039 FOR THE CONTINUATION OF THE RESIDENTIAL AREA. 1A

REVISION 1A:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE. SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES: 1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BAN26537 March 14, 2016 10:25am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8038.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

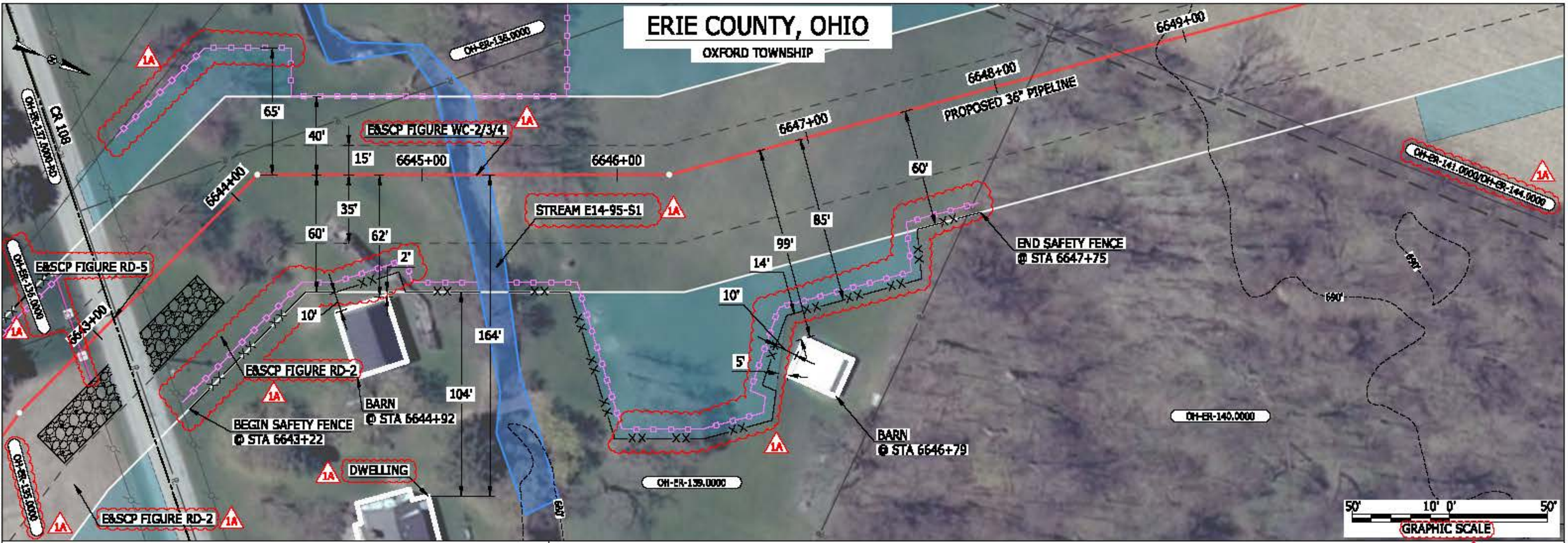
IG #:

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 125.72 TO MP 125.84

LOC.: ERIE COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8038

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST (M 00 P)
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD (PAR-0.0)
TEMPORARY ACCESS ROAD (TAR-0.0)
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE —T—T—
FENCE —x—x—
RAILROAD TRACK
ROAD CL
WATER PIPELINE —W—W—
UTILITY LINE
PROPERTY LINE —℄—
SAFETY FENCE —XX—XX—
TRACT NUMBER (00-XX-000.0000)
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT ⊕
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 6644+92 THERE IS A BARN LOCATED 2' TO THE RIGHT OF THE CWS AND 62' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 6646+79 THERE IS A BARN LOCATED 5' TO THE RIGHT OF THE CWS AND 99' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG WADS-P-8037 & WADS-P-8038 FOR THE CONTINUATION OF THE RESIDENTIAL AREA. 1A

REVISION 1A:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
PROPERTY BOUNDARIES AND SAFETY FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES: 1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15
REV.#	DESCRIPTION	DATE

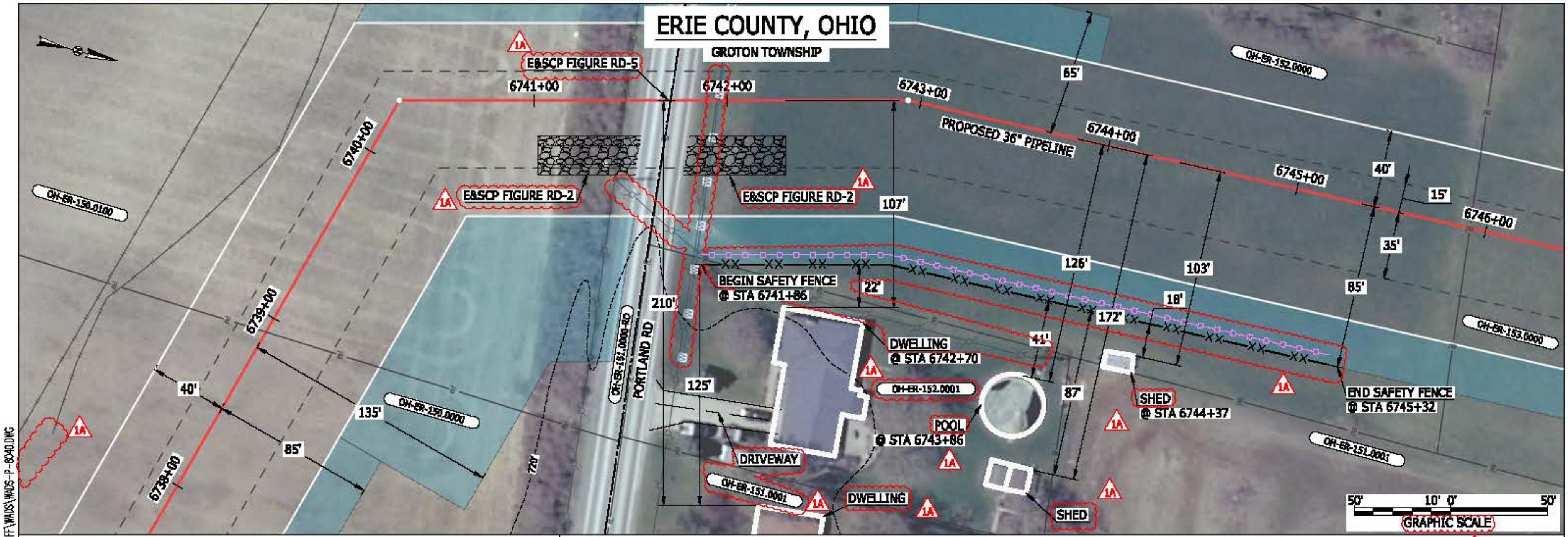
PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 125.8 TO MP 125.94

LOC.: ERIE COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8039

IG #

BAN26537
March 14, 2016 10:45am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WADS\WADS-P-8039.DWG



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD PAR-0.0
- TEMPORARY ACCESS ROAD TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER 00-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS ● WATER ●
- OIL ● UNKNOWN ●
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE ● FIRE HYDRANT ●
- MICROWAVE TOWER ☒ TOWER ☒
- TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 6742+70 THERE IS A DWELLING LOCATED 22' TO THE RIGHT OF THE CWS AND 107' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 6743+86 THERE IS A POOL LOCATED 41' TO THE RIGHT OF THE CWS AND 126' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 6744+37 THERE IS A SHED LOCATED 18' TO THE RIGHT OF THE CWS AND 103' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG WADS-P-8041 FOR THE CONTINUATION OF THE RESIDENTIAL AREA. 1A

REVISION 1A:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
UTILITY LINE, PROPERTY BOUNDARIES, POWER LINE AND FOREIGN PIPELINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES: 1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 127.61 TO MP 127.77

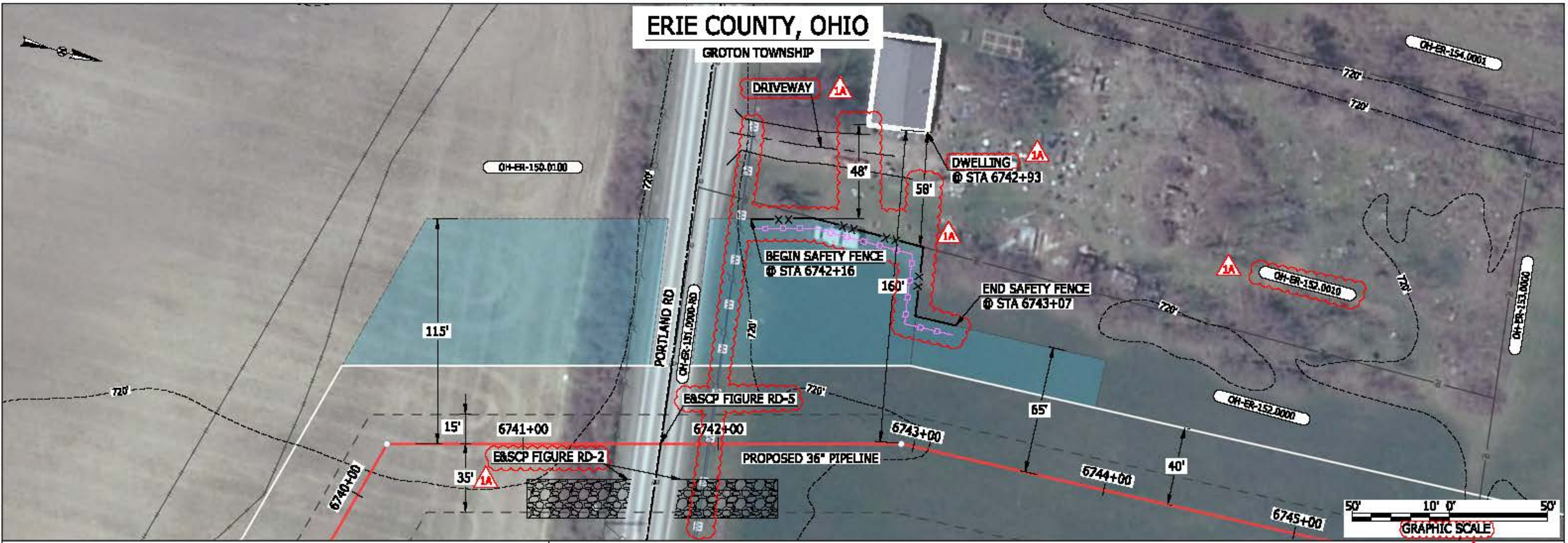
LOC.: ERIE COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8040

NEXUS GAS TRANSMISSION

MES13858 March 14, 2016 9:53am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8040.DWG

IG #

MES13858 March 14, 2016 10:04am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8041.DWG



LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	M 00 P
CONSTRUCTION LIMIT	▬
PERMANENT ROW	▭
ADDITIONAL TEMPORARY WORKSPACE	🟦
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	
STRUCTURES	
POWERLINES	
CONTOUR LINE	- - - 1200' - - -
SILT FENCE	—□—□—□—
STRAW BALE	—◫—◫—◫—
FOREIGN PIPELINES	—+—+—+—
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	—+—+—+—
ROAD CL	
WATER PIPELINE	—W—W—
UTILITY LINE	
PROPERTY LINE	— PL —
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	— — —
WELL: GAS	●
WELL: WATER	●
WELL: OIL	●
WELL: UNKNOWN	●
MAINLINE VALVE (MLV)	
BLOW OFF VALVE	
HORIZONTAL DIRECTIONAL DRILLING	●
LIGHT POLE	●
FIRE HYDRANT	●
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A 1A 1A

DESCRIPTION:

1A

AT SURVEY STATION 6742+93 THERE IS A DWELLING LOCATED 48' TO THE LEFT OF THE CWS AND 160' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG WADS-P-8040 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

1A

REVISION 1A:

ATWS ADJUSTED TO ALIGN WITH PROPERTY BOUNDARY BASED ON UPDATED CIVIL SURVEY.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
UTILITY LINES, PROPERTY BOUNDARIES AND SAFETY FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

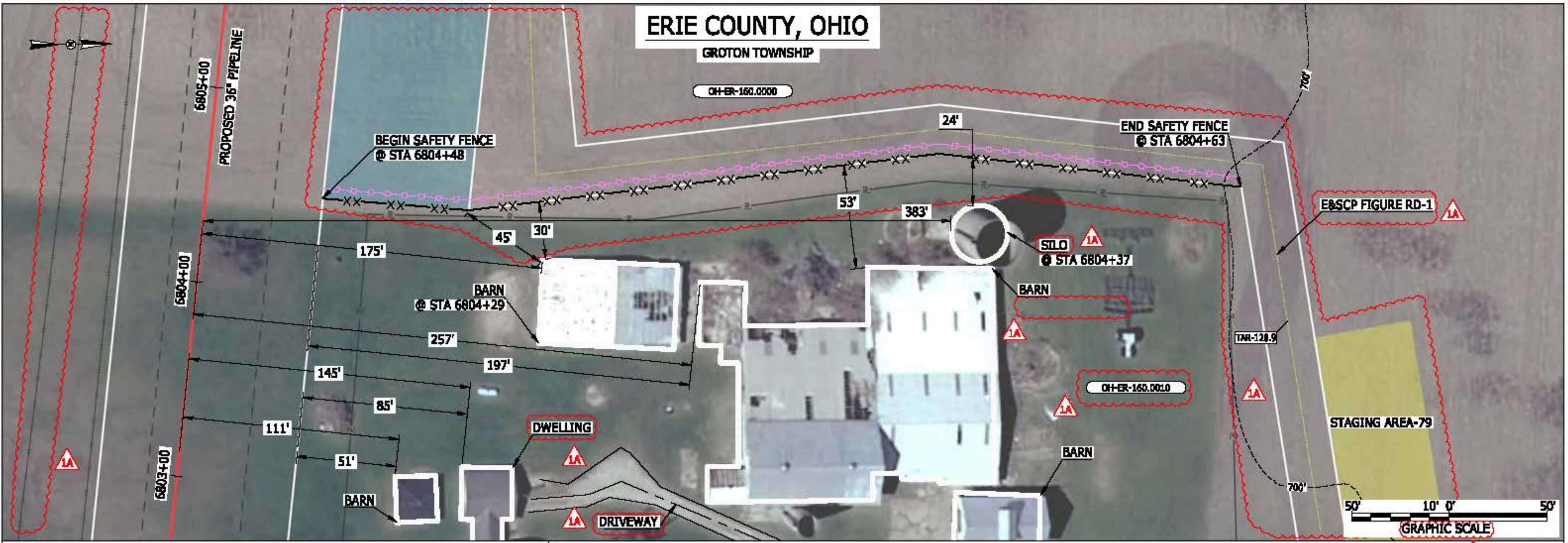
IG #

PROJ. ENG. VP	
CHECKED BY: DOB	
DRAWN BY: RSM 1A	
SCALE: AS SHOWN	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 127.65 TO MP 127.75

LOC.: ERIE COUNTY, OHIO | REV.: 1A
YR.: 2017 | W.O. | DWG.NO. WADS-P-8041

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 6804+29 THERE IS A BARN LOCATED 30' TO THE RIGHT OF THE CWS AND 175' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 6804+37 THERE IS A SILO LOCATED 24' TO THE RIGHT OF THE CWS AND 383' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

STAGING AREA, ATWS AND TAR ADJUSTED TO ALIGN WITH PROPERTY BOUNDARY BASED ON UPDATED CIVIL SURVEY.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
PROPERTY BOUNDARIES FOREIGN PIPELINES AND SAFETY FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

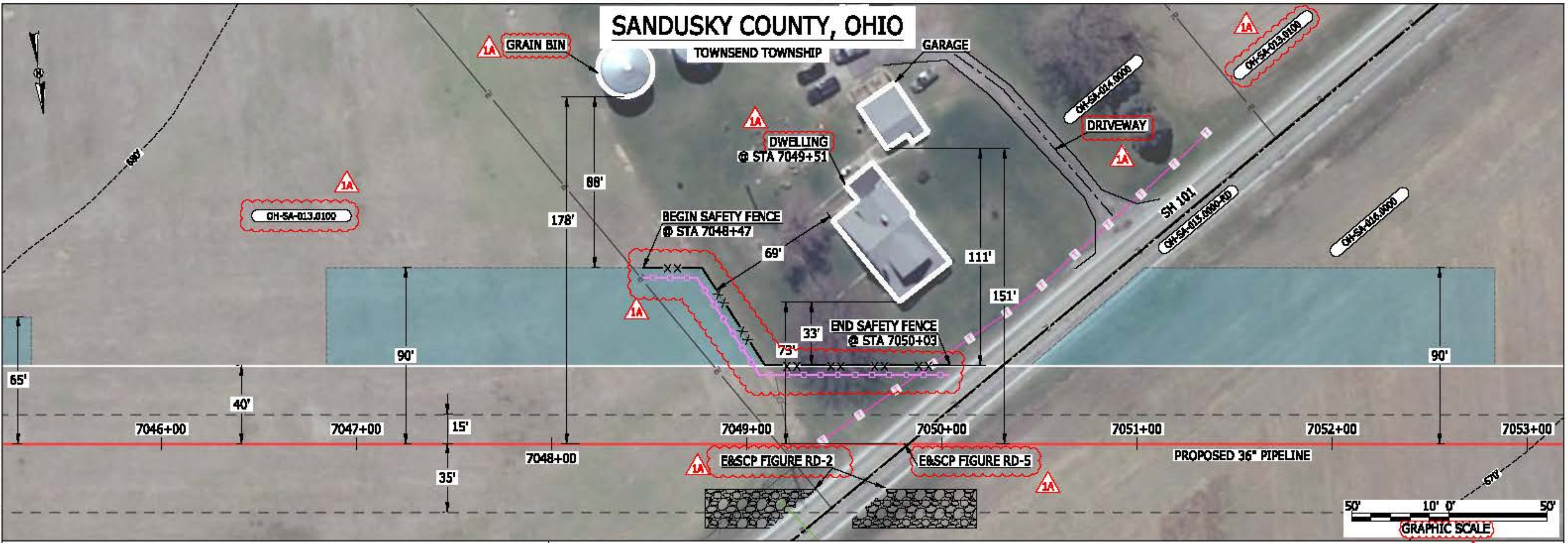
MES13858
March 14, 2016 10:09am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WADS\WADS-P-8042.DWG

IG#	REV.#	DESCRIPTION	DATE				
	1A	ISSUED FOR FERC	15MAR16		PROJ. ENG. VP		
	1	ISSUED FOR FERC	23FEB16		CHECKED BY: DOB		
	0	ISSUED FOR FERC FILING	22OCT15		DRAWN BY: RSM		
					SCALE: AS SHOWN	DATE	

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 128.84 TO MP 128.89

LOC.: ERIE COUNTY, OHIO — REV.: 1A
YR.: 2017 — W.O. — DWG.NO. WADS-P-8042

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST (M 00 P)
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD (PAR-0.0)
TEMPORARY ACCESS ROAD (TAR-0.0)
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER (00-XX-000.0000)
MUNICIPALITY LINE
WELL: GAS, OIL, WATER, UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE
FIRE HYDRANT
MICROWAVE TOWER
TOWER
TANK

1A

DESCRIPTION:

AT SURVEY STATION 7049+51 THERE IS A DWELLING LOCATED 33' TO THE LEFT OF THE CWS AND 73' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 10:16am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WADS\WADS-P-8043.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

IG #

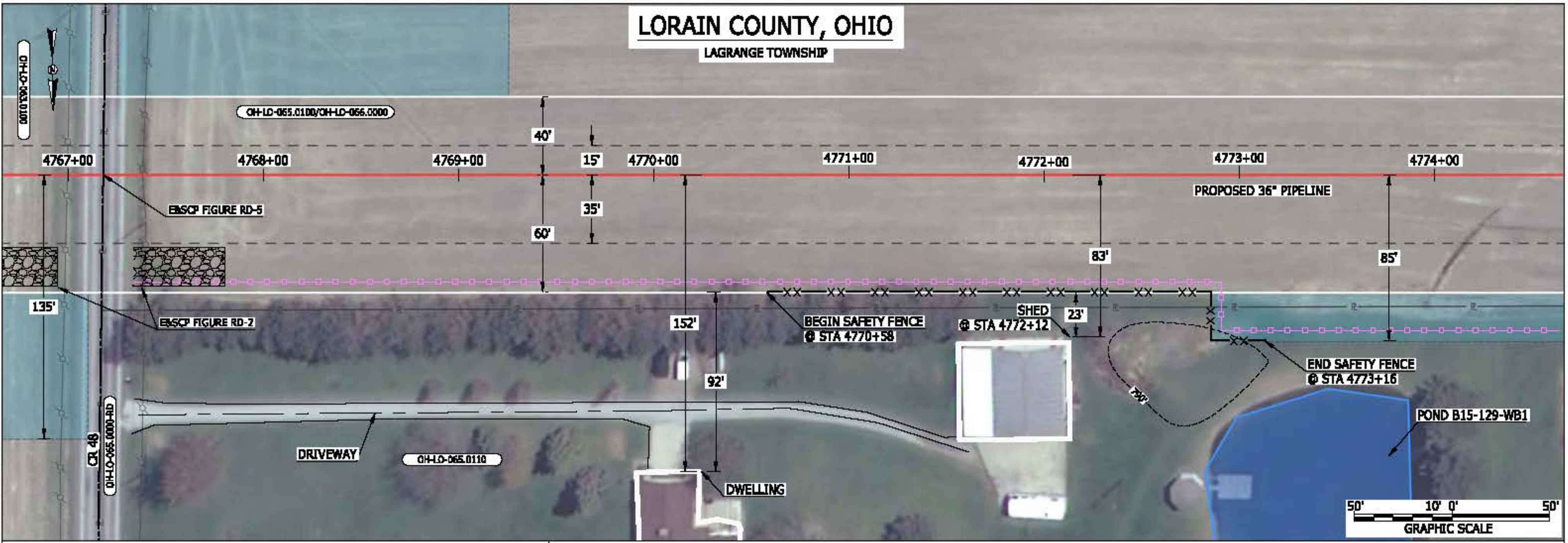
PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 133.43 TO MP 133.58

LOC.: SANDUSKY COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8043

NEXUS GAS TRANSMISSION

MES13858
March 15, 2016 2:20pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\ADDITIONAL\WADS-P-8047.DWG



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, WATER, OIL, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

DESCRIPTION:

AT SURVEY STATION 4772+12 THERE IS A SHED LOCATED 23' TO THE RIGHT OF THE CWS AND 83' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

CENTERLINE REROUTED AND ASSOCIATED WORKSPACE ADJUSTED TO IMPROVE CROSSING ANGLE AT EXISTING PIPELINE.
RESOURCES UPDATED BASED ON WETLAND/WATERBODY FIELD SURVEY DATA.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

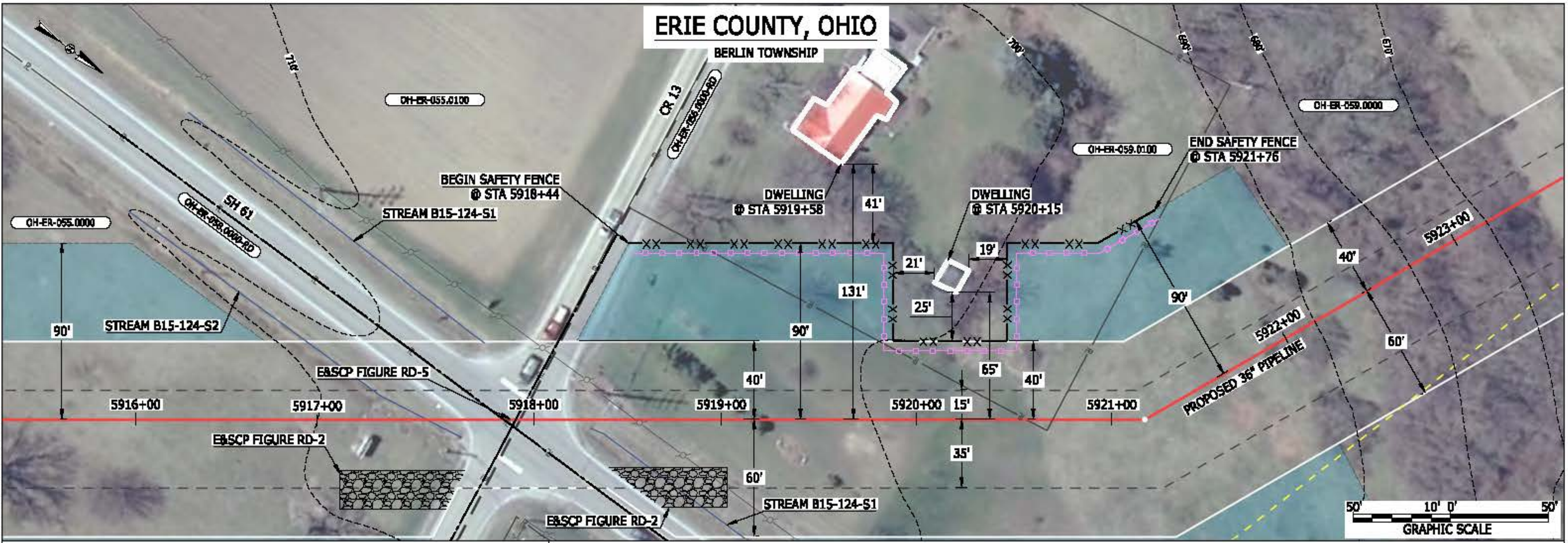
REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC	23FEB16

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 90.28R TO MP 90.43R

LOC.: LORAIN COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8047

IG #



LEGEND

PROPOSED NEXUS PIPELINE	🟥	POWERLINES	—ᛘ—ᛘ—
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -	CONTOUR LINE	----1200'----
INTERCONNECTING PIPELINE	🟪	SILT FENCE	—□—□—□—
PIPELINE MILEPOST	M 00 P	STRAW BALE	—▥—▥—▥—
CONSTRUCTION LIMIT	▬	FOREIGN PIPELINES	—‖—‖—‖—
PERMANENT ROW	[- - - -]	TELEPHONE	—T—T—
ADDITIONAL TEMPORARY WORKSPACE	🟦	FENCE	—x—x—
STAGING AREA	🟨	RAILROAD TRACK	—+—+—+—
WAREYARD	🟩	ROAD CL	—— - ——
ROCK ACCESS PAD	▨	WATER PIPELINE	—W—W—
PERMANENT ACCESS ROAD	PAR-0.0	UTILITY LINE	——
TEMPORARY ACCESS ROAD	TAR-0.0	PROPERTY LINE	—— ℞ ——
DELINEATED WATERBODY BANK		SAFETY FENCE	—XX—XX—
DELINEATED WETLAND BOUNDARY		TRACT NUMBER	00-XX-000.0000
AGRICULTURAL PEM WETLAND BOUNDARY		MUNICIPALITY LINE	— — —
DELINEATED WATERBODY CENTERLINE	——	WELL: GAS ⊕ WATER ⊕	
APPROXIMATE WATERBODY BANK		OIL ⊕ UNKNOWN ⊕	
APPROXIMATE WETLAND BOUNDARY		MAINLINE VALVE (MLV)	⋈
APPROXIMATE WATERBODY CENTERLINE	——	BLOW OFF VALVE	⋈
STRUCTURES		HORIZONTAL DIRECTIONAL DRILLING	⊙
		LIGHT POLE ● FIRE HYDRANT ⊕	
		MICROWAVE TOWER ☒ TOWER ☒	
		TANK	●

DESCRIPTION:

AT SURVEY STATION 5919+58 THERE IS A DWELLING LOCATED 41' TO THE LEFT OF THE CWS AND 131' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 5920+15 THERE IS A DWELLING LOCATED 19' TO THE LEFT OF THE CWS AND 65' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

CENTERLINES REROUTE TO AVOID THE EDISON WOODS PRESERVE.
TWS/ATWS ADJUSTED ACCORDINGLY. RESOURCES UPDATED BASED ON UPDATED FIELD SURVEY WETLAND/WATERBODY DATA.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588 March 14, 2016 9:18am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\ADDITIONAL\WADS-P-8048.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC	23FEB16

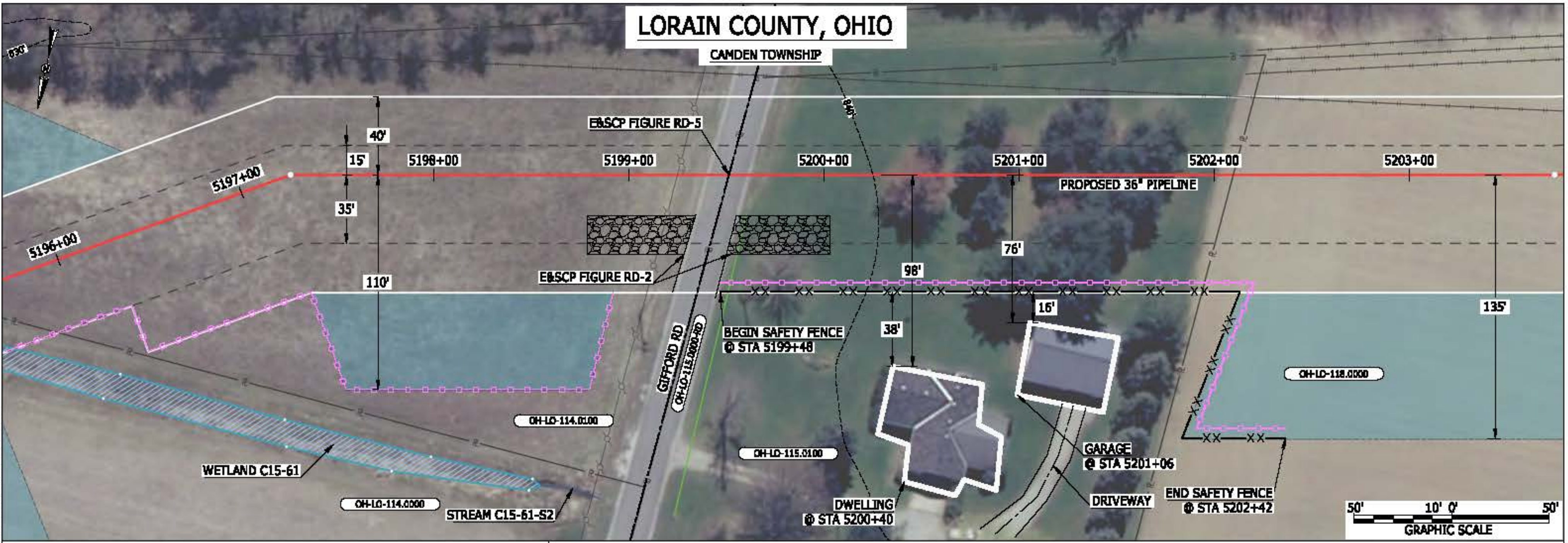
IG#

PROJ. ENG. VP	
CHECKED BY: DOB	
DRAWN BY: RSM	
SCALE: AS SHOWN	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 112.03R TO MP 112.19R

LOC.: ERIE COUNTY, OHIO | REV.: 1A
YR.: 2017 | W.O. | DWG.NO. WADS-P-8048

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE —XX—XX—
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT ⊕
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

DESCRIPTION:

AT SURVEY STATION 5200+40 THERE IS A DWELLING LOCATED 38' TO THE RIGHT OF THE CWS AND 98' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 5201+06 THERE IS A GARAGE LOCATED 16' TO THE RIGHT OF THE CWS AND 76' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

CENTERLINE REROUTED TO CO-LOCATE WITH EXISTING PIPELINES.
TWS/ATWS AND WETLAND ADJUSTED ACCORDINGLY. RESOURCES UPDATED BASED ON WETLAND/WATERBODY FIELD SURVEY DATA.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588
March 14, 2016 9:16am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\ADDITIONAL\WADS-P-8049.DWG

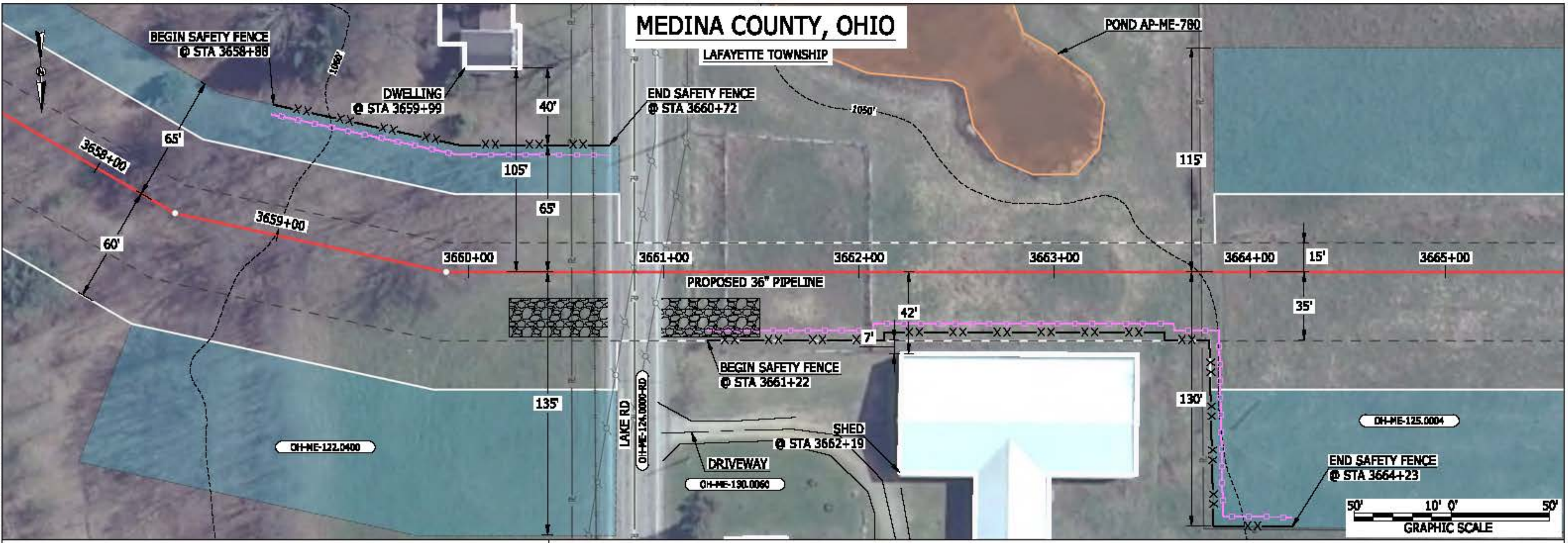
1A	ISSUED FOR FERC	15MAR16	PROJ. ENG. VP	
1	ISSUED FOR FERC	23FEB16	CHECKED BY: DOB	
0	ISSUED FOR FERC	23FEB16	DRAWN BY: RSM	
REV.#	DESCRIPTION	DATE	SCALE: AS SHOWN	DATE

IG#

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 98.4R TO MP 98.56R

LOC.: LORAIN COUNTY, OHIO		REV.: 1A
YR.: 2017	W.O.	DWG.NO. WADS-P-8049

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	🟥	POWERLINES	—ᘓ—ᘓ—
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -	CONTOUR LINE	- - - - 1200' - - - -
INTERCONNECTING PIPELINE	🟪	SILT FENCE	—□—□—□—
PIPELINE MILEPOST	M 00 P	STRAW BALE	—⊞—⊞—⊞—
CONSTRUCTION LIMIT	▬	FOREIGN PIPELINES	—+—+—+—
PERMANENT ROW	[- - - -]	TELEPHONE	—T—T—
ADDITIONAL TEMPORARY WORKSPACE	🟦	FENCE	—x—x—
STAGING AREA	🟨	RAILROAD TRACK	—+—+—+—
WAREYARD	🟩	ROAD CL	—— - ——
ROCK ACCESS PAD	▨	WATER PIPELINE	—W—W—
PERMANENT ACCESS ROAD	PAR-0.0	UTILITY LINE	——
TEMPORARY ACCESS ROAD	TAR-0.0	PROPERTY LINE	—— PL ——
DELINEATED WATERBODY BANK	🟦	SAFETY FENCE	—XX—XX—
DELINEATED WETLAND BOUNDARY	🟦	TRACT NUMBER	(00-XX-000.0000)
AGRICULTURAL PEM WETLAND BOUNDARY	🟦	MUNICIPALITY LINE	— — —
DELINEATED WATERBODY CENTERLINE	——	WELL: GAS ⊕ WATER ⊕	
APPROXIMATE WATERBODY BANK	🟧	OIL ⊕ UNKNOWN ⊕	
APPROXIMATE WETLAND BOUNDARY	🟧	MAINLINE VALVE (MLV)	⋈
APPROXIMATE WATERBODY CENTERLINE	——	BLOW OFF VALVE	⋈
STRUCTURES	▨	HORIZONTAL DIRECTIONAL DRILLING	⊙
		LIGHT POLE ● FIRE HYDRANT ⊕	
		MICROWAVE TOWER ☒ TOWER ☒	
		TANK	●

DESCRIPTION:

AT SURVEY STATION 3659+99 THERE IS A DWELLING LOCATED 40' TO THE LEFT OF THE CWS AND 105' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 3662+19 THERE IS A SHED LOCATED 7' TO THE RIGHT OF THE CWS AND 42' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:
CENTERLINE REROUTED TO AVOID SENSITIVE RESOURCE AREA. TWS/ATWS ADJUSTED ACCORDINGLY. APPROXIMATED RESOURCES ADDED.

NOTES:
1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BEL24588
March 14, 2016 9:11am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\ADDITIONAL\WADS-P-8050.DWG

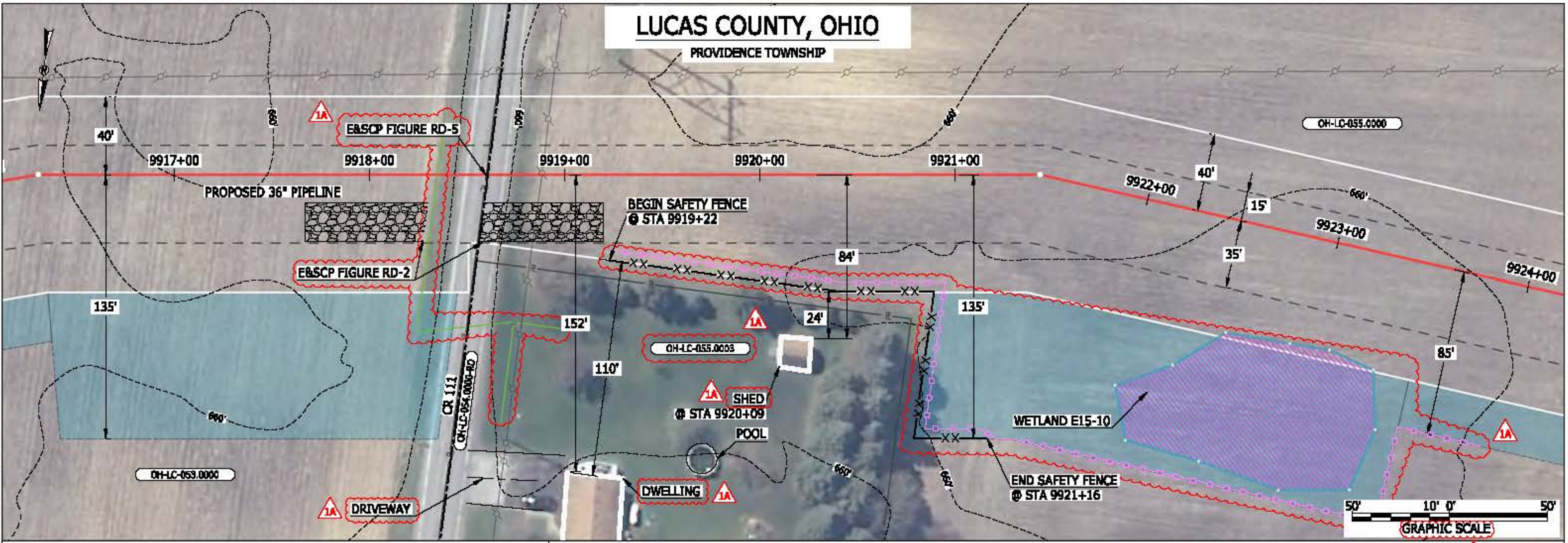
REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC	23FEB16

IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 69.27R TO MP 69.42R

LOC.: MEDINA COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WADS-P-8050



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS
- WATER
- OIL
- UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

1A

AT SURVEY STATION 9920+09 THERE IS A SHED LOCATED 24' TO THE RIGHT OF THE CWS AND 84' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

ATWS ADJUSTED BASED ON RESOURCE RECLASSIFIED AS AG-PEM WETLAND.
LEGEND SYMBOLOGY AND PARCEL NUMBER UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
PROPERTY BOUNDARIES AND UTILITY LINES HAVE BEEN UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858
March 14, 2016 10:45am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WATE\WATE-P-8001.DWG

1A	ISSUED FOR FERC	15MAR16	
1	ISSUED FOR FERC	23FEB16	
0	ISSUED FOR FERC FILING	22OCT15	
REV.#	DESCRIPTION	DATE	

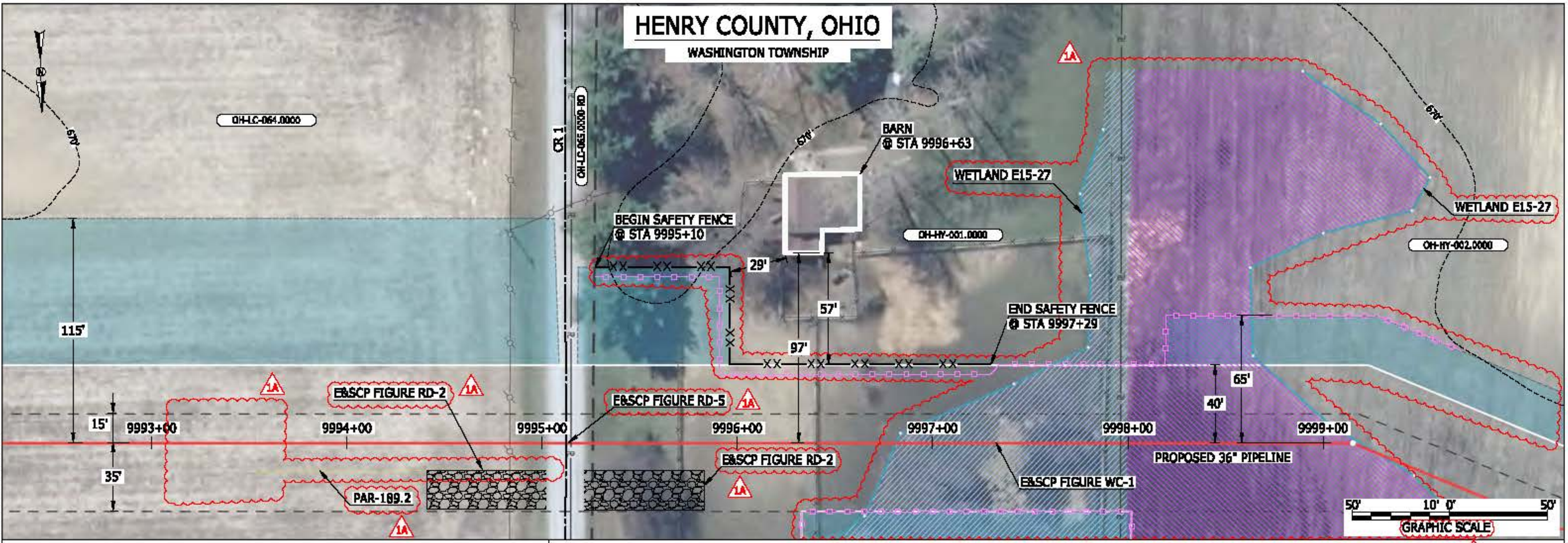
PROJ. ENG. VP	
CHECKED BY: DOB	
DRAWN BY: RSM 1A	
SCALE: AS SHOWN	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 187.81 TO MP 187.96

LOC.: LUCAS COUNTY, OHIO REV.: 1A
YR.: 2017 W.O. **DWG.NO.** WATE-P-8001

NEXUS GAS TRANSMISSION

IG#



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE —XX——XX—
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ● WATER ●
OIL ● UNKNOWN ●
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING ●
LIGHT POLE ● FIRE HYDRANT ●
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 9996+63 THERE IS A BARN LOCATED 29' TO THE LEFT OF THE CWS AND 97' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

MAINLINE VALVE 14 RELOCATED FROM MP 190.5 TO MP 189.3 AND RENAMED MLV13. PERMANENT EASEMENT, PAR, AND ATWS ADJUSTED ACCORDINGLY.
TWS/ATWS AND RESOURCES ADJUSTED BASED ON UPDATED FIELD SURVEY WETLAND/WATERBODY DATA.
LEGEND SYMBOLOGY AND PARCEL NUMBER UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
PROPERTY BOUNDARIES HAVE BEEN UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

1A

Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WATE\WATE-P-8002.DWG 5:12pm
MES13858
March 14, 2016

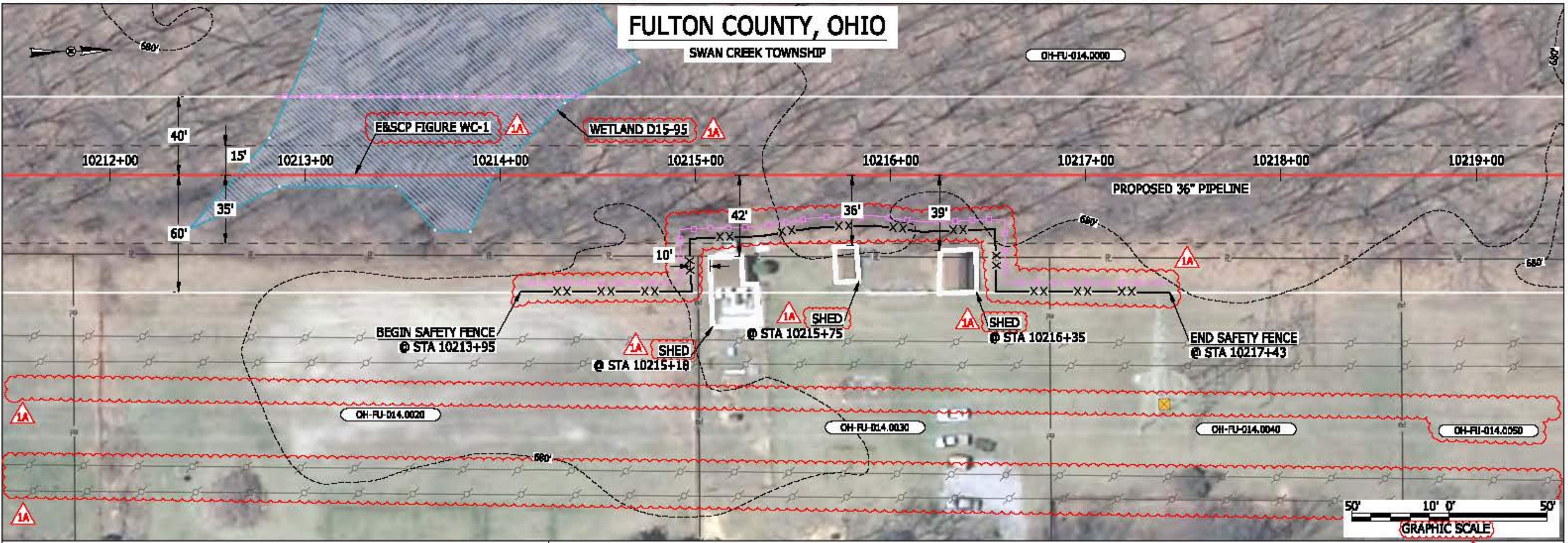
IG #	REV.#	DESCRIPTION	DATE
	1A	ISSUED FOR FERC	15MAR16
	1	ISSUED FOR FERC	23FEB16
	0	ISSUED FOR FERC FILING	22OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 189.25 TO MP 189.4

LOC.: HENRY COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WATE-P-8002

NEXUS
GAS TRANSMISSION



MES13858 March 14, 2016 10:44am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WATE\WATE-P-8003.DWG

LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES
POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ● WATER ●
OIL ● UNKNOWN ●
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT
MICROWAVE TOWER ☒ TOWER ☒
TANK ●
1A

DESCRIPTION:

AT SURVEY STATION 10215+18 THERE IS A SHED LOCATED INSIDE OF THE CWS AND 42' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 10215+75 THERE IS A SHED LOCATED INSIDE OF THE CWS AND 36' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 10216+35 THERE IS A SHED LOCATED INSIDE OF THE CWS AND 39' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY AND PARCEL NUMBER UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
POWERLINES HAVE BEEN UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

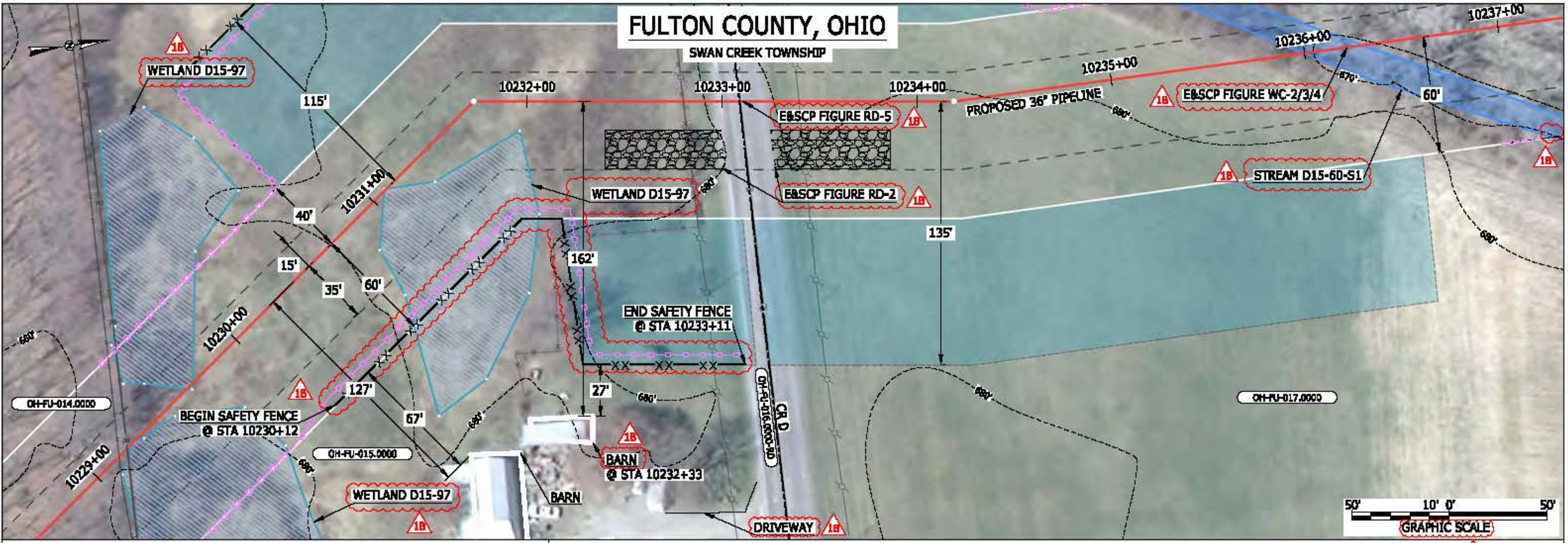
PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 193.4 TO MP 193.55

LOC.: FULTON COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WATE-P-8003

NEXUS GAS TRANSMISSION

IG #



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD PAR-0.0
- TEMPORARY ACCESS ROAD TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER 00-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1B

DESCRIPTION:

AT SURVEY STATION 10232+33 THERE IS A BARN LOCATED 27' TO THE RIGHT OF THE CWS AND 162' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG WATE-P-8005 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1B:

LEGEND SYMBOLOGY AND PARCEL NUMBER UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 10:42am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WATE\WATE-P-8004.DWG

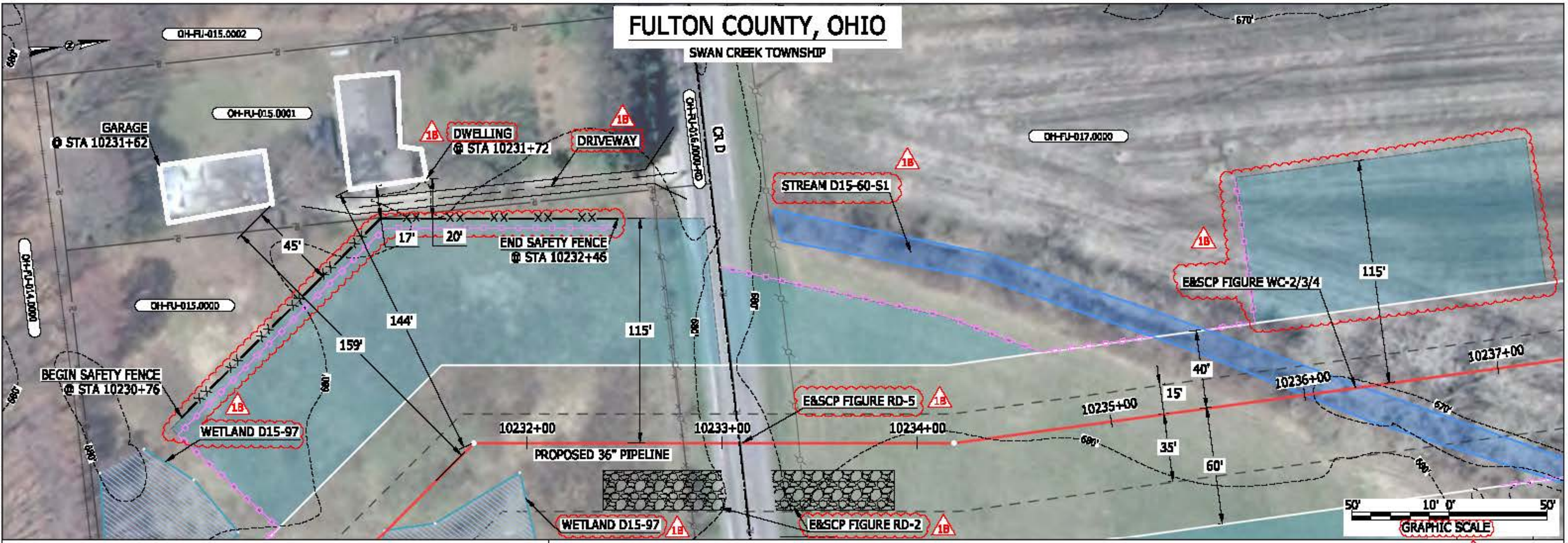
REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 193.72 TO MP 193.89

LOC.: FULTON COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. WATE-P-8004



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS ●, WATER ●, OIL ●, UNKNOWN ●
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE ● FIRE HYDRANT
- MICROWAVE TOWER ☒ TOWER ☒
- TANK ●

1B

DESCRIPTION:

AT SURVEY STATION 10231+72 THERE IS A DWELLING LOCATED 17' TO THE LEFT OF THE CWS AND 144' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 10231+62 THERE IS A GARAGE LOCATED 45' TO THE LEFT OF THE CWS AND 159' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG WATE-P-8004 FOR THE CONTINUATION OF THE RESIDENTIAL AREA. 1B

REVISION 1B:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND SILT FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND AND WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 10:38am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WATE\WATE-P-8005.DWG

REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	23OCT15

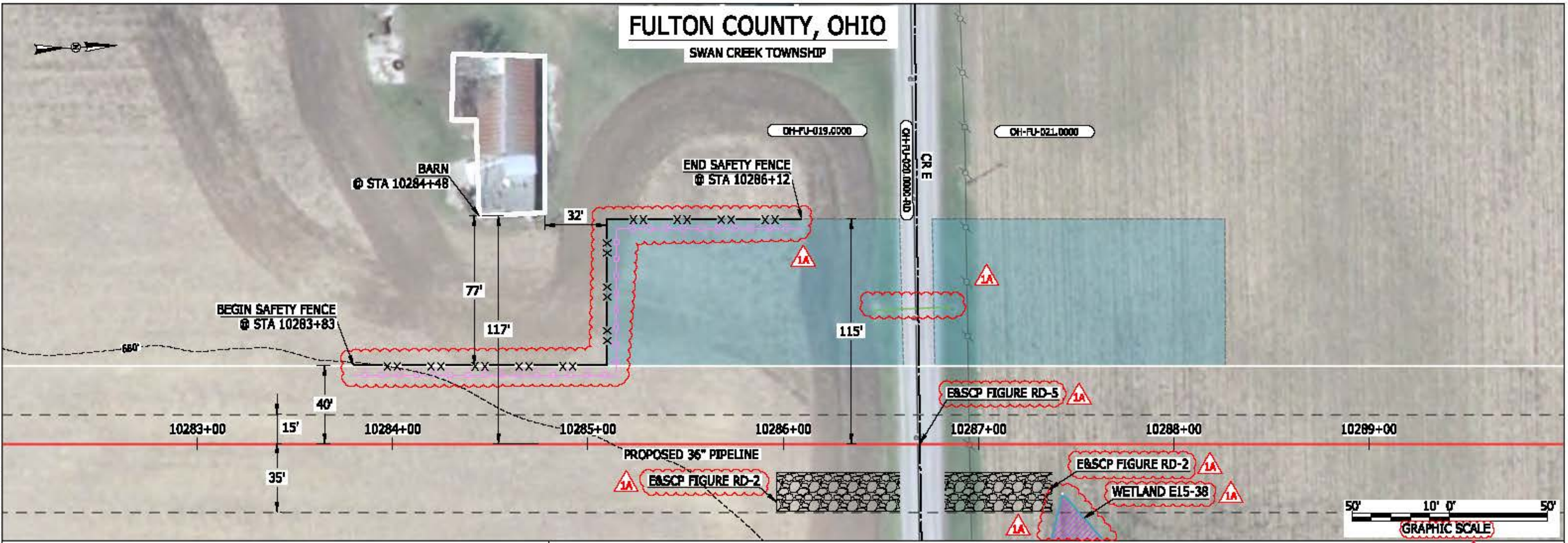
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 193.77 TO MP 193.89

LOC.: FULTON COUNTY, OHIO
REV.: 1B
YR.: 2017
W.O.
DWG.NO. WATE-P-8005

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, WATER, OIL, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 10284+48 THERE IS A BARN LOCATED 32' TO THE LEFT OF THE CWS AND 117' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES, SILT FENCE, AND UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WETLAND RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

BAN26537
March 11, 2016 4:11pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WATE\WATE-P-8006.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

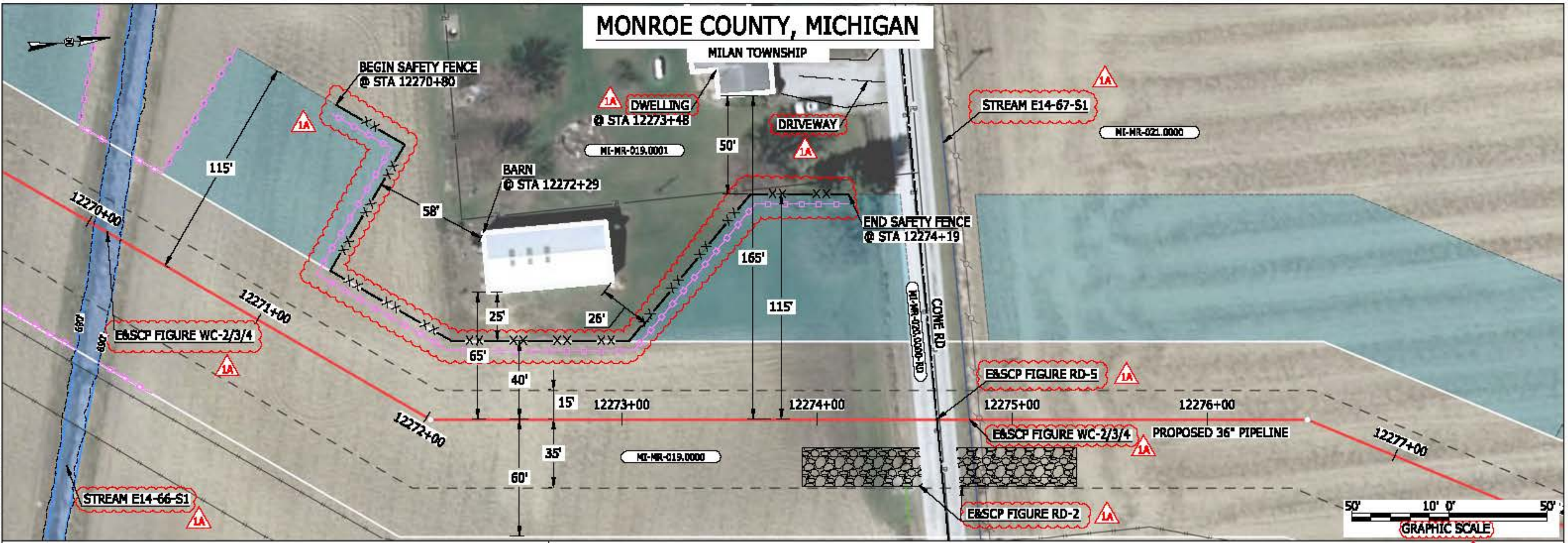
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 194.74 TO MP 194.89

LOC.: FULTON COUNTY, OHIO
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WATE-P-8006

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD — PAR-0.0
- TEMPORARY ACCESS ROAD — TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER — 00-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS, WATER, OIL, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

DESCRIPTION:

AT SURVEY STATION 12272+29 THERE IS A BARN LOCATED 25' TO THE LEFT OF THE CWS AND 65' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 12273+48 THERE IS A DWELLING LOCATED 50' TO THE LEFT OF THE CWS AND 165' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND SILT FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 10:36am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WATE\WATE-P-8007.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

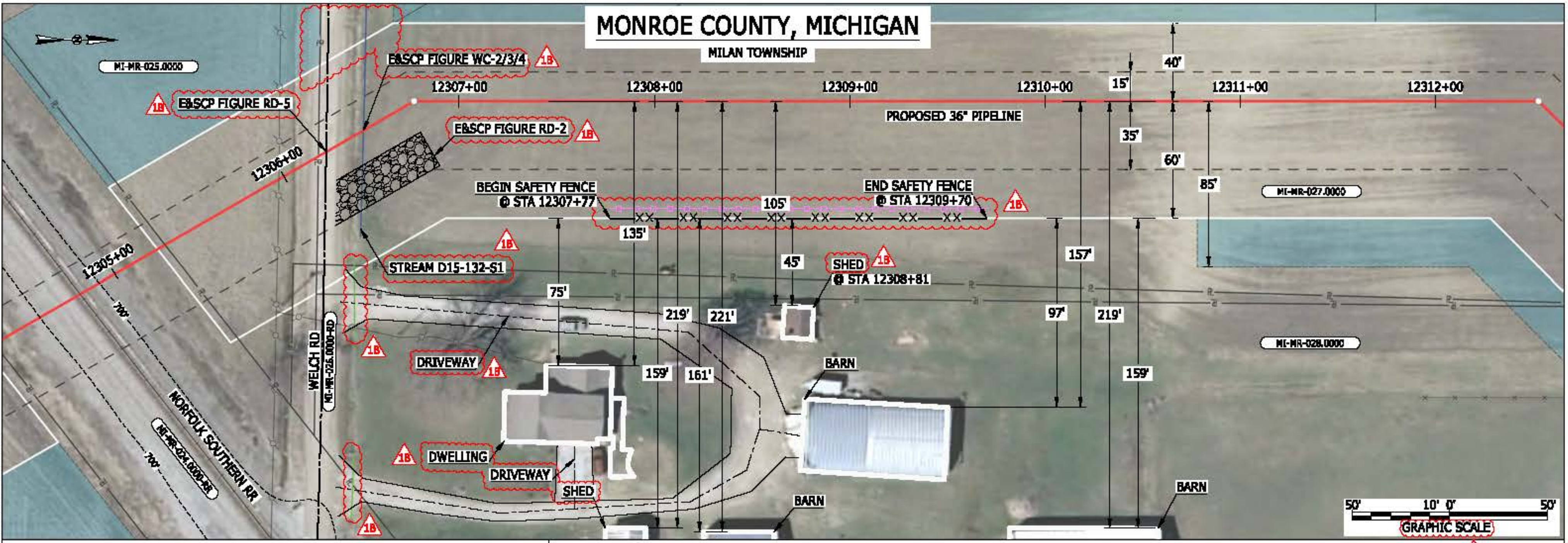
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 232.38 TO MP 232.53

LOC.: MONROE COUNTY, MICHIGAN
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WATE-P-8007

NEXUS GAS TRANSMISSION

MONROE COUNTY, MICHIGAN

MILAN TOWNSHIP



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS WATER
OIL UNKNOWN
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE FIRE HYDRANT
MICROWAVE TOWER TOWER
TANK

1B

DESCRIPTION:

AT SURVEY STATION 12308+81 THERE IS A SHED LOCATED 45' TO THE RIGHT OF THE CWS AND 105' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTE :

1. THE NORFOLK SOUTHERN RAIL ROAD AND WELCH ROAD CROSSINGS WILL BE INSTALLED WITH ONE CONVENTIONAL BORE.

REVISION 1B:

WORKSPACE ADJUSTED AT CROSSING OF EXISTING RAILROAD EASEMENT. PROPERTY BOUNDARIES AND SILT FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 10:34am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WATE\WATE-P-8008.DWG

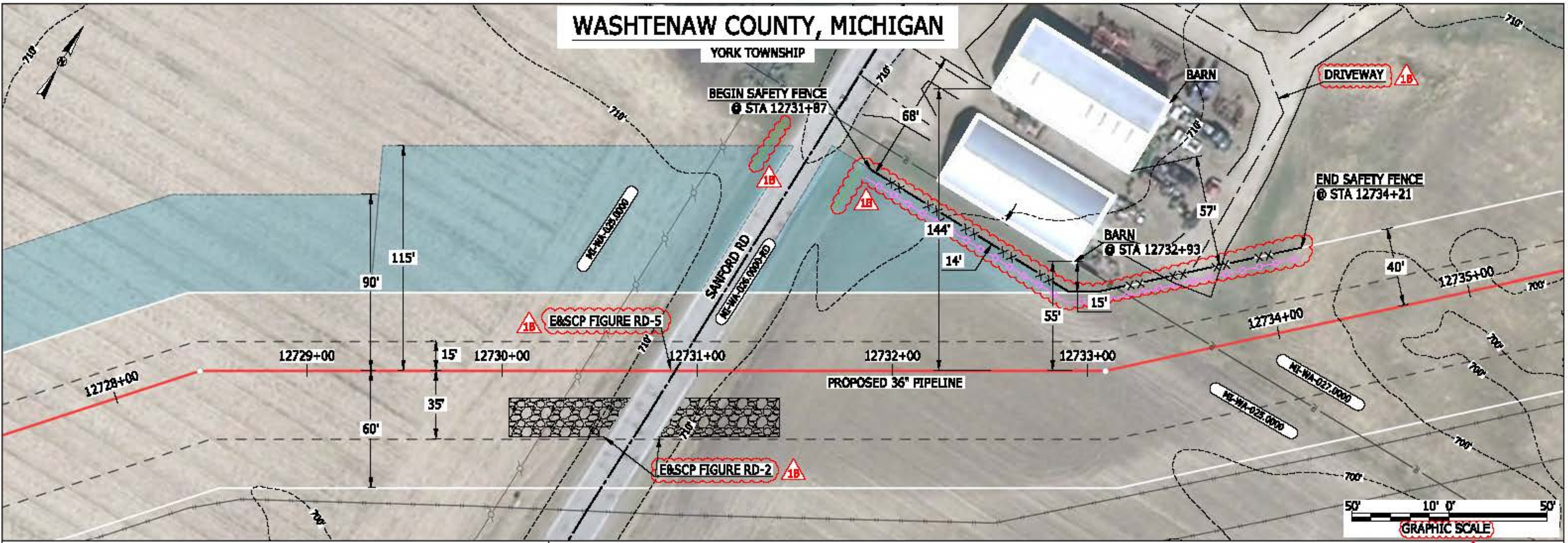
IG #			
	1B	ISSUED FOR FERC	15MAR16
	1A	ISSUED FOR FERC	26FEB16
	1	ISSUED FOR FERC	23FEB16
	0	ISSUED FOR FERC FILING	22OCT15
	REV.#	DESCRIPTION	DATE

PROJ. ENG.	VP	
CHECKED BY:	DOB	
DRAWN BY:	RSM	
SCALE:	AS SHOWN	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 233.04 TO MP 233.19

LOC.: MONROE COUNTY, MICHIGAN REV.: 1B
YR.: 2017 W.O. **DWG.NO.** WATE-P-8008

NEXUS GAS TRANSMISSION



MES13858
March 14, 2016 5:24pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WATE\WATE-P-8010.DWG

LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	M 00 P
CONSTRUCTION LIMIT	═
PERMANENT ROW	[‒ ‒ ‒]
ADDITIONAL TEMPORARY WORKSPACE	🟦
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	🟦
DELINEATED WETLAND BOUNDARY	🟦
AGRICULTURAL PEM WETLAND BOUNDARY	🟪
DELINEATED WATERBODY CENTERLINE	―
APPROXIMATE WATERBODY BANK	🟧
APPROXIMATE WETLAND BOUNDARY	🟧
APPROXIMATE WATERBODY CENTERLINE	―
STRUCTURES	▨
POWERLINES	—ᛰ—ᛰ—
CONTOUR LINE	- - - 1200' - - -
SILT FENCE	—□—□—□—□—
STRAW BALE	—▥—▥—▥—▥—
FOREIGN PIPELINES	—ᚔ—ᚔ—ᚔ—ᚔ—
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	—+—+—+—+—
ROAD CL	——— - ———
WATER PIPELINE	—W—W—
UTILITY LINE	―――
PROPERTY LINE	—— ℄ ——
SAFETY FENCE	—XX—XX—
TRACT NUMBER	(00-XX-000.0000)
MUNICIPALITY LINE	▬ ▬ ▬
WELL: GAS	⊕
WELL: WATER	⊕
WELL: OIL	⊕
WELL: UNKNOWN	⊕
MAINLINE VALVE (MLV)	⋈
BLOW OFF VALVE	⋈
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1B

DESCRIPTION:

AT SURVEY STATION 12732+93 THERE IS A BARN LOCATED 14' TO THE LEFT OF THE CWS AND 55' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1B:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND SILT FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA. UTILITY LINES ADDED BASED ON UPDATED FIELD SURVEY DATA.
ADDED DRIVEWAY CALL OUT.

NOTES:

1B

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1B
SCALE: AS SHOWN
DATE

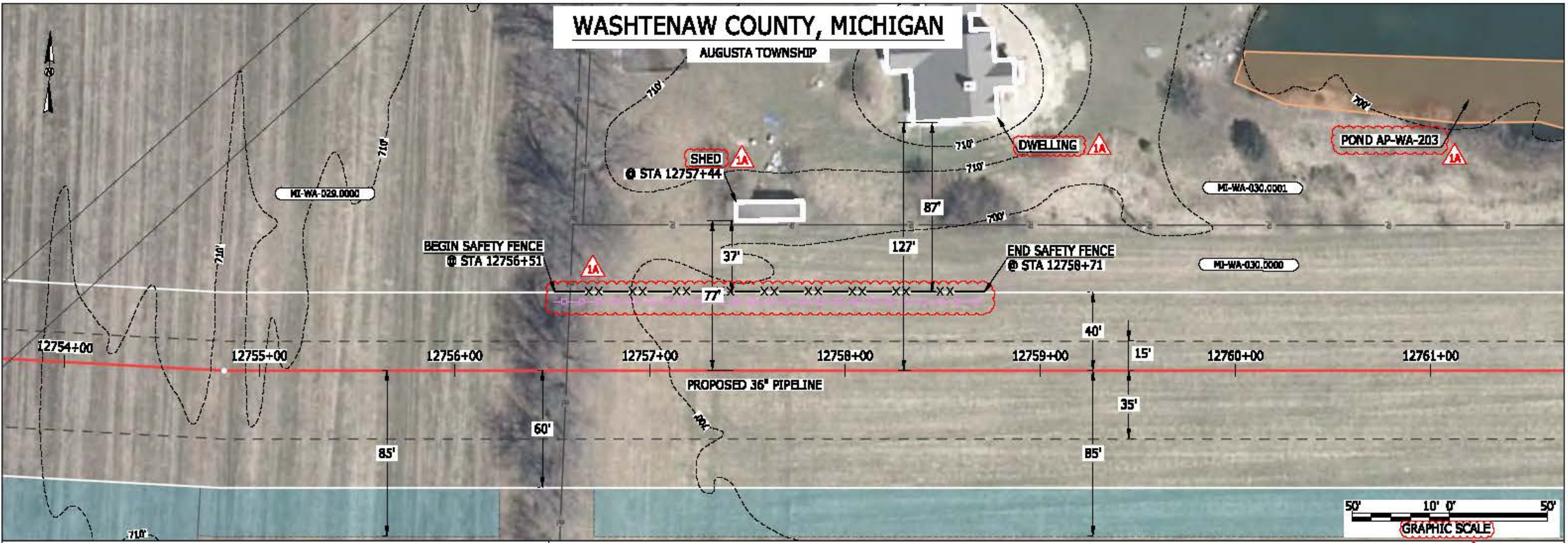
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 241.05 TO MP 241.2

LOC.: WASHTENAW COUNTY, MICHIGAN
REV.: 1B
YR.: 2017
W.O.
DWG.NO. WATE-P-8010

NEXUS GAS TRANSMISSION

WASHTENAW COUNTY, MICHIGAN

AUGUSTA TOWNSHIP



LEGEND

PROPOSED NEXUS PIPELINE	━○━
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	━○━
PIPELINE MILEPOST	M 00 P
CONSTRUCTION LIMIT	═
PERMANENT ROW	[- - - -]
ADDITIONAL TEMPORARY WORKSPACE	🟦
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	
DELINEATED WETLAND BOUNDARY	
AGRICULTURAL PEM WETLAND BOUNDARY	
DELINEATED WATERBODY CENTERLINE	━
APPROXIMATE WATERBODY BANK	
APPROXIMATE WETLAND BOUNDARY	
APPROXIMATE WATERBODY CENTERLINE	━
STRUCTURES	
POWERLINES	
CONTOUR LINE	- - - 1200' - - -
SILT FENCE	—□—□—□—□—
STRAW BALE	—▥—▥—▥—▥—
FOREIGN PIPELINES	—‖—‖—‖—‖—
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	—+—+—+—+—
ROAD CL	——-——
WATER PIPELINE	—W—W—
UTILITY LINE	——
PROPERTY LINE	—— ℙ ——
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
OIL	⊕
WATER	⊕
UNKNOWN	⊕
MAINLINE VALVE (MLV)	⋈
BLOW OFF VALVE	⋈
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A 1A 1A

DESCRIPTION:

AT SURVEY STATION 12757+44 THERE IS A SHED LOCATED 37' TO THE LEFT OF THE CWS AND 77' LEFT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. SILT FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 5:14pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WATE\WATE-P-8011.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

IG #

PROJ. ENG. VP	
CHECKED BY: DOB	
DRAWN BY: RSM 1A	
SCALE: AS SHOWN	DATE

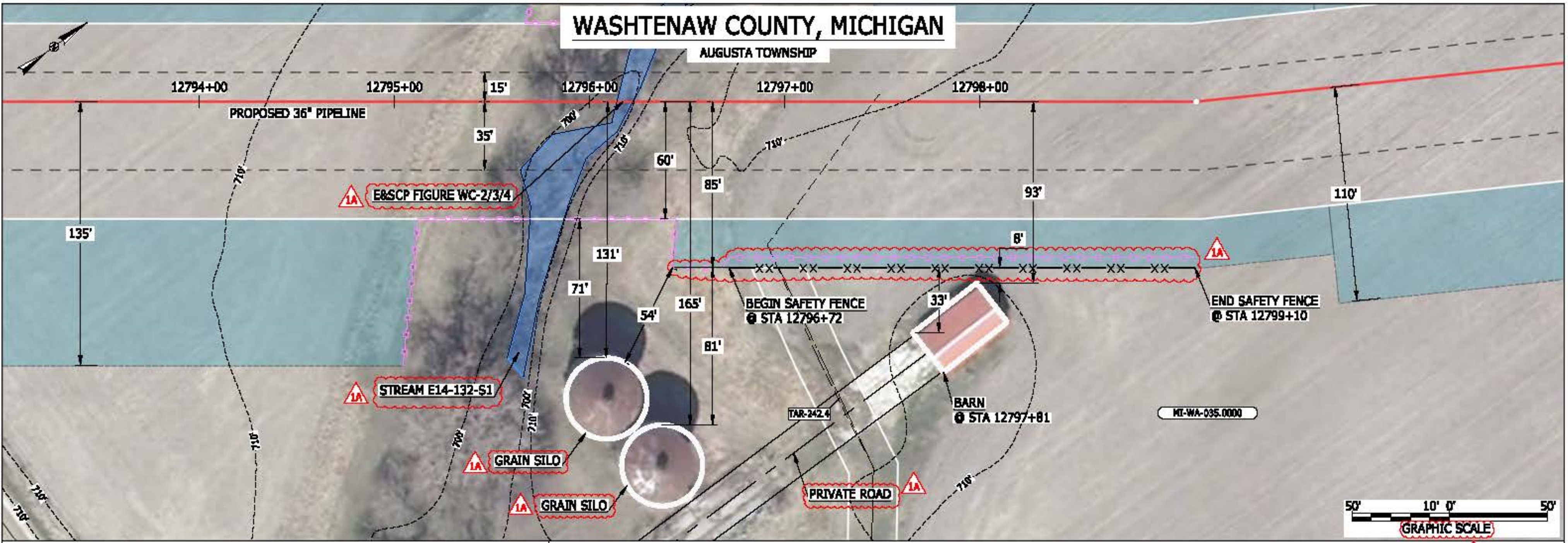
TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 241.55 TO MP 241.7

LOC.: WASHTENAW COUNTY, MICHIGAN | REV.: 1A
YR.: 2017 | W.O. | DWG.NO. WATE-P-8011

NEXUS GAS TRANSMISSION

WASHTENAW COUNTY, MICHIGAN

AUGUSTA TOWNSHIP



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, WATER, OIL, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 12797+81 THERE IS A BARN LOCATED 8' TO THE RIGHT OF THE CWS AND 93' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
WATERBODY RESOURCE IDENTIFICATION NUMBER ADDED FOR REFERENCE. SILT FENCE UPDATED BASED ON UPDATED FIELD SURVEY DATA.
ADDED PRIVATE ROAD CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858 March 14, 2016 5:16pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WATE\WATE-P-8012.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

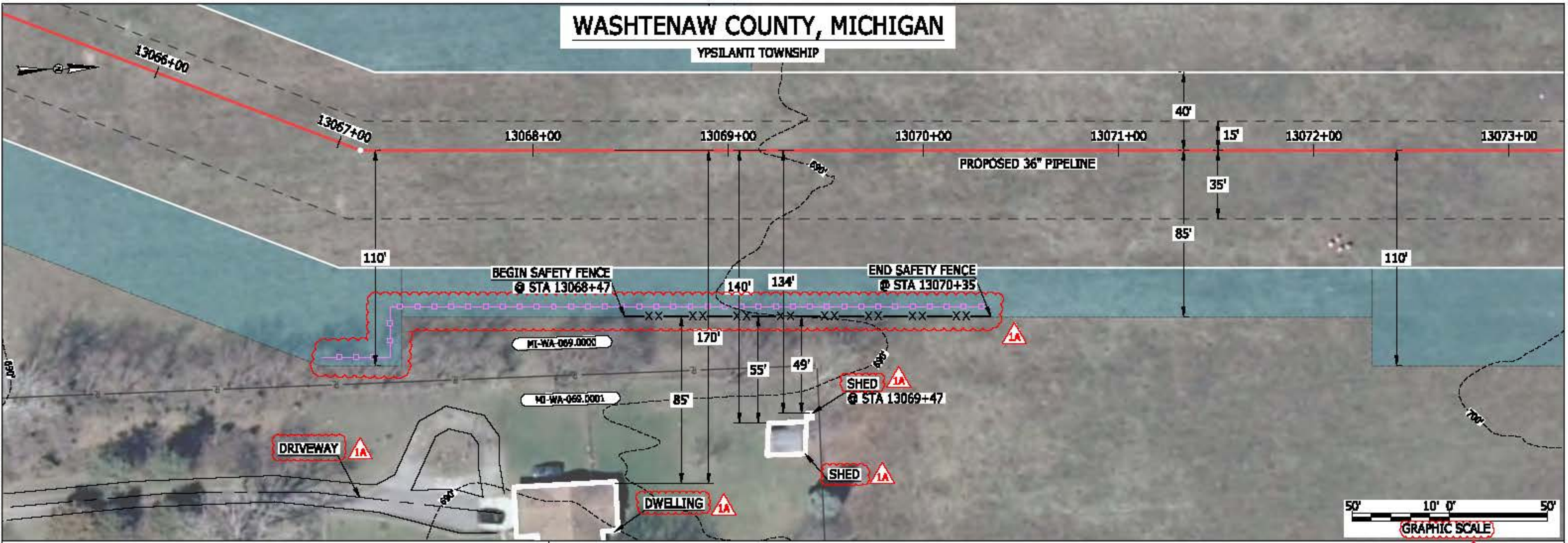
IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 242.29 TO MP 242.44

LOC.: WASHTENAW COUNTY, MICHIGAN
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WATE-P-8012

NEXUS GAS TRANSMISSION



LEGEND

PROPOSED NEXUS PIPELINE	🟥
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE	- - -
INTERCONNECTING PIPELINE	🟪
PIPELINE MILEPOST	◇ M 00 P
CONSTRUCTION LIMIT	▬
PERMANENT ROW	[- - - -]
ADDITIONAL TEMPORARY WORKSPACE	▭
STAGING AREA	🟨
WAREYARD	🟩
ROCK ACCESS PAD	▨
PERMANENT ACCESS ROAD	PAR-0.0
TEMPORARY ACCESS ROAD	TAR-0.0
DELINEATED WATERBODY BANK	🟦
DELINEATED WETLAND BOUNDARY	🟦
AGRICULTURAL PEM WETLAND BOUNDARY	🟪
DELINEATED WATERBODY CENTERLINE	—
APPROXIMATE WATERBODY BANK	🟧
APPROXIMATE WETLAND BOUNDARY	🟧
APPROXIMATE WATERBODY CENTERLINE	—
STRUCTURES	▭

1A

POWERLINES	—ᐅ—ᐅ—
CONTOUR LINE	- - - -1200'- - - -
SILT FENCE	—□—□—□—□—
STRAW BALE	—▥—▥—▥—▥—
FOREIGN PIPELINES	—ɪɪ—ɪɪ—ɪɪ—ɪɪ—
TELEPHONE	—T—T—
FENCE	—x—x—
RAILROAD TRACK	—+—+—+—+—
ROAD CL	—— - ——
WATER PIPELINE	—W—W—
UTILITY LINE	——
PROPERTY LINE	—— PL ——
SAFETY FENCE	—XX—XX—
TRACT NUMBER	00-XX-000.0000
MUNICIPALITY LINE	— — —
WELL: GAS	⊕
OIL	⊕
WATER	⊕
UNKNOWN	⊕
MAINLINE VALVE (MLV)	⋈
BLOW OFF VALVE	⋈
HORIZONTAL DIRECTIONAL DRILLING	⊙
LIGHT POLE	●
FIRE HYDRANT	⊕
MICROWAVE TOWER	☒
TOWER	☒
TANK	●

1A

DESCRIPTION:

AT SURVEY STATION 13069+47 THERE IS A SHED LOCATED 49' TO THE RIGHT OF THE CWS AND 134' RIGHT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858
March 14, 2016 5:19pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WATE\WATE-P-8013.DWG

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

IG #

PROJ. ENG. VP	
CHECKED BY: DOB	
DRAWN BY: RSM 1A	
SCALE: AS SHOWN	DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 247.45 TO MP 247.6

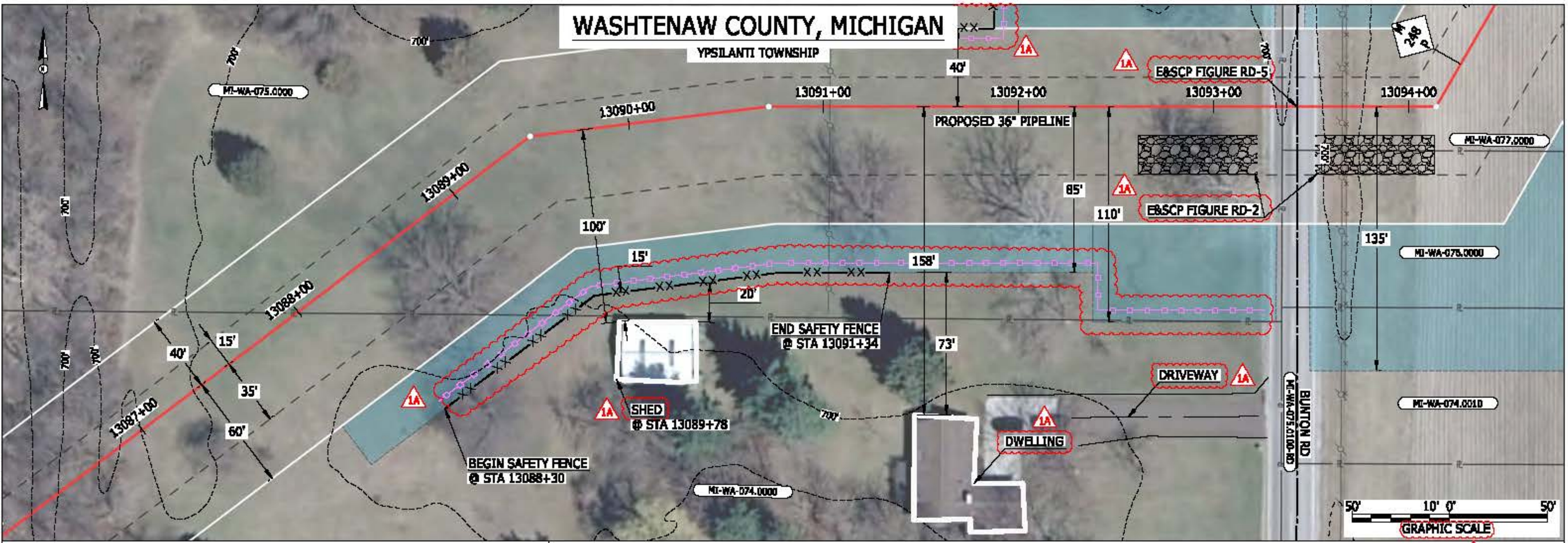
LOC.: WASHTENAW COUNTY, MICHIGAN REV.: 1A
YR.: 2017 W.O. DWG.NO. WATE-P-8013

NEXUS GAS TRANSMISSION

MES13858 March 14, 2016 5:51pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WATE\WATE-P-8014.DWG

WASHTENAW COUNTY, MICHIGAN

YPSILANTI TOWNSHIP



LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST (MP 00)
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD (PAR-0.0)
TEMPORARY ACCESS ROAD (TAR-0.0)
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER (00-XX-000.0000)
MUNICIPALITY LINE
WELL: GAS ● WATER ●
OIL ● UNKNOWN ●
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT ●
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

1A

DESCRIPTION:

AT SURVEY STATION 13089+78 THERE IS A SHED LOCATED 15' TO THE RIGHT OF THE CWS AND 100' RIGHT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG WATE-P-8015 FOR THE CONTINUATION OF THE RESIDENTIAL AREA.

REVISION 1A:

LEGEND SYMBOLOGY UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUT. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

IG #

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 247.84 TO MP 248.01

LOC.: WASHTENAW COUNTY, MICHIGAN
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WATE-P-8014

NEXUS GAS TRANSMISSION

LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST M 00 P
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD PAR-0.0
TEMPORARY ACCESS ROAD TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES
1A

POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE —T—T—
FENCE —x—x—
RAILROAD TRACK
ROAD CL
WATER PIPELINE —W—W—
UTILITY LINE
PROPERTY LINE —PL—
SAFETY FENCE —XX—XX—
TRACT NUMBER 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT
MICROWAVE TOWER ☒ TOWER ☒
TANK ●
1A

DESCRIPTION:

1A

AT SURVEY STATION 13091+26 THERE IS A DWELLING LOCATED 44' TO THE LEFT OF THE CWS AND 123' LEFT OF THE PROPOSED 36" PIPELINE.

SPECIAL NOTES :

1. SEE DWG WATE-P-8014 FOR THE CONTINUATION OF THE RESIDENTIAL AREA. 1A

REVISION 1A:

PROPERTY BOUNDARIES AND POWERLINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES: 1A

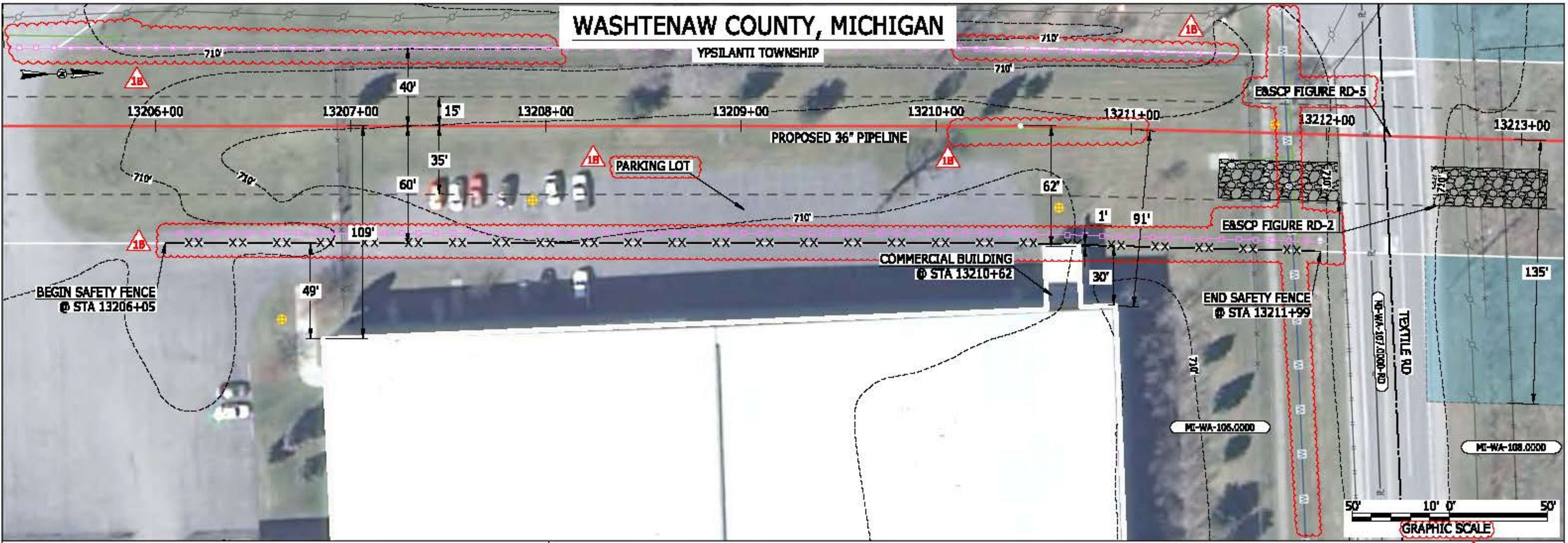
1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

MES13858
March 14, 2016 5:20pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WATE\WATE-P-8015.DWG

1A	ISSUED FOR FERC	15MAR16	PROJ. ENG. VP		TITLE: NEXUS GAS TRANSMISSION PROJECT RESIDENTIAL DRAWING MP 247.9 TO MP 248	
1	ISSUED FOR FERC	23FEB16	CHECKED BY: DOB			
0	ISSUED FOR FERC FILING	22OCT15	DRAWN BY: RSM 1A		LOC.: WASHTENAW COUNTY, MICHIGAN	REV.: 1A
REV.#	DESCRIPTION	DATE	SCALE: AS SHOWN	DATE	YR.: 2017 W.O.	DWG.NO. WATE-P-8015

IG #

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST — M 00 P
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD — PAR-0.0
- TEMPORARY ACCESS ROAD — TAR-0.0
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE — 1200'
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE — T — T
- FENCE — X — X
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE — W — W
- UTILITY LINE
- PROPERTY LINE — PL
- SAFETY FENCE — XX — XX
- TRACT NUMBER — 00-XX-000.0000
- MUNICIPALITY LINE
- WELL: GAS ● WATER ● OIL ● UNKNOWN ●
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING ●
- LIGHT POLE ● FIRE HYDRANT ●
- MICROWAVE TOWER ☒ TOWER ☒
- TANK ●

1B

DESCRIPTION:

AT SURVEY STATION 13210+62 THERE IS A COMMERCIAL BUILDING LOCATED 1' TO THE RIGHT OF THE CWS AND 62' RIGHT OF THE PROPOSED 36" PIPELINE.

REVISION 1B:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED PARKING LOT CALL OUT.

NOTES:

1B

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1B	ISSUED FOR FERC	15MAR16
1A	ISSUED FOR FERC	26FEB16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1B
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 250.1 TO MP 250.25

LOC.: WASHTENAW COUNTY, MICHIGAN
REV.: 1B
YR.: 2017
W.O.
DWG.NO. WATE-P-8016

NEXUS GAS TRANSMISSION

IG #

MES13858
March 15, 2016 12:39pm Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WATE\WATE-P-8016.DWG

LEGEND

PROPOSED NEXUS PIPELINE
PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
INTERCONNECTING PIPELINE
PIPELINE MILEPOST
CONSTRUCTION LIMIT
PERMANENT ROW
ADDITIONAL TEMPORARY WORKSPACE
STAGING AREA
WAREYARD
ROCK ACCESS PAD
PERMANENT ACCESS ROAD — PAR-0.0
TEMPORARY ACCESS ROAD — TAR-0.0
DELINEATED WATERBODY BANK
DELINEATED WETLAND BOUNDARY
AGRICULTURAL PEM WETLAND BOUNDARY
DELINEATED WATERBODY CENTERLINE
APPROXIMATE WATERBODY BANK
APPROXIMATE WETLAND BOUNDARY
APPROXIMATE WATERBODY CENTERLINE
STRUCTURES
POWERLINES
CONTOUR LINE
SILT FENCE
STRAW BALE
FOREIGN PIPELINES
TELEPHONE
FENCE
RAILROAD TRACK
ROAD CL
WATER PIPELINE
UTILITY LINE
PROPERTY LINE
SAFETY FENCE
TRACT NUMBER — 00-XX-000.0000
MUNICIPALITY LINE
WELL: GAS ⊕ WATER ⊕
OIL ⊕ UNKNOWN ⊕
MAINLINE VALVE (MLV)
BLOW OFF VALVE
HORIZONTAL DIRECTIONAL DRILLING
LIGHT POLE ● FIRE HYDRANT
MICROWAVE TOWER ☒ TOWER ☒
TANK ●

1B

DESCRIPTION:

AT SURVEY STATION 13306+38 THERE IS A DWELLING LOCATED 37' TO THE LEFT OF THE CWS AND 77' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 13306+90 THERE IS A SHED LOCATED ON EDGE OF THE CWS AND 41' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 13308+38 THERE IS A DWELLING LOCATED 26' TO THE LEFT OF THE CWS AND 66' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 13309+06 THERE IS A SHED LOCATED INSIDE OF THE CWS AND 29' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 13309+90 THERE IS A SHED LOCATED 50' TO THE LEFT OF THE CWS AND 90' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 13309+86 THERE IS A SHED LOCATED ON EDGE OF THE CWS AND 39' LEFT OF THE PROPOSED 36" PIPELINE.

REVISION 1B:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES.
PROPERTY BOUNDARIES AND UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
TANKS ADDED BASED ON UPDATED FIELD SURVEY DATA. SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED UTILITY AND DRIVEWAY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

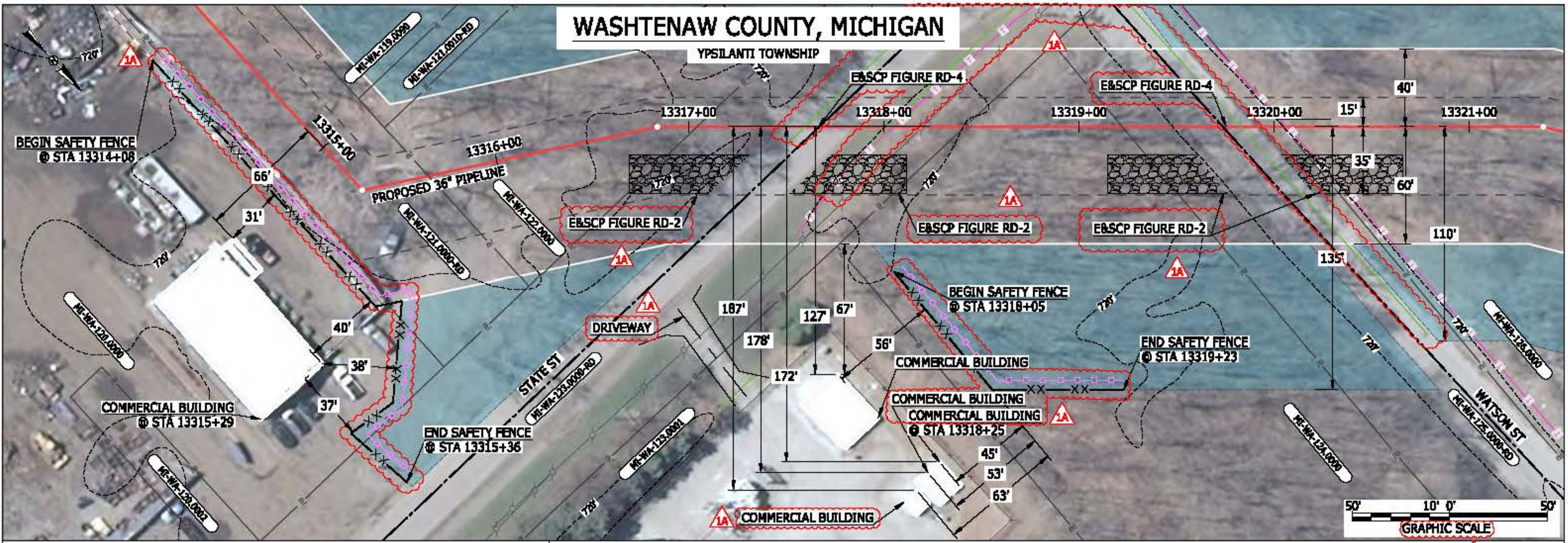
NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG 54NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

1B	ISSUED FOR FERC	15MAR16			TITLE: NEXUS GAS TRANSMISSION PROJECT RESIDENTIAL DRAWING MP 251.95 TO MP 252.1	NEXUS GAS TRANSMISSION
1A	ISSUED FOR FERC	26FEB16	PROJ. ENG. VP			
1	ISSUED FOR FERC	23FEB16	CHECKED BY: DOB			
0	ISSUED FOR FERC FILING	22OCT15	DRAWN BY: RSM		LOC.: WASHTENAW COUNTY, MICHIGAN — REV.: 1B	
REV.#	DESCRIPTION	DATE	SCALE: AS SHOWN	DATE	YR.: 2017 — W.O. — DWG.NO. WATE-P-8017	

IG #

MES13858 March 15, 2016 9:50am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\WATE\WATE-P-8017.DWG



BEL24588
March 14, 2016 9:02am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\FF\WATE\WATE-P-8018.DWG

LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST (M 00 P)
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, WATER, OIL, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

1A

DESCRIPTION:

AT SURVEY STATION 13315+29 THERE IS A COMMERCIAL BUILDING LOCATED 31' TO THE RIGHT OF THE CWS AND 66' RIGHT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 13318+25 THERE IS A COMMERCIAL BUILDING LOCATED 45' TO THE RIGHT OF THE CWS AND 172' RIGHT OF THE PROPOSED 36" PIPELINE.

1A

REVISION 1A:

LEGEND SYMBOLOGY AND PARCEL NUMBERS UPDATED TO REFLECT NEW UPDATES. UPDATED FIGURE CALL OUT TO MATCH E&SCP.
PROPERTY BOUNDARIES AND UTILITY LINES UPDATED BASED ON UPDATED FIELD SURVEY DATA.
SILT FENCE ADDED FOR EROSION CONTROL MEASURE.
ADDED DRIVEWAY CALL OUTS. UPDATED TYPE OF STRUCTURE CALL OUTS.

NOTES:

1A

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC FILING	22OCT15

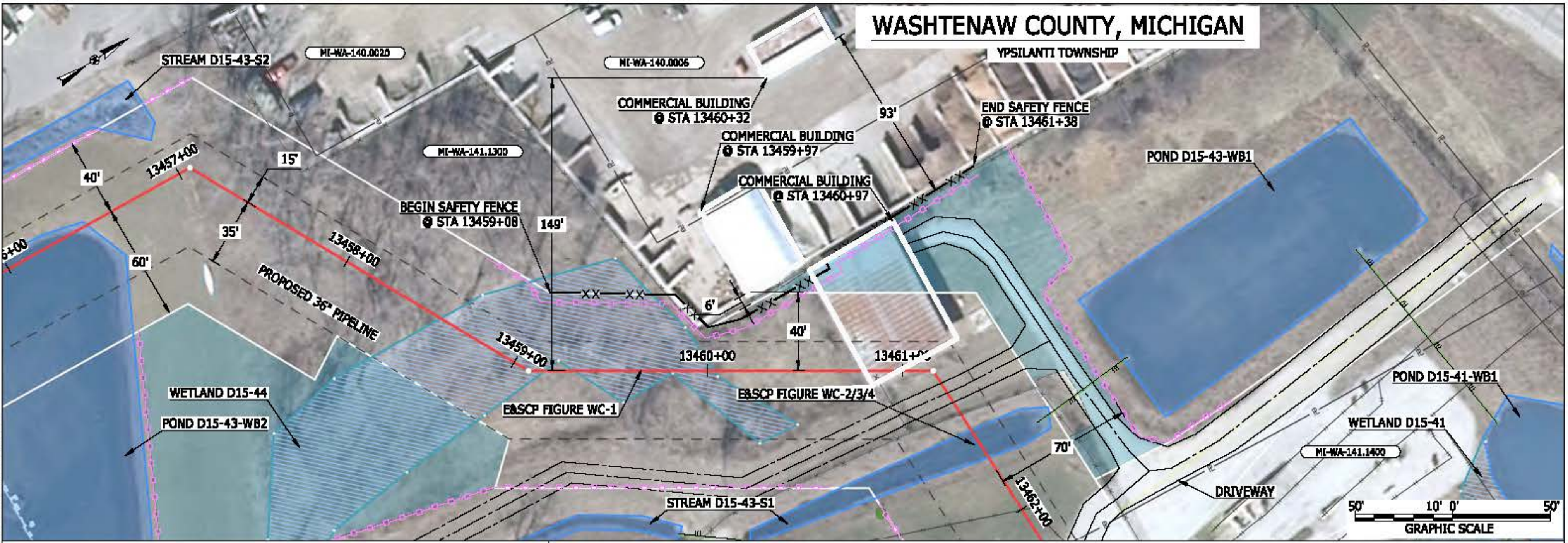
IG#

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM 1A
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 252.16 TO MP 252.3

LOC.: WASHTENAW COUNTY, MICHIGAN
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WATE-P-8018

NEXUS GAS TRANSMISSION



LEGEND

- PROPOSED NEXUS PIPELINE
- PROPOSED NEXUS PIPELINE - NOV. 2015 ROUTE
- INTERCONNECTING PIPELINE
- PIPELINE MILEPOST
- CONSTRUCTION LIMIT
- PERMANENT ROW
- ADDITIONAL TEMPORARY WORKSPACE
- STAGING AREA
- WAREYARD
- ROCK ACCESS PAD
- PERMANENT ACCESS ROAD (PAR-0.0)
- TEMPORARY ACCESS ROAD (TAR-0.0)
- DELINEATED WATERBODY BANK
- DELINEATED WETLAND BOUNDARY
- AGRICULTURAL PEM WETLAND BOUNDARY
- DELINEATED WATERBODY CENTERLINE
- APPROXIMATE WATERBODY BANK
- APPROXIMATE WETLAND BOUNDARY
- APPROXIMATE WATERBODY CENTERLINE
- STRUCTURES
- POWERLINES
- CONTOUR LINE
- SILT FENCE
- STRAW BALE
- FOREIGN PIPELINES
- TELEPHONE
- FENCE
- RAILROAD TRACK
- ROAD CL
- WATER PIPELINE
- UTILITY LINE
- PROPERTY LINE
- SAFETY FENCE
- TRACT NUMBER (00-XX-000.0000)
- MUNICIPALITY LINE
- WELL: GAS, OIL, WATER, UNKNOWN
- MAINLINE VALVE (MLV)
- BLOW OFF VALVE
- HORIZONTAL DIRECTIONAL DRILLING
- LIGHT POLE
- FIRE HYDRANT
- MICROWAVE TOWER
- TOWER
- TANK

DESCRIPTION:

AT SURVEY STATION 13459+97 THERE IS A COMMERCIAL BUILDING LOCATED 6' TO THE LEFT OF THE CWS AND 40' LEFT OF THE PROPOSED 36" PIPELINE.

AT SURVEY STATION 13460+97 THERE IS A COMMERCIAL BUILDING LOCATED INSIDE OF THE CWS AND ON ROUTE OF THE PROPOSED 36" PIPELINE.

REVISION 1A:

CENTERLINE REROUTED PER LANDOWNER REQUEST. ALL ATWS/TWS ADJUSTED ACCORDINGLY.

NOTES:

1. FOR SITE SPECIFIC RESIDENTIAL DRAWING NOTES REFER TO DWG S4NX-P-8036.
2. (CWS) REFERS TO THE CONSTRUCTION WORKSPACE.
3. SAFETY FENCE WILL BE INSTALLED AT THE EDGE OF THE CONSTRUCTION WORK AREA FOR A DISTANCE OF 100 FEET ON EITHER SIDE OF A STRUCTURE WITHIN 50 FEET OF CONSTRUCTION WORKSPACE.
4. STRUCTURES WITHIN CWS WILL BE REMOVED, RELOCATED OR PROTECTED PER LAND OWNER AGREEMENT.
5. SHRUBS, TREES, OTHER LANDSCAPING, FENCES, DRIVEWAYS, STONE WALLS, SIDEWALKS, WATER SUPPLY AND SEPTIC SYSTEMS WITHIN THE CWS WILL BE RESTORED PER AGREEMENT WITH THE LANDOWNER.
6. THE FINAL LOCATION OF EROSION CONTROL DEVICES (ECD's) WILL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION IN ACCORDANCE WITH THE E&SCP AND PROJECT REQUIREMENTS, AND IN CONSULTATION WITH THE ENVIRONMENTAL INSPECTOR AS NEEDED. THE LOCATION OF ECD's DEPICTED ON THIS PLAN ARE INTENDED FOR GUIDANCE PURPOSES ONLY.

REV.#	DESCRIPTION	DATE
1A	ISSUED FOR FERC	15MAR16
1	ISSUED FOR FERC	23FEB16
0	ISSUED FOR FERC	23FEB16

PROJ. ENG. VP
CHECKED BY: DOB
DRAWN BY: RSM
SCALE: AS SHOWN
DATE

TITLE:
NEXUS GAS TRANSMISSION PROJECT
RESIDENTIAL DRAWING
MP 254.84R TO MP 254.96R

LOC.: WASHTENAW COUNTY, MICHIGAN
REV.: 1A
YR.: 2017
W.O.
DWG.NO. WATE-P-8027

NEXUS GAS TRANSMISSION

IG #

BEL24588 March 14, 2016 8:57am Filename: P:\CAD\295_PIPELINE\RESIDENTIAL\IFF\ADDITIONAL\WATE-P-8027.DWG

APPENDIX F

NGT PROJECT INCORPORATED ROUTE VARIATIONS

APPENDIX F

NGT Project Incorporated Route Variations

Start MP	End MP	Length of Variation (Feet)	County (or Counties)	Supporting Reason(s) for Variation	Date Reported
0.0 TGP	0.9 TGP	4,711	Columbiana	Avoids metering sites and other infrastructure at Kensington Process Facility.	Prefiling (June 2015)
0.0	0.2	775	Columbiana	Rerouted at landowner request	Data response (March 2016)
0.0	1.3	7,659	Columbiana	Rerouted around existing infrastructure per request of Momentum Midstream.	Prefiling (June 2015)
1.3	2.2	4,540	Columbiana	Avoids two high voltage powerline crossings and reroutes to travel perpendicular to the stream.	Application (November 2015)
1.4	1.7	1,414	Columbiana	Avoids a pond, house and barn	Prefiling (June 2015)
2.1	2.3	775	Columbiana	Variation to change crossing angle at the roadway	Data response (March 2016)
2.1	2.3	1,126	Columbiana	Avoids a well, minimizes distance paralleling stream and reduces footprint within FEMA floodplain	Prefiling (June 2015)
3.4	4.1	3,556	Columbiana	Reroute maintains proper offset from the First Energy easement.	Application (November 2015)
3.5	3.6	450	Columbiana	Avoid overlap with existing utility easement	Data response (March 2016)
3.8	4	941	Columbiana	Avoid overlap with existing utility easement	Data response (March 2016)
4.1	4.3	1,020	Columbiana	Landowner request to preserve trees north of the alignment	Prefiling (June 2015)
4.2	4.6	2,122	Columbiana	Avoids a wellhead and storage tank	Prefiling (June 2015)
4.3	4.5	614	Columbiana	Avoid overlap with existing utility easement	Data response (March 2016)
5.2	5.7	2,638	Columbiana	Reroute maintains proper offset from the First Energy easement and adjusts to create constructable crossing of Rochester Road.	Application (November 2015)
5.4	5.8	2,425	Columbiana	Reroute avoids crossing through a pond	Prefiling (June 2015)
5.7	5.8	420	Columbiana	Avoid overlap with existing utility easement	Data response (March 2016)
5.9	6.3	2,129	Columbiana	Avoid overlap with existing utility easement	Data response (March 2016)
5.9	6.6	1,552	Columbiana	Reroute maintains proper offset from the First Energy easement	Application (November 2015)
6.6	8.6	10,198	Columbiana	Minimizes wetland and forested crossing length by crossing Category III wetland via HDD.	Application (November 2015)
6.8	7.0	949	Columbiana		Prefiling (June 2015)
7.1	7.6	2,225	Columbiana	Avoid a sensitive resource wetland area	Data response (March 2016)
7.3	7.8	2,158	Columbiana	Minimizes steep slope and wetland crossings	Prefiling (June 2015)
7.7	7.8	772	Columbiana	Reroute to accommodate HDD entry location	Data response (March 2016)
8.7	9.8	6,939	Columbiana	Minimizes forested clearing and wetland impacts	Application (November 2015)
9.7	10.7	5,451	Columbiana	Reroute maintains proper offset from the First Energy easement	Application (November 2015)
10.3	10.5	912	Columbiana	Avoid overlap with existing utility easement	Data response (March 2016)
10.7	11.7	4,525	Columbiana	Changes the location of a railroad crossing and minimizes forested clearing	Application (November 2015)

APPENDIX F

NGT Project Incorporated Route Variations

Start MP	End MP	Length of Variation (Feet)	County (or Counties)	Supporting Reason(s) for Variation	Date Reported
11.3	11.5	1,345	Columbiana	Avoids and minimizes crossing through forested wetlands and along stream, which minimizes forested wetland conversion	Prefiling (June 2015)
11.8	14.1	11,306	Columbiana, Stark	Reroute maintains proper offset from the First Energy easement	Application (November 2015)
13.6	13.8	1,041	Stark	Creates a right-angle crossing at Highway 183; avoids two ditched streams at boring location	Prefiling (June 2015)
14.3	14.7	2,131	Stark	Reroute maintains proper offset from the First Energy easement	Application (November 2015)
14.3	14.7	2,057	Stark	Avoid overlap with existing utility easement	Data response (March 2016)
15.5	16.2	3,920	Stark	Reroute maintains proper offset from the First Energy easement	Application (November 2015)
15.7	17.4	9,098	Stark	Rerouted per landowner request	Data response (March 2016)
18.6	22.2	17,662	Stark	Reroute avoids running parallel to a stream, minimizes forest and wetland impacts and improves crossing at Highway 62	Application (November 2015)
18.7	19.1	1,804	Stark	Avoids a crude oil storage tank, minimizes forested wetland clearing adjacent to a creek and avoids a survey section corner point installed by Ohio State Survey	Prefiling (June 2015)
22.1	22.5	2,762	Stark	Reroute per landowner request to route the line between a pump jack and storage tanks on the property	Application (November 2015)
23.3	23.4	1,000	Stark	Reroute to improve crossing of existing pipeline	Data response (March 2016)
23.9	24.4	2,288	Stark	Reroute per landowner request to move to the southern portion of property	Application (November 2015)
24.5	25.3	3,876	Stark	Avoids a pond and several houses, reduces forested wetland impacts, eliminates a stream crossing and avoids a large section of FEMA-mapped floodplain	Prefiling (June 2015)
26.4	28.1	9,124	Stark	Reroute avoids a conservation easement and satisfies landowner request to move route clower to a tree line	Application (November 2015)
27.7	27.8	566	Stark	Reroute to avoid existing culvert	Data response (March 2016)
27.7	28.1	2,340	Stark	Avoids an OEPA Class III wetland	Prefiling (June 2015)
28.6	29.1	2,735	Stark	Requested change per ODNR staff; avoids forested uplands	Prefiling (June 2015)
29.9	30.1	1,007	Stark	Avoids three large storage tanks	Prefiling (June 2015)
29.9	30.3	1,760	Stark	Avoids traversing a pond	Application (November 2015)
30.4	30.8	2,305	Stark	Avoids a pond and large associated wetland area and moves the alignment further away from two residences	Prefiling (June 2015)
30.7	31.2	2,668	Stark	Avoids a cultural site	Application (November 2015)
30.9	31.2	1,410	Stark	Avoids sensitive resource area and driveway	Data response (March 2016)

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Start MP	End MP	Length of Variation (Feet)	County (or Counties)	Supporting Reason(s) for Variation	Date Reported
31.4	32.1	2,973	Stark	Avoids a commercial structure, adjusts the crossing of a powerline, and improves constructability of a road and river crossing	Application (November 2015)
31.5	31.8	1,612	Stark	Avoid overlap with existing utility easement	Data response (March 2016)
32.5	39.6	37,066	Stark, Summit	Reroute to avoid impacts and address landowner concerns in the City of Green	Application (November 2015)
33.2	33.9	3,522	Stark	Reroute to avoid utilities	Data response (March 2016)
35.8	36.6	3,940	Summit	Reroute to avoid conflict with proposed business expansion	Data response (March 2016)
36.3	Joined at Removed Section of Former Alignment South of 37.2	4,669	Summit	Landowner request to avoid cutting through property and instead parallel northern property border.	Prefiling (June 2015)
36.7	37.0	1,330	Summit	Reroute to avoid conflict with proposed business expansion and to improve angle of existing pipelien crossing	Data response (March 2016)
39.7	41.9	9,515	Summit	Reroute based on stakeholder input and to avoid a Category III wetland	Data response (March 2016)
40.7	41.3	4,591	Summit	Reroute avoids impacts to a reservoir by adding a HDD	Application (November 2015)
41.9	42.6	3,089	Summit	Reroute maintains proper offset from the Dominion East Ohio Gas facilities	Application (November 2015)
42.2	42.3	643	Summit	Reroute to adjust angle of existing utility crossing	Data response (March 2016)
43.3	43.5	1,125	Summit	Reroute maintains proper offset from the Dominion East Ohio Gas facilities	Application (November 2015)
43.4	44.1	3,364	Summit	Reroute to avoid structures and workspace constraints	Data response (March 2016)
44.2	44.3	828	Summit	Reroute to adjust angle of existing pipeline crossing	Data response (March 2016)
44.4	45.2	4,302	Summit	Reroute maintains proper offset from the Dominion East Ohio Gas facilities	Application (November 2015)
46.4	46.4	373	Summit	Avoids stream impacts	Data response (March 2016)
46.4	46.7	1,717	Summit	Eliminates a point of inflection (PI)	Application (November 2015)
47.3	47.9	2,532	Summit	Eliminates a PI on a hill and minimizes forest impacts	Application (November 2015)
47.6	47.8	858	Summit	Reroute to accommodate HDD entry location	Data response (March 2016)
47.9	48.3	1,989	Summit, Wayne	Reroute to increase distance from residences and a barn	Prefiling (June 2015)
48.9	49.8	4,159	Summit	Eliminates crossing Pinto Drive and avoids storages tanks	Application (November 2015)
49	49.8	3,456	Wayne	Reroute to increase distance from residences	Prefiling (June 2015)
49.7	50.2	2,680	Summit	Reroute to avoid paralleling a stream	Data response (March 2016)
50.6	52.0	6,831	Wayne	Avoid overlap with existing utility easement	Data response (March 2016)

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Start MP	End MP	Length of Variation (Feet)	County (or Counties)	Supporting Reason(s) for Variation	Date Reported
52.0	52.1	493	Wayne	Reroute due to a landowner request	Data response (March 2016)
52.1	52.6	2,775	Wayne	Avoid overlap with existing utility easement	Data response (March 2016)
52.5	54.7	10,771	Wayne	Improves constructability of Highway 585 crossing and avoids impacts to future development	Application (November 2015)
52.7	53.0	1,395	Wayne	Reroute to avoid paralleling a stream	Data response (March 2016)
53.0	53.7	3,583	Wayne	Reroute avoids crossing near residences and powerline, and reduces forested areas crossed	Prefiling (June 2015)
53.1	53.2	819	Wayne	Reroute to avoid a ponded wetland	Data response (March 2016)
54.2	54.9	4,268	Wayne	Reroute per landowner request and to improve crossing angle with existing pipeline	Data response (March 2016)
55.7	56.4	3,043	Wayne	Avoids impacts to future development	Application (November 2015)
Departs from Removed Section of Former Alignment North of 56.1	57.1	5,530	Medina	Avoids house currently under construction and two large sheds/barns which have been constructed in past month	Prefiling (June 2015)
56.8	59.1	8,801	Wayne, Medina	Avoids Wadsworth Municipal Airport property and minimizes forest clearing near a stream	Application (November 2015)
57.1	57.4	1,487	Wayne, Medina	Reroute to avoid paralleling a stream	Data response (March 2016)
59.1	60.0	4,662	Medina	Per landowners request at Open House meeting – variation no longer runs between their houses	Prefiling (June 2015)
59.4	59.5	372	Medina	Reroute per a landowner request	Data response (March 2016)
60.1	60.3	638	Medina	Reroute to avoid an existing injection well	Data response (March 2016)
61.4	62.0	3,312	Medina	Per landowners request at Open House meeting – one landowner requested to have pipeline on their property and another requested it not to be placed on their property	Prefiling (June 2015)
61.6	62.3	4,118	Medina	Avoids construction workspace in close proximity to a stream	Application (November 2015)
62.7	63.1	2,119	Medina	Avoids construction workspace in close proximity to a stream and accommodates landowner request	Application (November 2015)
64.4	65.2	3,848	Medina	Accommodates landowner request	Application (November 2015)
68.4	69.0	3,417	Medina	Reroute changes the location of the Chippewa Rail Trail crossing	Application (November 2015)
68.9	69.6	3,767	Medina	Reroute to avoid sensitive resource	Data response (March 2016)

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Start MP	End MP	Length of Variation (Feet)	County (or Counties)	Supporting Reason(s) for Variation	Date Reported
69.2	69.3	661	Medina	Avoids having construction workspace in the vicinity of storage tanks	Application (November 2015)
70.0	70.5	2,703	Medina	Reroute to avoid a stormwater basin	Data response (March 2016)
70.4	70.9	2,743	Medina	Relocates PI and improves constructability	Application (November 2015)
70.8	71.8	5,264	Medina	Incorporates HDD crossing of a Category III wetland	Application (November 2015)
72.7	73.1	1,914	Medina	Shift due to updated civil survey	Data response (March 2016)
72.7	73.2	2,921	Medina	Avoids construction workspace in the vicinity of several streams and wetlands	Application (November 2015)
73.6	73.8	1,177	Medina	Avoids a communication box	Application (November 2015)
74.3	77.1	14,462	Medina	Per landowner request, that the pipeline be moved further to the north to travel through cleared agricultural fields – the resulting variation is further away from several developed lots, a stream crossing, a mature American Elm, and a wetland	Prefiling (June 2015)
75.0	75.2	652	Medina	Reoute to adjust crossing angle with existing pipeline	Data response (March 2016)
75.3	78.3	14,799	Medina	Avoids a Category III wetland	Application (November 2015)
75.9	76.2	1,300	Medina	Reoute to adjust crossing angle with existing pipeline	Data response (March 2016)
77.6	77.8	900	Medina	Reroute to shift PI away from existing pipelines	Data response (March 2016)
79.8	80.2	1,754	Lorain	Avoids a pond and moves the route further away from nearby homes	Prefiling (June 2015)
80.3	80.8	2,960	Lorain	Avoids a pet cemetery at request of landowners	Prefiling (June 2015)
80.4	80.6	1,196	Medina, Lorain	Avoid overlap with existing utility easement	Data response (March 2016)
80.8	81.7	3,999	Lorain	Avoids several houses and a wetland and reduces forested conversion.	Prefiling (June 2015)
81.2	81.7	2,354	Lorain	Avoids wetland impacts and moves workspace away from residence	Application (November 2015)
81.8	Joined at Removed Section of Former Alignment West of 82.9	5,224	Lorain	Avoids several homes and yards and reduces crossing distance through a portion of public park land	Prefiling (June 2015)
82.6	83.0	2,115	Lorain	Removes a PI in reroute around maple farm	Prefiling (June 2015)
Departs from Removed Section of Former Alignment West of 82.9	83.1	1,034	Lorain	Avoids a maple farm and minimizes mature forest conversion	Prefiling (June 2015)

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Start MP	End MP	Length of Variation (Feet)	County (or Counties)	Supporting Reason(s) for Variation	Date Reported
82.9	83.2	1,559	Lorain	Avoid overlap with existing utility easement	Data response (March 2016)
83.5	83.6	589	Lorain	Avoid overlap with existing utility easement	Data response (March 2016)
84.0	84.6	4	Lorain	Reroute per landowner request	Data response (March 2016)
84.3	85.1	4,019	Lorain	Avoids traversing two existing pipelines	Prefiling (June 2015)
86.3	86.9	3,398	Lorain	Improves alignment for East Branch Black River HDD	Application (November 2015)
Departs from Removed Section of Former Alignment North of 88.0	Joined at Removed Section of Former Alignment North of 88.4	2,299	Lorain	Avoids wetland and portion of a Lorain County Metro Park	Prefiling (June 2015)
Departs from Removed Section of Former Alignment North of 88.4	89.3	4,452	Lorain	Avoids passing within 660 feet of an active eagle nest and minimizes stream crossing impacts	Prefiling (June 2015)
88.5	88.5	834	Lorain	Reroute to improve crossing of existing pipeline	Data response (March 2016)
89.3	89.9	3,119	Lorain	Avoids a Class III wetland or a high scoring class II wetland and minimizes mature forest clearing	Prefiling (June 2015)
89.6	91.4	834	Lorain	Reroute to improve crossing of existing pipeline	Data response (March 2016)
90.1	91.4	6,915	Lorain	Avoids area of future development per landowner request	Application (November 2015)
90.3	91	3,463	Lorain	Minimizes crossings of existing pipeline	Prefiling (June 2015)
Departs from Removed Section of Former Alignment East of 90.9	Joined at Removed Section of Former Alignment North of 92.2	9,059	Lorain	Avoids a confluence of five existing pipelines and avoids Black Swamp Woods conservation easement and its constituent conservation site (maple-ash-oak swamp)	Prefiling (June 2015)
91.1	91.4	1,504	Lorain	Avoids passing within 660 feet of an active eagle nest	Prefiling (June 2015)
92.1	92.2	487	Lorain	Centerline adjusted to allow adequate workspace for HDD	Data response (March 2016)
92.6	92.8	1,185	Lorain	Reroute to improve crossing of existing pipeline	Data response (March 2016)
94.5	96.0	7,993	Lorain	Reroute to shift pipeline further from residences	Prefiling (June 2015)

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Start MP	End MP	Length of Variation (Feet)	County (or Counties)	Supporting Reason(s) for Variation	Date Reported
96.4	99.3	15,511	Lorain, Erie	Avoids crossing through a large section of an ODNR-mapped rare habitat (beech-sugar maple forest) and avoids a large area of forested wetland and upland. The variation will also reduce the crossing length through a conservation property owned by the Girl Scouts of America	Prefiling (June 2015)
96.4	106.3	49,330	Lorain, Erie, Huron	Avoids Boy and Girl Scout property, Western Reserve Land Conservancy and realigns HDD	Application (November 2015)
98.1	99.1	5,419	Lorain	Reroute across the Kipton Rock Quarry to co-locate with existing pipelines	Data response (March 2016)
99.2	99.4	1,245	Lorain	Reroute to avoid water well and natural ground spring	Data response (March 2016)
100.6	107.0	34,558	Erie	Variation shifts alignment further away from residences	Prefiling (June 2015)
109.0	110.3	5,839	Erie	Avoids two barns and avoids approximately 290 feet of crossing distance through a FEMA-mapped floodplain	Prefiling (June 2015)
110.3	111.2	4,564	Erie	Variation shifts alignment further away from residences	Prefiling (June 2015)
110.4	111.4	5,284	Erie	Avoids orchard and minimizes impacts to forested wetlands and forest	Application (November 2015)
111.9	112.3	1,919	Erie	Reroute to avoid Edison Woods Preserve	Data response (March 2016)
112.6	112.9	1,595	Erie	Eliminates a PI prior to the HDD crossing of the Huron River	Prefiling (June 2015)
113.1	113.5	2,113	Erie	Avoid overlap with existing utility easement	Data response (March 2016)
114.2	114.7	2,229	Erie	Avoids an active private shooting range	Prefiling (June 2015)
115.5	117.5	10,475	Erie	Variation avoids powerline and pond, and shifts alignment further from residence	Prefiling (June 2015)
115.8	116.0	780	Erie	Reroute to improve crossing of railroad	Data response (March 2016)
116.0	116.2	1,021	Erie	Avoid overlap with existing utility easement	Data response (March 2016)
116.4	116.5	804	Erie	Avoids a pond drainage system per landowner request	Application (November 2015)
116.7	117.4	3,636	Erie	Realigns HDD and shifts PI to improve constructability	Application (November 2015)
117.5	119.3	9,232	Erie	Colocates route on the south side of a powerline per county request	Application (November 2015)
119.2	120.3	5,292	Erie	Avoids future residential development per landowner request	Application (November 2015)
120.6	121.7	5,168	Erie	Moves further from a residence per landowner request	Application (November 2015)
125.8	126.5	3,227	Erie	Avoids a cultural site and Indiana bat habitat	Application (November 2015)
126.1	126.7	3,138	Erie	Variation avoids passing between two residences while paralleling an existing pipeline ROW	Prefiling (June 2015)
126.9	127.6	3,546	Erie	Variation parallels existing pipeline per landowner request	Application (November 2015)
127.1	129.0	9,749	Sandusky	Creates a right-angle crossing at I-90	Prefiling (June 2015)
127.8	128.3	2,689	Erie	Moves PI away from a stream and ditch and minimizes forest impacts	Application (November 2015)

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Start MP	End MP	Length of Variation (Feet)	County (or Counties)	Supporting Reason(s) for Variation	Date Reported
130.2	130.6	1,232	Erie	Reroute to improve crossing angle of existing pipeline	Data response (March 2016)
133.8	135.3	8,036	Sandusky	Avoids several wetland crossings and improves constructability of creek crossing	Application (November 2015)
134.5	135.0	2,462	Sandusky	Avoids a waste management facility (property has various test wells within its boundaries), avoids paralleling a large stream and minimizes wetland impacts	Prefiling (June 2015)
135.2	137.6	12,440	Sandusky	Reroute maintains proper offset from the First Energy easement	Application (November 2015)
136	137.4	7,561	Sandusky	Reroute to avoid sensitive resource	Data response (March 2016)
136.4	137.9	8,133	Sandusky	Variation avoids an existing bridge and shortens overall alignment	Prefiling (June 2015)
138.8	139.4	3,100	Sandusky	Avoids a forested area	Application (November 2015)
140.2	140.7	2,537	Sandusky	Avoids a forested wetland	Application (November 2015)
140.6	140.9	1,674	Sandusky	Reroute to improve crossing angle of existing pipeline	Data response (March 2016)
143.3	145.2	10,247	Sandusky	Variation removes a PI and shortens overall alignment	Prefiling (June 2015)
143.8	147.4	15,687	Sandusky	Reroute maintains proper offset from the First Energy easement	Application (November 2015)
145.4	146.4	6,141	Sandusky	Reroute to avoid a water well protection area	Data response (March 2016)
148.2	150.1	9,911	Sandusky	Avoids construction workspace in the vicinity of a stream	Application (November 2015)
148.8	149.7	4,709	Sandusky	Avoids Black Swamp Conservancy easement and avoids paralleling small stream for approximately 1,164 linear feet	Prefiling (June 2015)
150.1	150.8	3,822	Sandusky	Avoids Black Swamp Conservatory easement	Prefiling (June 2015)
150.9	152.3	7,069	Sandusky	Avoids Black Swamp Conservatory easement	Prefiling (June 2015)
151.2	151.3	576	Sandusky	Reroute to avoid overlap with existing utility easement	Data response (March 2016)
156.3	157.8	7,740	Sandusky	Avoids crossing over two existing pipelines and minimizes impacts on wetland	Prefiling (June 2015)
157.3	157.8	2,415	Sandusky	Avoids workspace encroachment onto landowner property	Application (November 2015)
160.3	160.5	1,065	Wood	Avoids an electric transmission line tower	Prefiling (June 2015)
161.6	161.9	1,377	Wood	Variation to cross railroad at a 90 degree angle	Prefiling (June 2015)
161.8	162.8	5,391	Sandusky	Rerouted to align with HDD crossing design	Data response (March 2016)
163.7	164.6	4,226	Wood	Avoids workspace encroachment onto landowner property and minimizes forest impacts	Application (November 2015)
166.7	167.0	1,450	Wood	Improves constructability at railroad crossing	Application (November 2015)
167.4	168.5	5,677	Wood	Reroute maintains proper offset from the easement of existing pipelines and reduces pipeline crossings	Application (November 2015)

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Start MP	End MP	Length of Variation (Feet)	County (or Counties)	Supporting Reason(s) for Variation	Date Reported
168.5	168.8	1,634	Wood	Reroute to avoid overlap with existing utility easement	Data response (March 2016)
171.4	171.8	2,284	Wood	Variation shifts alignment further from residences	Prefiling (June 2015)
173.9	175.5	7,967	Wood	Reduces powerline and road crossings and shifts alignment further from residences	Prefiling (June 2015)
175.2	176.7	7,411	Wood	Avoids traversing through an existing electrical substation and future development	Application (November 2015)
175.9	177.5	8,527	Wood, Lucas	Straighten the HDD under the Maumee River.	Prefiling (June 2015)
177.1	178.9	9,469	Wood	Reroute to avoid overlap with existing utility easement	Data response (March 2016)
178.0	179.6	8,330	Lucas	Provides right-angle crossings for Highway 24 and Hertzfeld Road reducing crossing distance	Prefiling (June 2015)
178.9	180.3	6,929	Wood	Variation improves constructability and reduces workspace necessary for HDD	Application (November 2015)
180.1	180.2	605	Wood	Adjusted to align with HDD crossing design	Data response (March 2016)
181.0	195.3	76,929	Lucas, Fulton	Variation avoids multiple OEPA Category III wetlands, road and pipeline crossings, and reroutes around the town of Swanton.	Prefiling (June 2015)
181.9	183.3	7,099	Lucas	Avoids landowner sewer lift station and plans for future development	Application (November 2015)
183.4	183.6	666	Lucas	Adjusted due to modifications at Compressor Station 4	Data response (March 2016)
183.5	184.2	3,650	Lucas	Avoids a PI in close proximity to a creek	Application (November 2015)
185.3	185.9	3,027	Lucas	Avoids forested wetland impacts	Application (November 2015)
187.7	187.9	1,221	Lucas	Avoids PIs under an existing high voltage powerline and minimizes tree clearing	Application (November 2015)
189.9	190.0	566	Henry	Avoids wetland impacts	Data response (March 2016)
190.3	191.3	5,660	Fulton	Minimizes forested impacts and avoids sensitive resource area	Data response (March 2016)
Departs from Removed Section of Former Alignment East of 191.9	Joined at Removed Section of Former Alignment East of 194.9	11,141	Fulton	Avoids residences, creates a right-angle crossing at roads and railroad, avoids electrical substation and avoids 944 linear feet of forested upland	Prefiling (June 2015)
192.1	192.5	2,592	Fulton	Avoids workspace in close proximity to a culvert at Route 3	Application (November 2015)
193.9	200.7	39,179	Fulton	Avoids high density residential development and several Category III wetlands	Application (November 2015)
196.2	196.4	1,318	Fulton	Variation avoids crossing through a residence	Prefiling (June 2015)
196.2	196.4	985	Fulton	Variation moves alignment further from residence	Prefiling (June 2015)

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Start MP	End MP	Length of Variation (Feet)	County (or Counties)	Supporting Reason(s) for Variation	Date Reported
200.6	Joined at Removed Section of Former Alignment East of 201.4	4,487	Fulton	Variation removes two powerline crossings and multiple PIs; shortens overall alignment	Prefiling (June 2015)
Departs from Removed Section of Former Alignment East of 201.4	Joined at Removed Section of Former Alignment East of 202.4	5,353	Fulton	Variation avoids the Metamora Water Facility and two likely TRO land tracts	Prefiling (June 2015)
201.5	201.8	1,468	Fulton	Variation adjusts crossing angle of a powerline	Application (November 2015)
202.4	203.1	4,031	Fulton, OH Lenawee, MI	Avoids powerline crossings and removes a PI	Prefiling (June 2015)
202.7	204.9	11,665	Fulton	Avoids overlap with existing utility easement	Data response (March 2016)
204.4	206.0	8,448	Fulton	Variation avoids residential structure and accommodates workspace for Route 20 bore crossing	Application (November 2015)
208.8	210.1	6,737	Lenawee	Reduces forest clearing adjacent to the Raisin River	Prefiling (June 2015)
209.7	210.4	3,761	Lenawee	Variation allows for crossing of East Mulberry Road and railroad in single bore crossing	Application (November 2015)
209.7	211.1	7,789	Lenawee	Removes PIs and reduces length of the alignment	Prefiling (June 2015)
211.4	211.6	1,083	Lenawee	Avoids a residence	Prefiling (June 2015)
214.6	216.4	9,208	Lenawee	Variation improves constructability of River Raisin HDD	Application (November 2015)
215.6	219.3	19,361	Lenawee	Avoids crossing existing utilities and collocates with existing pipelines	Prefiling (June 2015)
216.8	219.0	11,676	Lenawee	Variation increases distance from residential structures and minimizes forest impacts	Application (November 2015)
219.0	220.1	5,298	Lenawee	Adjusted to eliminate PI	Data response (March 2016)
224.9	226.7	9,346	Lenawee	Minimizes impacts to forested bat habitat	Application (November 2015)
227.3	229.1	8,604	Monroe	Variation crosses railroad at 90° angle and avoids crossing existing pipelines	Prefiling (June 2015)
228.8	229.3	3,150	Lenawee	Reroute to maintain offset from existing pipelines	Data response (March 2016)
231.1	231.2	654	Monroe	Maintain offset from existing utilities	Data response (March 2016)
231.2	232.6	6,784	Washtenaw	Reduces forest clearing adjacent to the Saline River	Prefiling (June 2015)
233.9	236.6	13,961	Monroe	Reroute to avoid sensitive resource areas and maintain offset from existing pipelines	Data response (March 2016)

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Start MP	End MP	Length of Variation (Feet)	County (or Counties)	Supporting Reason(s) for Variation	Date Reported
234.5	235.1	3,401	Monroe	Variation increases distance from residential structures and accommodates necessary workspace for Mead Road crossing	Application (November 2015)
235.3	236.6	6,468	Monroe	Variation increases constructability over two existing TransCanada pipelines	Application (November 2015)
235.8	236.0	1,067	Washtenaw	Avoids crossing through a residence and a garage	Prefiling (June 2015)
238.2	238.5	1,640	Washtenaw	Variation increases collocation and minimizes foreign pipeline crossings	Application (November 2015)
238.9	239.7	3,821	Washtenaw	Avoids crossing in close proximity to a pond, minimizes wetland impacts and improves constructability of bore	Application (November 2015)
241.0	243.0	13,086	Washtenaw	Avoids residences and waterbodies; avoids street lay adjacent to a school, church, cemetery and several neighborhoods	Prefiling (June 2015)
241.5	242.5	4,643	Washtenaw	Avoids residential structures	Application (November 2015)
243.4	Joined at Removed Section of Former Alignment West of 244.6	6,171	Washtenaw	Avoids street lay constraints associated with existing underground utilities	Prefiling (June 2015)
243.8	245.0	7,141	Washtenaw	Reduces the number of PIs and increases distance from residential structures	Application (November 2015)
244.6	245.6	3,850	Washtenaw	Variation to former alignment and HDD location across the Maumee River to avoid parkland, river crossing, HVAC lines, existing pipelines, water mains, water towers, a dam, and nearby roads.	Prefiling (June 2015)
245.6	246.9	6,093	Washtenaw	Variation minimizes impacts to forested wetlands	Application (November 2015)
246.1	246.2	590	Washtenaw	Minor alteration to avoid existing salvage yard.	Prefiling (June 2015)
249.2	251.4	11,622	Washtenaw	Avoid existing underground utilities	Application (November 2015)
251.1	251.2	662	Washtenaw	Shift to account for HDD exit location	Data response (March 2016)
252.1	252.3	870	Washtenaw	Avoids a high voltage powerline and substation	Application (November 2015)
252.4	255.1	13,226	Washtenaw, Wayne	Avoids existing underground utilities and improves constructability	Application (November 2015)
253.3	255.1	9,654	Washtenaw, Wayne	Reroute per landowner request	Data response (March 2016)

APPENDIX G

GEOLOGY TABLES

G-1: BEDROCK GEOLOGY OF THE NGT AND TEAL PROJECTS
G-2: OIL AND GAS WELLS WITHIN 0.25 MILE OF THE NGT AND TEAL PROJECTS

APPENDIX G-1

BEDROCK GEOLOGY OF THE NGT AND TEAL PROJECTS

APPENDIX G-1

Bedrock Geology of the NGT and TEAL Projects

Project, State, Component	Milepost	Unit Age	Lithology 1	Lithology 2
NGT PROJECT				
Ohio				
TGP Interconnect Pipeline	0 - 0.9	Pennsylvanian	Siltstone	Shale
Mainline	0 - 1.9	Pennsylvanian	Siltstone	Shale
	1.9 - 2.3	Pennsylvanian	Shale	Siltstone
	2.3 - 4.7	Pennsylvanian	Siltstone	Shale
	4.7 - 5.3	Pennsylvanian	Shale	Siltstone
	5.3 - 5.5	Pennsylvanian	Siltstone	Shale
	5.5 - 5.7	Pennsylvanian	Shale	Siltstone
	5.7 - 6.4	Pennsylvanian	Siltstone	Shale
	6.4 - 6.5	Pennsylvanian	Shale	Siltstone
	6.5 - 7.4	Pennsylvanian	Siltstone	Shale
	7.4 - 7.7	Pennsylvanian	Shale	Siltstone
	7.7 - 8.0	Pennsylvanian	Siltstone	Shale
	8.0 - 8.3	Pennsylvanian	Shale	Siltstone
	8.3 - 9.6	Pennsylvanian	Siltstone	Shale
	9.6 - 12.0	Pennsylvanian	Shale	Siltstone
	12.0 - 12.2	Pennsylvanian	Siltstone	Shale
	12.2 - 12.5	Pennsylvanian	Shale	Siltstone
	12.5 - 13.1	Pennsylvanian	Siltstone	Shale
	13.1 - 34.2	Pennsylvanian	Shale	Siltstone
	34.2 - 39.6	Pennsylvanian	Shale	Siltstone
	39.6 - 39.7	Mississippian	Shale	Siltstone
	39.7 - 40.7	Pennsylvanian	Shale	Siltstone
	40.7 - 41.3	Mississippian	Shale	Siltstone
	41.3 - 45.3	Pennsylvanian	Shale	Siltstone
	45.3 - 45.5	Mississippian	Shale	Siltstone
	45.5 - 47.9	Pennsylvanian	Shale	Siltstone
	47.9 - 48.3	Mississippian	Shale	Siltstone
	48.3 - 48.9	Pennsylvanian	Shale	Siltstone
	48.9 - 49.2	Mississippian	Shale	Siltstone
	49.2 - 50.4	Pennsylvanian	Shale	Siltstone
	50.4 - 51.5	Pennsylvanian	Shale	Siltstone
	51.5 - 52.0	Mississippian	Shale	Siltstone
	52.0 - 52.2	Pennsylvanian	Shale	Siltstone
	52.2 - 52.4	Mississippian	Shale	Siltstone

APPENDIX G-1 (cont’d)

Bedrock Geology of the NGT and TEAL Projects

Project, State, Component	Milepost	Unit Age	Lithology 1	Lithology 2
Mainline (cont’d)	52.4 - 54.9	Pennsylvanian	Shale	Siltstone
	54.9 - 55.6	Mississippian	Shale	Siltstone
	55.6 - 56.0	Pennsylvanian	Shale	Siltstone
	56.0 - 56.5	Pennsylvanian	Shale	Siltstone
	56.6 - 57.2	Mississippian	Shale	Siltstone
	57.2 - 57.7	Mississippian	Shale	Siltstone
	57.7 - 59.5	Mississippian	Shale	Siltstone
	59.5 - 59.8	Pennsylvanian	Shale	Siltstone
	59.8 - 60.1	Mississippian	Shale	Siltstone
	60.1 - 60.5	Pennsylvanian	Shale	Siltstone
	60.5 - 61.8	Mississippian	Shale	Siltstone
	61.8 - 64.6	Pennsylvanian	Shale	Siltstone
	64.6 - 80.5	Mississippian	Shale	Siltstone
	80.5 - 89.8	Mississippian	Shale	Siltstone
	89.8 - 91.0	Devonian	Sandstone	Shale
	91.0 - 91.6	Mississippian	Shale	Siltstone
	91.6 - 95.3	Devonian	Sandstone	Shale
	95.3 - 96.1	Mississippian	Shale	Siltstone
	96.1 - 100.3	Devonian	Sandstone	Shale
	100.3 - 100.7	Devonian	Black shale	Shale
	100.7 - 101.3	Devonian	Sandstone	Shale
	101.3 - 104.7	Devonian	Sandstone	Shale
	104.7 - 109.8	Devonian	Sandstone	Shale
	109.8 - 110.1	Devonian	Black shale	Shale
	110.1 - 112.1	Devonian	Sandstone	Shale
	112.1 - 124.2	Devonian	Black shale	Shale
	124.2 - 125.0	Devonian	Limestone	Dolostone (dolomite)
	125.0 - 125.6	Devonian	Shale	Limestone
	125.6 - 126.1	Devonian	Limestone	N/A
	126.1 - 126.5	Devonian	Shale	Limestone
	126.5 - 128.8	Devonian	Limestone	N/A
	128.8 - 131.5	Devonian	Limestone	Dolostone (dolomite)
	131.5 - 132.1	Devonian	Limestone	Dolostone (dolomite)
	132.1 - 140.1	Silurian	Dolostone (dolomite)	Shale
	140.1 - 148.2	Silurian	Dolostone (dolomite)	Shale
	148.2 - 150.2	Silurian	Dolostone (dolomite)	N/A
	150.2 - 151.2	Silurian	Dolostone (dolomite)	Shale

APPENDIX G-1 (cont'd)

Bedrock Geology of the NGT and TEAL Projects

Project, State, Component	Milepost	Unit Age	Lithology 1	Lithology 2
Mainline (cont'd)	151.2 - 163.4	Silurian	Dolostone (dolomite)	N/A
	163.4 - 163.6	Silurian	Dolostone (dolomite)	Shale
	163.6 - 163.7	Silurian	Dolostone (dolomite)	N/A
	163.7 - 168.7	Silurian	Dolostone (dolomite)	N/A
	168.7 - 170.5	Silurian	Dolostone (dolomite)	Shale
	170.5 - 173.0	Silurian	Dolostone (dolomite)	N/A
	173.0 - 174.1	Silurian	Dolostone (dolomite)	Shale
	174.1 - 178.1	Silurian	Dolostone (dolomite)	N/A
	178.1 - 180.8	Silurian	Dolostone (dolomite)	Shale
	180.8 - 181.5	Silurian	Dolostone (dolomite)	Shale
	181.5 - 182.5	Silurian	Dolostone (dolomite)	Shale
	182.5 - 186.2	Devonian	Dolostone (dolomite)	Evaporite
	186.2 - 187.2	Devonian	Limestone	Dolostone (dolomite)
	187.2 - 187.8	Devonian	Dolostone (dolomite)	Evaporite
	187.8 - 188.5	Devonian	Limestone	Dolostone (dolomite)
	188.5 - 189.3	Devonian	Dolostone (dolomite)	Shale
	189.3 - 190.2	Devonian	Dolostone (dolomite)	Shale
	190.2 - 203.2	Devonian	Shale	Black shale
	203.2 - 208.3	Devonian and/or Mississippian	Shale	Black shale
Hanoverton Compressor Station (CS-1)	1.4	Pennsylvanian	Siltstone	Shale
Wadsworth Compressor Station (CS-2)	63.5	Pennsylvanian	Shale	Siltstone
Clyde Compressor Station (CS-3)	134.0	Silurian	Dolostone (dolomite)	Shale
Waterville Compressor Station (CS-4)	183.5	Devonian	Dolostone (dolomite)	Evaporite
Michigan				
Mainline	208.3 - 210.5	Late Devonian	Shale	Sandstone
	210.5 - 211.8	Late Devonian	Sandstone	Siltstone
	211.8 - 212.8	Mississippian-Devonian	Black shale	N/A
	212.8 - 217.1	Mississippian	Shale	Limestone
	217.1 - 217.6	Mississippian-Devonian	Black shale	N/A
	217.6 - 220.4	Mississippian	Shale	Limestone
	220.4 - 221.2	Mississippian-Devonian	Black shale	N/A
	221.2 - 224.5	Late Devonian	Sandstone	Siltstone
	224.5 - 225.7	Late Devonian	Shale	Sandstone
	225.7 - 227.2	Late Devonian	Black shale	Limestone
	227.2 - 230.4	Middle Devonian	Limestone	Shale
	230.4 - 230.9	Middle Devonian	Limestone	Shale
	230.9 - 233.8	Middle Devonian	Limestone	Dolostone (dolomite)
	233.8 - 235.7	Middle Devonian	Limestone	Shale

APPENDIX G-1 (cont'd)

Bedrock Geology of the NGT and TEAL Projects

Project, State, Component	Milepost	Unit Age	Lithology 1	Lithology 2
Mainline (cont'd)	235.7 - 235.9	Middle Devonian	Limestone	Dolostone (dolomite)
	235.9 - 236.8	Middle Devonian	Limestone	Shale
	236.8 - 247.7	Middle Devonian	Limestone	Shale
	247.7 - 255.0	Late Devonian	Black shale	Limestone
TEAL PROJECT				
Ohio				
Pipeline Loop	0.0 - 4.4 [a]	Permian and/or Pennsylvanian	Mudstone	Shale
Connecting Pipeline	0.0 - 0.3 [a]	Pennsylvania	Siltstone	Shale
Salineville Compressor Station	5.9 [a]	Pennsylvanian	Siltstone	Shale
Colerain Compressor Station	49.9 [a]	Permian and/or Pennsylvanian	Mudstone	Shale

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a Line 73 Pipeline milepost designations are used.

Sources: USGS, 2004. Michigan geologic map data. USGS, GIS datalayer. https://mrdata.usgs.gov/geology/state/state.php?state=MI
USGS, 2005. Ohio geologic map data. USGS, GIS datalayer. https://mrdata.usgs.gov/geology/state/state.php?state=OH

APPENDIX G-2

OIL AND GAS WELLS WITHIN 0.25 MILE OF THE NGT AND TEAL PROJECTS

APPENDIX G-2

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
NGT PROJECT		
Active Wells		
Ohio		
Mainline	0.0	201
	0.0	1211
	0.3	60
	1.9	561
	2.0	440
	2.3	49
	2.7	110
	3.5	850
	3.6	1228
	4.2	449
	4.2	7
	4.3	968
	4.4	407
	4.5	79
	4.6	972
	4.8	38
	4.9	1041
	5.0	197
	5.1	553
	5.3	364
	5.5	751
	5.7	197
	5.8	1148
	6.0	1151
	6.0	904
	6.0	240
	6.0	380
	6.1	179
	6.2	953
	6.4	963
	6.5	134
	6.5	834
	6.6	1222
	6.7	141
	6.7	143
	6.9	1100
	6.9	449
	7.3	449
	7.3	100
	7.4	292
	7.5	438
	7.5	1
	7.5	68
	7.5	487
	7.6	86
	7.6	343
	7.6	594
	7.6	615
	7.6	656

APPENDIX G-2 (cont'd)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Mainline (cont'd)	7.6	769
	7.6	796
	7.6	808
	7.6	897
	7.6	1077
	7.7	1283
	7.8	707
	7.8	929
	7.8	41
	8.0	942
	8.1	502
	8.3	42
	8.4	1019
	8.5	0
	8.6	784
	8.8	658
	9.0	132
	9.1	355
	9.2	849
	9.4	1096
	9.6	159
	9.7	1035
	9.7	1007
	9.9	63
	10.0	1140
	10.2	650
	10.3	1318
	10.3	1113
	10.3	760
	10.3	619
	10.3	1083
	10.3	300
	10.3	21
	10.4	1003
	10.4	950
	10.4	870
	10.4	1141
	10.5	1044
	10.5	1220
	10.5	1188
	10.5	545
	10.6	292
	10.6	269
	10.6	0
	10.8	487
	10.9	1104
	10.9	649
	11.1	1061
	11.1	1219
	11.1	974
	11.1	1307
	11.5	300
	11.9	103
	12.2	1010

APPENDIX G-2 (cont'd)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Mainline (cont'd)	12.3	174
	12.8	526
	12.8	642
	13.4	32
	13.7	1148
	14.0	132
	14.9	1259
	15.0	156
	15.4	594
	15.5	35
	15.7	676
	16.0	634
	16.1	365
	16.4	462
	16.5	683
	16.7	1214
	16.7	93
	17.3	1244
	17.4	41
	17.6	1296
	17.9	758
	18.8	896
	19.1	288
	19.2	1024
	19.7	600
	19.7	544
	20.0	328
	20.2	860
	20.6	351
	21.5	460
	21.8	978
	21.8	133
	22.0	392
	22.2	309
	22.2	1025
	22.3	903
	22.4	106
	22.5	876
	22.5	1041
	22.6	508
	22.9	840
	22.9	355
	22.9	638
	23.1	58
	23.1	332
	23.2	635
	23.4	443
	23.4	950
	23.6	693
	23.6	313
	23.9	682
	24.1	418
	24.1	421
	24.1	725

APPENDIX G-2 (cont'd)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Mainline (cont'd)	24.3	896
	24.4	431
	24.5	231
	24.6	860
	24.6	412
	24.8	774
	24.9	327
	24.9	1087
	25.1	556
	25.1	461
	25.2	1149
	25.4	975
	25.4	33
	25.6	325
	25.7	285
	25.7	207
	25.7	776
	25.9	645
	26.1	670
	26.2	41
	26.3	1191
	26.4	872
	26.5	58
	26.6	1204
	26.6	1284
	26.7	113
	26.8	1139
	27.0	404
	27.1	719
	27.3	1143
	27.3	56
	27.5	653
	28.0	377
	28.2	511
	28.5	938
	28.6	191
	28.9	375
	29.4	452
	30.1	136
	30.5	232
	30.7	331
	31.3	867
	31.9	608
	32.2	354
	32.5	123
	33.0	1248
	33.1	87
	33.7	1145
	33.8	78
	34.4	286
	34.7	970
	34.9	138
	35.2	121
	35.2	1194

APPENDIX G-2 (cont'd)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Mainline (cont'd)	35.2	1079
	35.5	322
	35.8	625
	36.3	66
	36.7	331
	36.9	447
	37.2	250
	41.8	1116
	45.1	755
	45.1	26
	45.4	63
	45.6	833
	46.3	133
	47.9	228
	48.3	58
	48.5	825
	48.6	0
	48.7	1275
	48.7	676
	49.0	519
	49.2	1062
	49.3	32
	49.3	976
	50.0	378
	50.1	1248
	50.2	546
	50.6	835
	50.8	98
	51.0	879
	51.5	654
	51.6	675
	52.4	326
	52.7	1076
	52.8	300
	54.5	636
	54.8	985
	55.2	94
	55.5	343
	56.2	0
	56.7	174
	56.9	80
	57.1	775
	57.3	1102
	57.9	2
	58.2	1258
	58.4	1170
	58.6	135
	58.8	94
	59.0	956
	59.1	1281
	59.5	882
	59.6	113
	60.0	368
	60.2	86

APPENDIX G-2 (cont'd)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Mainline (cont'd)	60.3	132
	60.3	1090
	60.7	91
	60.8	1136
	61.1	653
	61.2	560
	61.4	265
	61.4	1161
	61.6	66
	61.7	1115
	61.7	957
	61.8	388
	62.1	747
	62.4	11
	62.9	493
	63.1	119
	63.3	727
	63.8	393
	64.0	133
	64.3	0
	64.3	1016
	64.6	5
	64.7	1089
	65.0	485
	65.3	175
	65.4	772
	65.9	89
	66.5	89
	66.6	784
	67.0	1013
	67.1	113
	67.2	86
	67.4	373
	67.5	343
	67.8	171
	67.9	997
	68.1	24
	68.3	876
	68.9	1309
	69.5	1066
	69.8	118
	69.9	404
	70.0	755
	70.3	6
	70.4	494
	70.5	405
	70.7	0
	71.0	382
	71.2	1010
	71.4	1257
	72.0	589
	75.4	57
	77.8	237
	77.8	423

APPENDIX G-2 (cont'd)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Mainline (cont'd)	77.9	13
	78.9	421
	79.8	995
	82.6	1002
	82.9	920
	83.6	1079
	84.5	1222
	85.9	389
	87.2	655
	88.3	1061
	89.9	166
	90.0	1296
	90.1	613
	90.2	553
	90.7	0
	91.1	1147
	91.8	490
	92.3	215
	93.3	765
	93.5	301
	94.5	1104
	94.7	126
	95.6	194
	101.2	793
	101.2	1253
	102.3	1115
	163.6	1082
	163.8	26
	163.8	167
	163.9	355
	163.9	147
	164.0	826
	164.0	492
	164.0	187
	164.0	540
	164.0	782
	164.1	1229
	164.1	693
	164.1	91
	164.2	0
	164.3	0
	164.3	420
	164.4	440
	164.5	233
	164.5	652
	164.5	944
	164.5	777
	164.6	1040
	164.6	919
	164.6	1165
	164.6	248
	164.7	858
	164.7	667
	164.7	207

APPENDIX G-2 (cont'd)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Mainline (cont'd)	164.8	1207
	164.8	361
	164.8	1190
	164.8	83
	164.8	499
	164.8	951
	164.9	350
	164.9	1046
	164.9	665
	164.9	272
	165.0	78
	165.0	1070
	165.1	883
	165.1	588
	165.1	560
	165.2	623
	165.2	449
	165.9	1072
	167.1	1102
	167.1	496
	167.1	957
	167.2	184
	167.2	235
	167.3	426
	167.3	1274
	167.3	434
	167.4	250
	167.5	1038
	167.5	1135
	167.5	1302
	167.5	1202
	172.8	61
	172.8	337
	172.8	1300
	172.8	1025
	172.8	1279
	173.0	1197
	173.3	1077
Michigan		
Mainline	230.3	4
	254.8	13
Wadsworth Compressor Station (CS-2)	63.5	1099
	63.5	0
	63.5	1237
	63.5	0
	63.5	739
Clyde Compressor Station (CS-3)	134.0	699
Inactive or Abandoned		
Ohio		
TGP Interconnect	0.0	491
	0.4	400
	0.7	0
Mainline	0.4	624
	0.4	1015

APPENDIX G-2 (cont'd)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Mainline (cont'd)	1.3	332
	1.9	579
	2.5	1216
	2.6	1111
	3.0	164
	4.0	1227
	4.1	216
	4.1	0
	5.0	0
	5.4	494
	5.5	676
	5.8	309
	5.9	1148
	6.1	816
	6.4	1054
	6.8	309
	7.1	920
	7.1	729
	7.1	858
	7.3	291
	7.4	374
	7.4	30
	7.4	423
	7.5	270
	7.5	139
	7.6	1299
	7.6	1030
	7.6	1079
	7.7	634
	7.8	888
	7.8	651
	7.8	581
	7.8	370
	7.8	704
	8.1	316
	8.1	0
	9.0	141
	9.1	606
	9.1	1309
	9.2	381
	9.2	1307
	9.3	597
	9.3	0
	9.4	1040
	9.4	749
	9.5	1123
	9.6	0
	9.6	928
	9.7	1229
	9.7	1194
	9.8	1301
	9.8	36
	10.1	113
	10.2	0

APPENDIX G-2 (cont'd)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Mainline (cont'd)	10.3	1072
	10.3	901
	10.3	861
	10.4	1128
	10.4	529
	10.5	1099
	10.5	866
	10.5	993
	10.5	844
	10.5	341
	10.6	800
	10.6	1210
	10.6	591
	10.6	710
	10.7	0
	10.8	882
	10.8	95
	10.8	788
	11.1	1016
	11.2	1068
	11.2	418
	11.5	131
	11.5	436
	11.6	164
	11.6	367
	11.7	466
	11.7	394
	11.7	0
	11.7	828
	11.8	576
	11.8	177
	11.8	578
	11.8	860
	11.8	1077
	11.9	0
	11.9	879
	11.9	579
	11.9	251
	11.9	1084
	11.9	409
	11.9	905
	11.9	156
	11.9	1273
	12.0	1294
	12.0	742
	12.3	1187
	12.3	1212
	12.5	1014
	12.5	1122
	13.0	159
	13.9	352
	14.1	358
	14.5	260
	14.7	1294

APPENDIX G-2 (cont'd)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Mainline (cont'd)	16.0	1035
	16.9	1257
	17.7	674
	21.8	68
	22.9	614
	23.1	264
	23.6	660
	23.9	554
	23.9	554
	23.9	775
	24.3	1317
	24.5	523
	24.7	1266
	25.4	148
	26.0	527
	27.5	554
	27.7	294
	27.8	782
	28.8	866
	29.1	750
	29.2	185
	29.3	227
	29.3	1175
	29.6	798
	29.6	1012
	29.7	434
	30.4	969
	30.8	809
	31.2	1172
	31.2	867
	31.2	923
	31.5	258
	31.7	149
	31.8	647
	31.9	1170
	32.0	40
	32.8	737
	33.4	533
	33.5	994
	33.5	943
	35.1	1304
	35.8	339
	35.8	758
	35.9	641
	36.0	1240
	36.1	915
	36.6	114
	36.9	629
	38.2	67
	39.0	1189
	39.0	715
	40.7	871
	40.7	45
	40.8	787

APPENDIX G-2 (cont'd)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Mainline (cont'd)	40.9	244
	40.9	795
	41.3	581
	41.4	0
	41.9	835
	42.0	242
	42.1	1309
	42.4	169
	42.6	1023
	42.6	213
	42.8	42
	42.9	1128
	42.9	887
	43.1	447
	43.2	634
	43.2	795
	43.3	456
	43.4	413
	43.5	521
	43.6	842
	43.7	1283
	43.8	369
	43.8	599
	44.0	25
	44.2	932
	44.2	587
	44.3	379
	44.3	964
	44.4	66
	44.5	824
	44.6	458
	44.8	427
	44.8	0
	45.1	690
	45.1	55
	45.1	803
	45.2	237
	45.2	736
	45.3	635
	45.3	973
	45.4	514
	45.4	504
	45.4	1178
	45.4	205
	45.5	821
	45.5	411
	45.6	457
	46.2	1138
	46.8	524
	47.0	956
	47.8	151
	48.2	867
	48.3	1122
	48.9	882

APPENDIX G-2 (cont’d)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Mainline (cont’d)	48.9	33
	49.0	535
	49.0	657
	49.3	53
	50.1	153
	51.3	1202
	51.4	571
	51.7	310
	51.8	692
	51.8	673
	51.9	19
	52.0	887
	52.1	942
	52.1	1019
	52.2	544
	52.5	448
	52.6	335
	52.6	392
	52.8	268
	53.1	1066
	53.1	1066
	53.7	555
	53.8	403
	54.0	999
	54.2	142
	54.5	201
	54.7	989
	54.8	107
	55.1	151
	55.1	1275
	55.3	728
	55.5	862
	55.8	70
	55.8	1235
	55.8	319
	55.9	1094
	56.2	10
	56.3	631
	56.7	20
	56.8	500
	56.9	1041
	57.0	0
	57.5	723
	57.7	120
	58.0	1164
	58.1	555
	58.3	486
	58.3	533
	58.3	436
	58.7	1146
	58.9	1208
	59.0	1063
	59.0	271
	59.0	304

APPENDIX G-2 (cont'd)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Mainline (cont'd)	59.1	408
	59.2	379
	59.2	579
	59.8	489
	60.3	172
	60.6	1139
	61.2	1026
	61.9	432
	62.0	1189
	62.5	547
	62.7	775
	63.2	1079
	63.2	1111
	65.0	1044
	66.2	131
	66.6	272
	67.5	568
	68.2	996
	69.0	1057
	69.1	458
	69.2	67
	69.2	1212
	69.5	1220
	69.5	1264
	69.5	1188
	69.6	852
	70.1	384
	70.2	453
	70.5	93
	70.5	355
	70.5	827
	70.9	1112
	71.1	703
	71.2	1126
	71.2	197
	71.7	409
	71.9	645
	71.9	0
	72.0	696
	72.2	53
	72.5	1239
	72.9	734
	73.1	311
	73.1	986
	73.1	458
	73.2	103
	73.2	956
	73.3	507
	73.4	412
	73.5	334
	73.6	730
	73.7	224
	73.7	1264
	73.8	348

APPENDIX G-2 (cont'd)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Mainline (cont'd)	73.9	1015
	74.0	512
	74.0	523
	74.0	661
	74.6	325
	74.9	1254
	74.9	150
	74.9	0
	75.1	226
	75.1	879
	75.1	336
	75.1	36
	75.3	310
	75.3	285
	75.3	898
	75.4	0
	75.5	1003
	75.5	346
	75.6	587
	75.7	298
	75.8	434
	75.8	710
	75.8	1111
	75.8	618
	75.8	992
	75.9	763
	75.9	109
	76.0	963
	76.0	112
	76.1	529
	76.2	1186
	76.2	292
	76.2	155
	76.2	439
	76.4	856
	77.1	450
	77.8	703
	77.8	63
	77.8	583
	77.8	580
	77.9	584
	79.1	77
	80.8	992
	81.4	1067
	81.9	116
	83.0	328
	83.8	1248
	84.4	76
	84.4	310
	84.5	161
	84.5	402
	84.5	1042
	84.5	988
	84.5	1134

APPENDIX G-2 (cont'd)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Mainline (cont'd)	84.5	785
	84.5	861
	84.5	619
	84.5	696
	84.5	443
	84.5	548
	84.5	284
	85.2	625
	85.7	252
	85.8	489
	86.0	763
	86.1	108
	86.2	812
	87.3	805
	87.4	604
	87.9	389
	88.9	1286
	89.9	827
	91.2	282
	91.3	529
	91.4	0
	92.0	886
	92.2	976
	92.3	798
	93.0	1171
	95.4	1065
	95.5	12
	95.5	1174
	95.5	221
	101.0	954
	101.2	1016
	101.2	173
	101.2	332
	101.4	656
	101.7	91
	101.8	1243
	104.0	1259
	104.0	156
	104.2	962
	104.7	572
	105.1	396
	105.2	1290
	105.6	1025
	105.6	57
	106.0	839
	106.4	1113
	106.7	988
	106.8	950
	107.0	652
	107.2	623
	107.5	1151
	107.7	358
	108.4	1294
	108.8	786

APPENDIX G-2 (cont'd)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Mainline (cont'd)	126.5	212
	135.1	859
	135.5	816
	138.8	744
	139.0	524
	139.6	790
	139.9	515
	153.5	608
	156.1	764
	156.2	765
	164.2	608
	164.6	1237
	164.7	671
	165.1	953
	165.3	122
	166.1	1273
	167.2	166
	167.5	451
	167.5	925
	167.5	828
	173.2	1006
	173.3	969
	173.4	1047
	174.6	973
	174.7	860
	174.9	0
	174.9	480
	175.0	464
	175.0	80
	175.0	95
	194.9	374
Michigan		
Mainline	218.5	1241
	230.3	4
	230.3	254
	230.4	900
	230.4	370
	231.5	733
	231.8	146
	250.9	791
	254.8	247
Hanoverton Compressor Station (CS-1)	1.4	1000
Wadsworth Compressor Station (CS-2)	63.5	516
	63.5	1000
TEAL PROJECT		
Active or Inactive Wells		
Ohio		
Pipeline Loop	0.3	1212
	0.6	1199
	1.5	1031
	1.7	192
	3.3	1250
Connecting Pipeline	0.0 - 0.3 [a]	768
Colerain Compressor Station	49.9 [a]	106

APPENDIX G-2 (cont'd)

Oil and Gas Wells within 0.25 mile of the NGT and TEAL Projects

Project, Well Status, State, Component	Milepost (mile)	Distance to Project (feet)
Colerain Compressor Station (cont'd)	49.9 [a]	400
	49.9 [a]	610
	49.9 [a]	987
	49.9 [a]	569
	49.9 [a]	849
	49.9 [a]	779
	49.9 [a]	311
	49.9 [a]	1221
	49.9 [a]	271
	49.9 [a]	865
	49.9 [a]	630
	49.9 [a]	7
	49.9 [a]	321
	49.9 [a]	1071
	49.9 [a]	547
	49.9 [a]	950
	49.9 [a]	769
Line 73 Receiver Site	N/A [b]	1125
Line 73 Regulator	N/A [b]	1029

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[a] Line 73 Pipeline milepost designations are used.

[b] N/A means milepost information is not applicable for these TEAL components.

Sources: USGS, 2004. Michigan geologic map data. USGS, GIS datalayer. https://mrdata.usgs.gov/geology/state/state.php?state=MI

USGS, 2005. Ohio geologic map data. USGS, GIS datalayer: https://mrdata.usgs.gov/geology/state/state.php?state=OH

N/A = not applicable

APPENDIX H

WATER RESOURCES TABLES

- H-1: WATER SUPPLY WELLS AND SPRINGS WITHIN 150 FEET OF THE NGT AND TEAL PROJECTS
- H-2: WATERBODIES CROSSED BY THE NGT AND TEAL PROJECTS
- H-3: SURFACE PUBLIC WATER SUPPLY PROTECTION AREAS CROSSED BY THE NGT AND TEAL PROJECTS
- H-4: IMPAIRED SURFACE WATERS CROSSED BY THE NGT AND TEAL PROJECTS
- H-5: FEMA FLOOD ZONES CROSSED BY THE NGT PROJECT
- H-6: ATWS WITHIN 50 FEET OF WETLANDS AND WATERBODIES ON THE NGT AND TEAL PROJECTS

APPENDIX H-1

WATER SUPPLY WELLS AND SPRINGS WITHIN 150 FEET OF THE NGT AND TEAL PROJECTS

APPENDIX H-1

Water Supply Wells and Springs within 150 Feet of the NGT and TEAL Projects

Segment	County, State	Supply Type	Approximate Milepost	Approximate Distance from Construction Work Area (feet)
NGT Pipeline				
Mainline	Columbiana, OH	Agricultural/Irrigation Well	2.2	4
Mainline	Columbiana, OH	Domestic Well	2.2	61
Mainline	Columbiana, OH	Private Spring	3.5	97
Mainline	Columbiana, OH	Unspecified Well	7.1	150
Mainline	Columbiana, OH	Domestic Well	8.0	92
Mainline	Columbiana, OH	Domestic Well	10.5	0
Mainline	Columbiana, OH	Domestic Well	11.2	4
Mainline	Columbiana, OH	Private Well	11.4	18
Mainline	Stark, OH	Domestic Well	14.5	13
Mainline	Stark, OH	Domestic Well	18.3	0
Mainline	Stark, OH	Unspecified Well	18.6	7
Mainline	Stark, OH	Unspecified Well	18.6	82
Mainline	Stark, OH	Unspecified Well	19.6	2
Mainline	Stark, OH	Unspecified Well	23.6	117
Mainline	Stark, OH	Domestic Well	26.5	16
Mainline	Stark, OH	Domestic Well	30.3	94
Mainline	Stark, OH	Domestic Well	30.8	0
Mainline	Stark, OH	Domestic Well	30.9	94
Mainline	Stark, OH	Domestic Well	32.1	102
Mainline	Stark, OH	Unspecified Well	33.0	61
Mainline	Summit, OH	Domestic Well	35.0	0
Mainline	Summit, OH	Unspecified Well	36.8	3
Mainline	Summit, OH	Unspecified Well	36.8	65
Mainline	Columbiana, OH	Private Well[1]	36.8	16
Mainline	Summit, OH	Unspecified Well	37.8	1
Mainline	Summit, OH	Unspecified Well	38.3	0
Mainline	Summit, OH	Domestic Well	38.9	145
Mainline	Summit, OH	Unspecified Well	39.0	24
Mainline	Summit, OH	Unspecified Well	39.0	0
Mainline	Summit, OH	Unspecified Well	40.2	140
Mainline	Summit, OH	Private Well	40.2	37
Mainline	Summit, OH	Domestic Well	41.4	124
Mainline	Summit, OH	Domestic Well	41.5	34
Mainline	Summit, OH	Unspecified Well	41.6	117
Mainline	Summit, OH	Domestic Well	42.1	74
Mainline	Summit, OH	Domestic Well	42.2	0
Mainline	Summit, OH	Domestic Well	42.3	147
Mainline	Summit, OH	Unspecified Well	42.9	127
Mainline	Summit, OH	Unspecified Well	43.6	42
Mainline	Summit, OH	Unspecified Well	43.6	0
Mainline	Summit, OH	Unspecified Well	43.6	63
Mainline	Summit, OH	Private Well	43.7	41
Mainline	Summit, OH	Domestic Well	44.8	0
Mainline	Summit, OH	Unspecified Well	44.9	0
Mainline	Summit, OH	Domestic Well	44.9	79

APPENDIX H-1 (cont'd)

Water Supply Wells and Springs within 150 Feet of the NGT and TEAL Projects

Segment	County, State	Supply Type	Approximate Milepost	Approximate Distance from Construction Work Area (feet)
Mainline	Summit, OH	Domestic Well	46.2	25
Mainline	Summit, OH	Unspecified Well	46.2	106
Mainline	Summit, OH	Domestic Well	46.8	75
Mainline	Summit, OH	Unspecified Well	46.8	0
Mainline	Summit, OH	Private Well	48.0	143
Mainline	Summit, OH	Unspecified Well	49.4	90
Mainline	Summit, OH	Domestic Well	50.3	76
Mainline	Summit, OH	Unspecified Well	50.4	0
Mainline	Wayne, OH	Domestic Well	51.4	143
Mainline	Wayne, OH	Agricultural/Irrigation Well	52.0	85
Mainline	Wayne, OH	Private Well	52.9 [1]	0
Mainline	Wayne, OH	Domestic Well	53.0	0
Mainline	Wayne, OH	Domestic Well	53.0	94
Mainline	Wayne, OH	Private Spring	53.1 [1]	116
Mainline	Wayne, OH	Unspecified Well	53.6	0
Mainline	Wayne, OH	Unspecified Well	54.1	68
Mainline	Wayne, OH	Domestic Well	54.3	42
Mainline	Wayne, OH	Domestic Well	54.6	0
Mainline	Wayne, OH	Domestic Well	54.6	104
Mainline	Wayne, OH	Domestic Well	55.7	41
Mainline	Wayne, OH	Unspecified Well	55.7	0
Mainline	Wayne, OH	Unspecified Well	55.7	116
Mainline	Wayne, OH	Unspecified Well	55.7	88
Mainline	Wayne, OH	Unspecified Well	55.7	88
Mainline	Wayne, OH	Unspecified Well	56.5	118
Mainline	Wayne, OH	Unspecified Well	56.5	118
Mainline	Wayne, OH	Unspecified Well	56.5	118
Mainline	Wayne, OH	Unspecified Well	56.5	118
Mainline	Wayne, OH	Private Well	56.5 [1]	35
Mainline	Medina, OH	Domestic Well	56.6	148
Mainline	Wayne, OH	Unspecified Well	57.2	108
Mainline	Wayne, OH	Unspecified Well	57.2	108
Mainline	Wayne, OH	Unspecified Well	57.2	108
Mainline	Wayne, OH	Unspecified Well	57.2	108
Mainline	Wayne, OH	Unspecified Well	57.2	108
Mainline	Wayne, OH	Domestic Well	57.2	108
Mainline	Wayne, OH	Unspecified Well	57.2	31
Mainline	Wayne, OH	Unspecified Well	57.2	31
Mainline	Wayne, OH	Unspecified Well	57.2	31
Mainline	Wayne, OH	Unspecified Well	57.2	31
Mainline	Wayne, OH	Unspecified Well	57.2	31
Mainline	Wayne, OH	Unspecified Well	57.2	31
Mainline	Wayne, OH	Unspecified Well	57.3	136
Mainline	Medina, OH	Domestic Well	62.6	30
Mainline	Medina, OH	Domestic Well	64.2	0
Mainline	Medina, OH	Domestic Well	67.0	54
Mainline	Medina, OH	Domestic Well	67.1	93

APPENDIX H-1 (cont'd)

Water Supply Wells and Springs within 150 Feet of the NGT and TEAL Projects

Segment	County, State	Supply Type	Approximate Milepost	Approximate Distance from Construction Work Area (feet)
Mainline	Medina, OH	Domestic Well	67.3	70
Mainline	Medina, OH	Unspecified Well	68.3	139
Mainline	Medina, OH	Unspecified Well	68.8	121
Mainline	Medina, OH	Unspecified Well	69.3	15
Mainline	Medina, OH	Unspecified Well	72.6	41
Mainline	Medina, OH	Unspecified Well	77.0	0
Mainline	Medina, OH	Unspecified Well	78.1	0
Mainline	Lorain, OH	Private Well	84.4[1]	86
Mainline	Lorain, OH	Private Well	84.5[1]	150
Mainline	Lorain, OH	Unspecified Well	88.2	103
Mainline	Lorain, OH	Private Well	92.6[1]	81
Mainline	Lorain, OH	Private Well	99.3[1]	21
Mainline	Lorain, OH	Private Spring	99.3[1]	25
Mainline	Lorain, OH	Unspecified Well	99.9	69
Mainline	Huron, OH	Unspecified Well	102.4	140
Mainline	Erie, OH	Unspecified Well	111.2	61
Mainline	Erie, OH	Dry/No Water	114.7	124
Mainline	Erie, OH	Dry/No Water	114.7	76
Mainline	Erie, OH	Unspecified Well	115.0	0
Mainline	Erie, OH	Unspecified Well	118.3	124
Mainline	Erie, OH	Unspecified Well	123.2	88
Mainline	Erie, OH	Unspecified Well	125.8	72
Mainline	Erie, OH	Private Well	125.9	93
Mainline	Erie, OH	Unspecified Well	127.7	0
Mainline	Erie, OH	Unspecified Well	128.8	38
Mainline	Erie, OH	Unspecified Well	129.8	0
Mainline	Erie, OH	Unspecified Well	130.7	77
Mainline	Sandusky, OH	Domestic Well	134.1	0
Mainline	Sandusky, OH	Domestic Well	134.1	0
Mainline	Sandusky, OH	Domestic Well	134.1	0
Mainline	Sandusky, OH	Unspecified Well	139.2	82
Mainline	Sandusky, OH	Unspecified Well	145.3	116
Mainline	Sandusky, OH	Unspecified Well	145.3	145
Mainline	Sandusky, OH	Unspecified Well	146.2	135
Mainline	Sandusky, OH	Unspecified Well	146.5	94
Mainline	Sandusky, OH	Unspecified Well	146.5	94
Mainline	Sandusky, OH	Unspecified Well	146.5	94
Mainline	Sandusky, OH	Unspecified Well	146.5	94
Mainline	Sandusky, OH	Unspecified Well	146.5	94
Mainline	Sandusky, OH	Unspecified Well	146.5	94
Mainline	Sandusky, OH	Unspecified Well	146.5	94
Mainline	Sandusky, OH	Unspecified Well	146.5	94
Mainline	Sandusky, OH	Unspecified Well	146.5	94
Mainline	Sandusky, OH	Unspecified Well	146.5	94
Mainline	Sandusky, OH	Unspecified Well	146.5	94
Mainline	Sandusky, OH	Unspecified Well	146.5	94
Mainline	Sandusky, OH	Unspecified Well	146.5	94

APPENDIX H-1 (cont'd)

Water Supply Wells and Springs within 150 Feet of the NGT and TEAL Projects

Segment	County, State	Supply Type	Approximate Milepost	Approximate Distance from Construction Work Area (feet)
Mainline	Sandusky, OH	Unspecified Well	146.5	94
Mainline	Sandusky, OH	Unspecified Well	147.4	64
Mainline	Sandusky, OH	Domestic Well	147.7	112
Mainline	Sandusky, OH	Unspecified Well	154.8	115
Mainline	Sandusky, OH	Domestic Well	157.5	121
Mainline	Sandusky, OH	Unspecified Well	161.8	38
Mainline	Sandusky, OH	Domestic Well	163.7	132
Mainline	Wood, OH	Unspecified Well	163.7	113
Mainline	Wood, OH	Unspecified Well	167.2	59
Mainline	Lucas, OH	Domestic Well	187.9	0
Mainline	Lucas, OH	Domestic Well	188.4	0
Mainline	Lucas, OH	Domestic Well	188.4	0
Mainline	Lucas, OH	Unspecified Well	188.8	0
Mainline	Lucas, OH	Domestic Well	189.3	117
Mainline	Fulton, OH	Unspecified Well	194.8	149
Mainline	Fulton, OH	Unspecified Well	194.8	131
Mainline	Fulton, OH	Domestic Well	195.6	91
Mainline	Fulton, OH	Domestic Well	195.6	86
Mainline	Fulton, OH	Unspecified Well	196.2	141
Mainline	Fulton, OH	Unspecified Well	196.2	141
Mainline	Lenawee, MI	Unspecified Well	227.6	0
Mainline	Lenawee, MI	Unspecified Well	228.1	0
Mainline	Monroe, MI	Unspecified Well	231.3	102
Mainline	Monroe, MI	Unspecified Well	232.5	124
Mainline	Monroe, MI	Unspecified Well	233.1	69
Mainline	Monroe, MI	Unspecified Well	236.3	126
Mainline	Washtenaw, MI	Unspecified Well	237.6	99
Mainline	Washtenaw, MI	Unspecified Well	239.3	137
Mainline	Washtenaw, MI	Unspecified Well	245.1	0
Mainline	Washtenaw, MI	Unspecified Well	245.2	0
Mainline	Washtenaw, MI	Unspecified Well	245.2	0
Mainline	Washtenaw, MI	Private Well	246.6	43
Mainline	Washtenaw, MI	Unspecified Well	246.6	46
Mainline	Washtenaw, MI	Private Well	247.4	73
Mainline	Washtenaw, MI	Unspecified Well	250.5	0
Mainline	Washtenaw, MI	Unspecified Well	250.5	0
Mainline	Washtenaw, MI	Unspecified Well	250.6	0
Mainline	Washtenaw, MI	Unspecified Well	253.7	0
Mainline	Washtenaw, MI	Unspecified Well	253.9	55
Mainline	Washtenaw, MI	Unspecified Well	253.9	0
Mainline	Washtenaw, MI	Unspecified Well	254.9	62
NGT Aboveground Facilities				
Hanoverton CS	Columbiana, OH	Unspecified Well	1.3	62
Wadsworth CS	Medina, OH	Unspecified Well	63.5	139
Wadsworth CS	Medina, OH	Unspecified Well	63.5	119
Wadsworth CS	Medina, OH	Domestic Well	63.5	61
Clyde CS	Sandusky, OH	Unspecified Well	134.1	0

APPENDIX H-1 (cont'd)

Water Supply Wells and Springs within 150 Feet of the NGT and TEAL Projects

Segment	County, State	Supply Type	Approximate Milepost	Approximate Distance from Construction Work Area (feet)
Clyde CS	Sandusky, OH	Domestic Well	134.1	55
MR04	Washtenaw, MI	Unspecified Well	255.0	0
NGT Contractor Wareyards				
Wareyard 1-1	Stark, OH	Domestic Well	23.0	0
Wareyard 3-1a	Wood, OH	Unspecified Well	176.7	0
Wareyard 3-2	Lucas, OH	Domestic Well	186.6	84
Wareyard 3-2	Lucas, OH	Unspecified Well	186.7	0
Wareyard 4-1	Lenawee, MI	Unspecified Well	228.6	0
Wareyard 4-1	Monroe, MI	Unspecified Well	228.7	88
Wareyard 4-1	Monroe, MI	Unspecified Well	228.8	83
NGT Staging Areas				
Staging Area-57	Stark, OH	Unspecified Well	13.5	115
Staging Area-17	Stark, OH	Unspecified Well	15.3	111
Staging Area-1	Summit, OH	Domestic Well	41.4	125
Staging Area-34	Wayne, OH	Unspecified Well	53.7	84
Staging Area-11	Medina, OH	Unspecified Well	68.4	96
Staging Area-11	Medina, OH	Unspecified Well	68.4	17
Staging Area-93	Sandusky, OH	Unspecified Well	133.3	133
Staging Area-96	Fulton, OH	Unspecified Well	200.8	0
NGT Access Roads				
TAR-7.3	Columbiana, OH	Private Well	7.3	14
TAR-13.5	Stark, OH	Unspecified Well	13.5	61
TAR-15.4	Stark, OH	Unspecified Well	15.4	149
TAR-18.6	Stark, OH	Unspecified Well	18.7	99
TAR-18.6	Stark, OH	Unspecified Well	18.7	85
TAR-18.6	Stark, OH	Unspecified Well	18.7	81
TAR-18.6	Stark, OH	Unspecified Well	18.7	74
TAR-18.6	Stark, OH	Unspecified Well	18.7	72
TAR-18.6	Stark, OH	Unspecified Well	18.7	72
TAR-18.6	Stark, OH	Unspecified Well	18.7	72
TAR-18.6	Stark, OH	Unspecified Well	18.7	53
TAR-18.6	Stark, OH	Domestic Well	18.7	64
TAR-18.6	Stark, OH	Unspecified Well	18.7	64
TAR-18.6	Stark, OH	Domestic Well	18.7	38
TAR-18.6	Stark, OH	Unspecified Well	18.7	42
TAR-18.6	Stark, OH	Unspecified Well	18.7	0
TAR-18.6	Stark, OH	Unspecified Well	18.7	0
TAR-22.9	Stark, OH	Unspecified Well	22.9	125
TAR-33.5 R	Stark, OH	Unspecified Well	33.6	62
TAR-40.8 R	Summit, OH	Unspecified Well	40.5	103
TAR-40.8 R	Summit, OH	Unspecified Well	40.5	31
TAR 43.7 R	Summit, OH	Unspecified Well	43.6	139
TAR 43.7 R	Summit, OH	Unspecified Well	43.6	11
TAR 43.7 R	Summit, OH	Domestic Well	43.6	47
TAR 43.7 R	Summit, OH	Unspecified Well	43.7	0
TAR-43.3	Summit, OH	Private Well	43.7	17
TAR-44.3	Summit, OH	Unspecified Well	44.4	72

APPENDIX H-1 (cont'd)

Water Supply Wells and Springs within 150 Feet of the NGT and TEAL Projects

Segment	County, State	Supply Type	Approximate Milepost	Approximate Distance from Construction Work Area (feet)
TAR-48.5	Summit, OH	Domestic Well	48.5	141
TAR-48.5	Summit, OH	Unspecified Well	48.8	15
TAR-48.5	Summit, OH	Unspecified Well	48.8	17
TAR-53.5	Wayne, OH	Unspecified Well	53.5	3
TAR-56.2	Medina, OH	Unspecified Well	56.2	114
TAR-63.1	Medina, OH	Domestic Well	63.0	108
TAR-66.4	Medina, OH	Unspecified Well	66.4	101
TAR-68.6	Medina, OH	Unspecified Well	68.4	100
TAR-73.1	Medina, OH	Unspecified Well	73.2	30
TAR-76.8a	Medina, OH	Unspecified Well	77.0	120
TAR-92.2	Lorain, OH	Unspecified Well	92.2	11
TAR-92.2	Lorain, OH	Unspecified Well	92.2	46
PAR-128.8	Erie, OH	Unspecified Well	128.8	0
TAR-163.9	Wood, OH	Domestic Well	163.9	63
TAR-173.9	Wood, OH	Unspecified Well	173.9	144
TAR-200.7	Fulton, OH	Unspecified Well	200.6	83
TAR-237.2	Washtenaw, MI	Unspecified Well	237.1	107
TAR-237.2	Washtenaw, MI	Unspecified Well	237.1	145
TEAL Pipeline				
Loopline	Monroe, OH	Private Well	1.3	0
Loopline	Monroe, OH	Private Spring	3	0
Loopline	Monroe, OH	Private Spring	3	40
Loopline	Monroe, OH	Private Spring	3.9	5

Sources: Ohio: ODNR, 2016b; OEPA Source Water Assessment and Protection Program; and field surveys.
Michigan: Michigan Department of Technology, Management, & Budget, 2016; MDEQ MDE Wellhead Protection Program; and field surveys.

APPENDIX H-2

WATERBODIES CROSSED BY THE NGT AND TEAL PROJECTS

APPENDIX H-2

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
NGT PROJECT									
Mainline									
Columbiana County, OH									
B15-17-S3	Tributary to Brush Creek	0.1	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	5	N/A
B15-17-S4	Tributary to Brush Creek	0.1	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3	N/A
B15-17-S2	Tributary to Brush Creek	0.1	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	4	Wet Cut
B15-28-S1	Tributary to Sandy Creek	0.7	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	2	Wet Cut
B15-29-S1	Tributary to Sandy Creek	1.0	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
A14-5-S4	Tributary to Sandy Creek	2.0	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	12	Bore
A14-5-S3	Tributary to Sandy Creek	2.2	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	4	Dry Cut
A14-8-S1	Tributary to Sandy Creek	3.9	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	9	Dry Cut
A14-10-S1	Conser Run	4.9	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	20	Bore
A14-10-S2	Tributary Conser Run	5.0	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	2	N/A
A14-11-S1	Tributary to Conser Run	5.3	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	5	Wet Cut
A14-126-S1	Tributary to Conser Run	5.6	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3	Wet Cut
A14-127-S1	Tributary to Conser Run	5.7	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3	Wet Cut
A14-12-S1	Tributary to Conser Run	6.5	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	3	Dry Cut
B15-33-S1	Tributary to Lake Placentia	7.7	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	5	Wet Cut
A14-196-S1	Tributary to Middle Branch Sandy Creek	9.8	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
A14-13-S1	Tributary to Middle Branch Sandy Creek	10.1	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	2	Wet Cut
A14-15-S1	Tributary to Middle Branch Sandy Creek	10.6	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	4	Dry Cut
C15-65-S1	Tributary to Middle Branch Sandy Creek	11.0	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	8	Dry Cut
A15-34-S1	Tributary to Middle Branch Sandy Creek	11.2	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	4	Bore
A15-34-S2	Sandy Creek	11.2	Perennial	Minor	WWF	AWS and IWS	Primary Contact B	7	Bore
A14-17-S4	Tributary to Middle Branch Sandy Creek	11.8	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	3	Dry Cut
A14-165-S2	Tributary to Woodland Lake	12.3	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	6	Dry Cut
A14-165-S1	Tributary to Woodland Lake	12.3	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	5	Dry Cut

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
Stark County, OH									
B15-63-S1	Tributary to Middle Branch Sandy Creek	13.4	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	4	Dry Cut
B15-66-S1	Tributary to Middle Branch Sandy Creek	13.7	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3.5	Wet Cut
A15-47-S1	Tributary to Middle Branch Sandy Creek	13.9	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3	Dry Cut
B15-54-S2	Tributary to Middle Branch Sandy Creek	14.0	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	1.3	Wet Cut
C15-92-S1	Tributary to Beech Creek	15.3	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	3	N/A
C15-116-S3	Tributary to Beech Creek	16.8	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	5	Dry Cut
C15-116-S5	Tributary to Beech Creek	16.8	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3	N/A
C15-116-S2	Beech Creek	17.1	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Dry Cut
C15-116-S1	Tributary to Beech Creek	17.2	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	10	Wet Cut
A14-105-S1	Tributary to Beech Creek	17.8	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	3	Bore
A14-103-S1	Tributary to Beech Creek	18.2	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	5	Wet Cut
C15-87-S1	Tributary to Beech Creek	19.4	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	22	N/A
C15-87-S2	Tributary to Beech Creek	19.4	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	5	Wet Cut
A15-36-S1	Tributary to Red Pine Lake	20.5	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
A15-36-S2	Tributary to Red Pine Lake	20.5	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	4	N/A
A14-25-S1	Middle Branch Nimishillen Creek	21.8	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
B15-41-S1	Tributary to Middle Branch Nimishillen Creek	22.0	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	3.5	Bore
B15-40-S1	Tributary to Middle Branch Nimishillen Creek	22.3	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	4	Bore
A14-175-S1	Tributary to Middle Branch Nimishillen Creek	22.8	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
A14-174-S1	Tributary to Middle Branch Nimishillen Creek	23.0	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	4	Wet Cut
A14-27-S1	Tributary to Middle Branch Nimishillen River	24.1	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	3	Wet Cut
A14-161-S1	Tributary to Middle Branch Nimishillen Creek	24.6	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	28	Dry Cut
A14-161-S2	Tributary to Middle Branch Nimishillen River	24.6	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	6	Dry Cut

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
A14-31-S1	Tributary to Middle Branch Nimishillen Creek	25.8	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
A14-100-S1	Tributary to Nimishillen Creek	26.7	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	3	Wet Cut
B15-75-S1	Middle Branch Nimishillen Creek	26.8	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	3.8	Dry Cut
B15-45-S1	Tributary to Swartz Ditch	27.7	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Wet Cut
A14-168-S1	Tributary to West Branch Nimishillen Creek	28.9	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	8	Wet Cut
B15-98-S1	Tributary to West Branck Nimishillen Creek	29.0	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	4	Wet Cut
B15-101-S1	Tributary to West Branch Nimishillen Creek	29.3	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Dry Cut
B15-103-S1	Tributary to West Branch Nimishillen Creek	29.6	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	30	Dry Cut
A14-157-S1	Tributary to West Branch Nimishillen Creek	30.3	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	10	Wet Cut
A14-159-S1	Tributary to West Branch Nimishillen Creek	30.7	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
A14-158-S1	Tributary to West Branch Nimishillen Creek	30.9	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Dry Cut
A14-162-S1	Tributary to West Branch Nimishillen Creek	31.5	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
A14-163-S1	Tributary to West Branch Nimishillen Creek	31.6	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	4	Dry Cut
A14-164-S2	West Branch Nimishillen Creek	32.0	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	16	Dry Cut
A14-164-S1	Tributary to West Branch Nimishillen Creek	32.2	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	22	Dry Cut
A15-68-S1	Tributary to Tuscarawas River	33.8	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	20	Dry Cut
Summit County, OH									
A15-71-S1	Tributary to Tuscarawas River	34.7	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	5	Wet Cut
AS-SU-210	Tributary to Tuscarawas River	34.9	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
B15-68-S1	Tributary to Tuscarawas River	35.1	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	8	Dry Cut
AS-SU-401	Tributary to Tuscarawas River	36.1	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	18	Dry Cut
C15-106-S1	Tributary to Willowdale Lake	36.8	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	3	Wet Cut
B15-108-WB1	Tributary to Willowdale Lake	36.9	Pond	Intermediate	WWH	AWS and IWS	Primary Contact B	27	N/A
C15-122-S1	Tributary to Willowdale Lake	37.1	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3	Wet Cut
C15-120-S1	Tributary to Willowdale Lake	37.5	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	5	Dry Cut
C15-113-S1	Tributary to Singer Lake	38.7	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	1	Wet Cut
F15-1-S1	Tributary to Nimisila Reservoir	39.4	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	7	Dry Cut
A14-112-S1	Tributary to Nimisila Reservoir	39.5	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	5	Dry Cut
A14-112-S1A	Tributary to Nimisila Reservoir	39.9	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
AP-SU-336	Tributary to Nimisila Reservoir	40.6	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	25	N/A
AS-SU-200	Nimisila Reservoir	41.1	Reservoir	Major	WWH	AWS and IWS	Primary Contact B	650	HDD
A14-122-S2	Nimisilla Creek	41.7	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	80	Dry Cut
A14-122-S4	Tributary to Nimisila Creek	41.7	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3	N/A
A14-122-S3	Tributary to Nimisilla Creek	41.7	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	30	N/A
A14-122-S5	Tributary to Nimisila Creek	41.9	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	5	Dry Cut
A14-122-S1	Tributary to Nimisila Creek	42.0	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	4	Wet Cut
AS-SU-18	Tributary to Nimisila Creek	42.5	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	11	Wet Cut
A14-117-S1	Tributary to Nimisila Creek	43.3	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Wet Cut
A15-16-S2	Tributary to Nimisila Creek	43.8	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	3	N/A
A15-95-S1/ AS-SU-22	Tributary to Nimisila Creek	43.9	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	2.5	Wet Cut
C15-102-S1	Tributary to Nimisila Creek	44.1	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	13	Dry Cut
AS-SU-29	Tributary to Tuscarawas River	45.9	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	5	Wet Cut
A14-119-S1	Tributary to Tuscarawas River	46.4	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	2.5	Wet Cut
C15-25-S1	Tributary to Tuscarawas River	46.8	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	6	Dry Cut

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
A15-13-S1	Tributary to Tuscarawas River	46.8	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	4	N/A
A15-14-S1	Tributary to Tuscarawas River	47.0	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	8	Wet Cut
C15-28-S1	Tuscarawas River	48.1	Perennial	Intermediate	MWH	AWS and IWS	Primary Contact A	83	HDD
AS-SU-40	Pancake Creek	48.9	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	24	Dry Cut
AS-SU-43	Tributary to Willowdale Lake	49.2	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	5	Wet Cut
A14-41-S3	Tributary to Pancake Creek	49.6	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	4.5	Wet Cut
A14-41-S2	Tributary to Pancake Creek	49.8	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3	Wet Cut
A14-41-S1	Tributary to Pancake Creek	50.0	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	4	Dry Cut
A14-42-S1	Tributary to Pancake Creek	50.1	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3	Wet Cut
A14-42-S2	Tributary to Pancake Creek	50.1	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	2	Wet Cut
Wayne County, OH									
A15-20-S1	Tributary to Pancake Creek	50.5	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
A15-21-S2	Tributary to Silver Creek	51.5	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3	N/A
A15-21-S1	Tributary to Silver Creek	51.6	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	2	Wet Cut
C15-34-S1	Tributary to Silver Creek	52.2	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	8	Wet Cut
A14-124-S2	Tributary to Silver Creek	52.6	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	7	Dry Cut
A14-124-S1	Silver Creek	52.6	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	12	Dry Cut
A15-52-S5	Tributary to Silver Creek	52.8	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	18	Dry Cut
A15-52-S1	Tributary to Silver Creek	52.8	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	1.5	Dry Cut
A15-53-S1	Tributary to Silver Creek	53.0	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	5	Dry Cut
A15-54-S1	Tributary to Silver Creek	53.0	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	7	N/A
B15-91-S1	Tributary to Silver Creek	53.5	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	3	Bore
B15-47-S1	Tributary to Mill Creek	54.9	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	17	Dry Cut
A15-41-S1	Mill Creek	55.3	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
Medina County, OH									
B15-49-S1	Tributary to River Styx	57.2	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	4	Bore
Wayne County, OH									
B15-50-S3	Tributary to River Styx	57.2	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	3.5	Bore
B15-50-S2	Tributary to River Styx	57.3	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	3.5	Dry Cut
AS-WA-603	NA	57.3	NA	NA	NA	NA	NA	0	NA
B15-50-S1	Tributary to Styx River	57.4	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	8	Bore
B15-51-S1	Styx River	57.6	Perennial	Intermediate	MWH	AWS and IWS	Primary Contact B	28	Dry Cut

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
Medina County, OH									
B15-53-S1	Tributary to Styx River	57.7	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	7	Bore
B14-7-S1	Tributary to Styx River	58.4	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
A14-44-S1	Tributary to Styx River	59.3	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	5	N/A
B15-02-S1	Tributary to Styx River	59.9	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	5	Dry Cut
A14-39-S1	Tommy Run	60.7	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
A14-40-S1	Tributary to Tommy Run	60.9	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	8	Dry Cut
A14-40-S2	Tributary to Tommy Run	60.9	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	2	Wet Cut
A14-116-S2	Tributary to Hubbard Creek	65.3	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Wet Cut
A14-116-S5	Tributary to Hubbard Creek	65.4	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	4	Wet Cut
AS-ME-24	Tributary to Hubbard Creek	66.0	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	8	Bore
B14-4-S1	Tributary to Hubbard Creek	66.2	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
AS-ME-27	Tributary to Chippewa Creek	67.4	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	17	Wet Cut
AS-ME-30	Tributary to Chippewa Creek	67.6	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Wet Cut
AS-ME-31	Tributary to Chippewa Creek	67.6	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	5	Wet Cut
AS-ME-31A	Tributary to Chippewa Creek	67.7	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	5	Wet Cut
B15-82-S1	Tributary to Chippewa Creek	67.9	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
AS-ME-34	Tributary to Chippewa Creek	68.1	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	21	Dry Cut
A15-3-S1	McCabe Creek	68.8	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Dry Cut
C15-41-S1	Tributary to The Inlet	69.7	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Dry Cut
C15-6-S2	Tributary to The Inlet	69.9	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	17	Wet Cut
C15-6-S1	Tributary to The Inlet	70.0	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	23	Wet Cut
C15-42-S1	The Inlet	70.8	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	21	Bore
A15-72-S1	Tributary to The Inlet	70.9	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	6	Bore
C15-44-S1	Tributary to the Inlet	71.1	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	13	HDD
A14-46-S2	Tributary to the Inlet	71.3	Ephemeral	Intermediate	WWH	AWS and IWS	Primary Contact B	13	HDD
A14-46-S1	Tributary to the Inlet	71.4	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	13	HDD
B15-120-S1	NA	72.8	NA	NA	NA	NA	NA	0	NA
C15-24-S1	Tributary to Mallet Creek	72.9	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	20	Dry Cut

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
C15-24-S7	Tributary to Mallet Creek	73.3	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	1.5	Wet Cut
C15-24-S7	Tributary to Mallet Creek	73.3	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	1.5	Wet Cut
C15-24-S8	Tributary to Mallet Creek	73.4	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	4	Wet Cut
C15-24-S1-3	Mallet Creek	73.4	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Dry Cut
C15-24-S1-3	Mallet Creek	73.5	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Dry Cut
AS-ME-56	Tributary to Mallet Creek	73.7	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	10	Bore
AS-ME-58A	Tributary to Mallet Creek	73.9	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	14	Dry Cut
B15-84-S1	Tributary to Mallet Creek	74.0	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	11	Dry Cut
B15-84-S2	Tributary to Mallet Creek	74.0	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	5	N/A
B14-9-S1	Tributary to Mallet Creek	74.3	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	4	N/A
B14-10-S1	Tributary to Mallet Creek	75.4	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	2	Wet Cut
B15-74-S3	Tributary to Mallet Creek	75.8	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	8	Wet Cut
B15-74-S1	Mallet Creek	76.0	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	30	Dry Cut
B15-74-S4	Tributary to Mallet Creek	76.3	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	5	Wet Cut
A15-76-S1	Tributary to Mallet Creek	76.9	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	5	Wet Cut
A15-76-S2	Tributary to Mallet Creek	77.0	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	20	Dry Cut
AS-ME-200	Tributary to Mallet Creek	78.0	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	6	Bore
AS-ME-96	Tributary to West Branch Rocky River	78.9	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	14	Dry Cut
B15-85-S1	Tributary to West Branch Rocky River	79.1	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	6	Bore
AS-ME-98	Tributary to West Branch Rocky River	79.4	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	5	Wet Cut
AS-ME-99	Tributary to West Branch Rocky River	79.5	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	5	Wet Cut
AS-LO-1	Tributary to East Branch Black River	80.3	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	19	Dry Cut
B15-15-S1	Tributary to East Branch Black River	80.4	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	2	Dry Cut
Lorain County, OH									
A15-28-S1	Tributary to East Branch Black River	81.4	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
A14-59-S1	Tributary to East Branch Black River	82.0	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	2	N/A
A14-69-S6	Tributary to Salt Creek	84.3	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	5	N/A

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
A14-69-S4	Salt Creek	84.4	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	25	Dry Cut
A15-56-S1	Tributary to East Branch Black River	85.8	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	8	Wet Cut
A15-63-S1	Tributary to East Branch Black River	86.0	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	12	Bore
A14-50-S1	East Branch Black River	86.7	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact A	65	HDD
B15-61-S1	Tributary to Finnegan Ditch	87.1	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	9	Bore
A14-55-S1	Tributary to Dent Ditch	87.3	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	5	Wet Cut
B15-96-S1	Tributary to Dent Ditch	88.0	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	10	Wet Cut
B15-97-S1	Tributary to Dent Ditch	88.2	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	4	Bore
A14-73-S1	King Ditch	88.6	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	7	Dry Cut
A14-128-S1	Tributary to King Ditch	89.2	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	3	Bore
A14-75-S1	Tributary to King Ditch	89.3	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3	Bore
A14-75-S2	Tributary to King Ditch	89.3	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	8	Wet Cut
A14-76-S1	Kelner Ditch	90.1	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Dry Cut
A14-76-S2	Tributary to Kelner Ditch	90.1	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	1.5	N/A
AS-LO-402	Tributary to Elk Creek	91.2	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	2	Wet Cut
C15-37-S1	Elk Creek	91.3	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	20	Dry Cut
C15-35-S1	Wellington Creek	91.8	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	50	Dry Cut
C15-8-S2	Tributary to West Branch Black River	92.3	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	9	HDD
C15-8-S3	Tributary to West Branch Black River	92.3	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	55	HDD
C15-8-S4	West Branch Black River	92.4	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact A	45	HDD
C15-9-S1	Tributary to West Branch Black River	92.6	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	25	Dry Cut
A14-140-S1	Tributary to West Branch Black River	93.4	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	2	Bore
A14-141-S1	Plum Creek	96.1	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
C15-57-S1	Tributary to Plum Creek	97.3	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	2	Wet Cut
C15-61-S1	Tributary to East Fork Vermilion River	98.3	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	12	Wet Cut
A15-85-S1	Tributary to East Fork Vermillion River	98.9	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	3	Wet Cut

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
A15-85-S2	Tributary to East Fork Vermillion River	98.9	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	2	Wet Cut
C15-66-S1	East Fork Vermilion River	99.3	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	40	Dry Cut
C15-67-S1	Frankenburg Creek	101.3	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Bore
Huron County, OH									
C15-100-S1	Tributary to East Fork Frankenburg Creek	101.7	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	12	Wet Cut
C15-101-S1	Tributary to East Fork Frankenburg Creek	101.9	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	9	Wet Cut
A15-57-S1	Tributary to East Fork Frankenburg Creek	102.3	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	8	Wet Cut
C15-88-S1	Tributary to Frankenburg Creek	103.0	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Dry Cut
C15-56-S1	Tributary to Vermillion River	104.2	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	8	HDD
C15-56-S4, C15-56-S4B	Vermillion River	104.4	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact A	66, 60	HDD
C15-56-S4A	Tributary to Vermillion River	104.5	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	40	HDD
Erie County, OH									
C15-69-S1	Chappel Creek	105.9	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	34	Dry Cut
B15-115-S1	NA	110.3	NA	NA	NA	NA	NA	0	NA
B15-124-S1	Tributary to Old Woman Creek	112.1	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	12	Bore
B15-124-S2	Tributary to Old Woman Creek	112.1	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	12	Bore
AS-ER-35	Tributary to Old Woman Creek	113.0	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	3	Wet Cut
A14-187-S1	Old Woman Creek	113.1	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	28	Dry Cut
A14-188-S1	Tributary to Old Woman Creek	113.3	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
A14-188-S2	Tributary to Old Woman Creek	113.3	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	5	N/A
AS-ER-12	Tributary to Old Woman Creek	113.8	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	33	Dry Cut
B15-07-S1	Tributary to Old Woman Creek	114.3	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
C15-14-S1	Tributary to Huron River	115.4	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	4	Wet Cut

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
C15-15-S1	Tributary to Huron River	115.7	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	30	Dry Cut
B15-09-S1	Tributary to Huron River	116.0	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	10	Wet Cut
C15-17-S1	Tributary to Huron River	116.1	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	2	Wet Cut
C15-16-S1	Tributary to Huron River	116.2	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
A14-156-S2	Tributary to Huron River	116.5	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	5	
A14-155-S1	Tributary to Huron River	116.5	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Bore
A14-186-S1, AS-ER-19	Huron River	116.9	Perennial	Major	WWH	AWS and IWS	Primary Contact A	195	HDD
AS-ER-20A	Tributary to Huron River	117.0	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	3	HDD
AS-ER-20	Tributary to Huron River	117.1	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3	HDD
C15-20-S1	Tributary to Mud Brook	117.6	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	18	Dry Cut
C15-18-S1	Tributary to Mud Brook	118.4	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	18	Wet Cut
B15-11-S1	Tributary to Mud Brook	118.8	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	5	Dry Cut
E14-97-S1	Mud Creek	119.0	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	19	Dry Cut
C15-21-S1	Zorn Beutal Ditch	120.0	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	18	Dry Cut
C15-22-S1	Sheerer Ditch	120.4	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	28	Dry Cut
C15-74-S1	Tributary to Sheerer Ditch	120.5	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	4	Wet Cut
B15-12-S1	Sherer Ditch	120.9	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	2	Bore
B15-13-S1	Sherer Ditch	122.0	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	5	Bore
AS-ER-205	Tributary to Sawmill Creek	122.1	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	5	Dry Cut
E14-96-S1	Tributary to Sherer Ditch	123.1	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
A15-62-S1	Tributary to Pipe Creek	124.0	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	4	Dry Cut
C15-23-S1	Tributary to Pipe Creek	125.7	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	6.5	Wet Cut
E14-95-S1	Pipe Creek	125.9	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
E14-49-S1	Tributary to Pipe Creek	127.4	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	5	Wet Cut
E14-50-S1	Tributary to Mills Creek	127.9	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	10	Wet Cut
E14-51-S1	Tributary to Mills Creek	128.4	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Bridge
E14-94-S1	Mills Creek	129.3	Perennial	Intermediate	WWH	AWS and IWS	Secondary Contact	30	Dry Cut
Sandusky County, OH									
D15-74-S1	Scherz Ditch	134.3	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	14	Dry Cut
D14-4-S1	Strong Creek	135.3	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Dry Cut
D14-6-S1	Fuller Creek	136.0	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	13	N/A
D14-7-S1	Tributary to Fuller Creek	136.4	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	6	Bore
D15-49-S1	Tributary to Fuller Creek	136.9	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Wet Cut

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
E14-105-S1	Pickerel Creek	138.0	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	18	Dry Cut
D14-9-S1	Little Raccoon Creek	138.7	Perennial	Minor	WWH	AWS and IWS	Secondary Contact	10	Dry Cut
D14-10-S1	Tributary to Little Racoon Creek	139.1	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
D14-8-S1	Raccoon Creek	139.9	Perennial	Intermediate	WWH	AWS and IWS	Secondary Contact	30	Dry Cut
D14-8-S2	Tributary to Raccoon Creek	139.9	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	2	N/A
E14-103-S1	South Creek	140.5	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	22	Dry Cut
D15-31-S1	Tributary to South Creek	141.2	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	18	Dry Cut
D14-11-S1	Green Creek	141.7	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	35	Dry Cut
D15-115-S1	Tributary to Buehler Creek	142.7	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Wet Cut
E14-36-S1	Tributary to Buehler Ditch	143.0	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	10	Wet Cut
D15-47-S1	Buehler Ditch	143.3	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	20	Dry Cut
D14-40-S1	Bark Creek	143.7	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	20	Dry Cut
AS-SA-699	Sandusky River	145.9	Perennial	Major	WWH	AWS and IWS	Primary Contact A	500	HDD
AP-SA-700	NA	146.0	NA	NA	NA	NA	NA	0	NA
D15-104-WB	Tributary to Sandusky River	146.4	Pond	Major	WWH	AWS and IWS	Primary Contact B	70	Dry Cut
AS-SA-702	Tributary to Sandusky River	146.4	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	7	Wet Cut
E15-39-S1	Greesman Ditch	146.7	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
D14-33-S1	Tributary to Muskellunge Creek	147.5	Ephemeral	Intermediate	WWH	AWS and IWS	Primary Contact B	14	Bore
E14-121-S1	Tributary to Muskellunge Creek	147.7	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	9	Wet Cut
D15-34-S1	Tributary to Little Muddy Creek	148.8	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
D15-52-S1	Little Muddy Creek	149.4	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	30	Dry Cut
D15-87-S1	Tributary to Muddy Creek	152.7	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3	Bore
E14-43-S1	Muddy Creek	153.4	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	24	Dry Cut
E14-181-S1	Tributary to Muddy Creek	153.8	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	5	Bore
D15-35-S1	Tributary to Muddy Creek	154.4	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	20	Dry Cut
E14-109-S1	Tributary to Muddy Creek	154.7	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	4	Bore
E14-42-S1	Ninemile Creek	155.2	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	18	Dry Cut
E14-3-S1	Tributary to Ninemile Creek	155.9	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	4	Bore
D15-51-S1	Tributary to Wolf Creek	156.6	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	7	Wet Cut
D15-50-S1	Tributary to Wolf Creek	156.9	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	8	Wet Cut

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
C15-79-S1	Wolf Creek	157.8	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	11	Dry Cut
D14-25-S1	Sugar Creek	158.6	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact A	35	Dry Cut
E14-107-S1	Tributary to Victoria Creek	160.8	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	9	Wet Cut
E14-108-S1	Victoria Creek	161.3	Ephemeral	Intermediate	WWH	AWS and IWS	Primary Contact B	13	Wet Cut
D15-26-S1	Portage River	162.5	Perennial	Major	WWH	AWS and IWS	Primary Contact A	200	HDD
Wood County, OH									
E14-111-S1	Martin Ditch	163.8	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	17	Dry Cut
D14-31-S1	Tributary to Martin Ditch	164.8	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
E14-85-S1	Tributary to Toussaint Creek	165.6	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	13	Dry Cut
E14-153-S1	Tributary to Toussaint Creek	166.5	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
D14-34-S1	Tributary to Toussaint Creek	166.8	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	6	Bore
E14-175-S1	Toussaint Creek	167.3	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	24	Dry Cut
E15-22-S1	Tributary to Toussaint Creek	167.8	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	5	Bore
E14-48-S3	Tributary to Toussaint Creek	168.2	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
E14-48-S4	Tributary to Toussaint Creek	168.3	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
E14-48-S2	Tributary to Toussaint Creek	168.4	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	7	Bore
E14-79-S1	Tributary to Packer Creek	170.4	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	7	Wet Cut
E14-80-S1	Tributary to Packer Creek	170.8	Ephemeral	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Dry Cut
E14-40-S1	Packer Creek	171.1	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	25	Dry Cut
D15-62-S1	Tributary to Cedar Creek	174.0	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	10	Bore
E14-35-S1	Tributary to Cedar Creek	174.5	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	10	Bore
E15-32-S1	Tributary to Henry Creek	175.4	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
E15-33-S1	Tributary to Henry Creek	175.6	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
E15-34-S1	Tributary to Henry Creek	176.2	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	4	Wet Cut
E15-7-S1	Tributary to Maumee River	177.3	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	11	Dry Cut
D14-45A-S1	Tributary to Maumee River	178.1	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	8	Bore
E15-8-S1	Tributary to Maumee River	179.9	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	4	HDD
D15-101-S1	Tributary to Maumee River	180.0	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	40	HDD
D15-99-S1	Tributary to Maumee River	180.1	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3	HDD
E14-46-S1	Tributary to Maumee River	180.7	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	5	Wet Cut
E14-44-S1	Tributary to Maumee River	180.8	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	10	Wet Cut
E14-47-S1	Tributary to Maumee River	181.0	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	2.5	Wet Cut

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
Wood and Lucas Counties, OH									
E14-55-S1	Maumee River	181.6	Perennial	Major	WWH	AWS and IWS	Primary Contact A	857	HDD
Lucas County, OH									
D15-48-S1	Tributary to Maumee River	181.9	Intermittent	Minor	NA	NA	Primary Contact A	857	HDD
E14-116-S1	Blystone Ditch	182.7	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
E14-29-S1	Suter Ditch	183.3	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	9	Wet Cut
AS-LU-2	Tributary to Whitemeir Ditch	183.4	Ephemeral	Intermediate	WWh	AWS and IWS	Primary Contact B	15	Bore
E14-1-S1	Whitemeir Ditch	183.6	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
E14-37-S1	Estworthy Ditch	183.7	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
E14-38-S1	Disher Ditch	184.1	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	12	Dry Cut
E14-39-S1	Harris Ditch	185.3	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	18	Bore
E14-22-S1	Tributary to Ruhm Ditch	186.6	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	12	Wet Cut
E15-21-S1	Doran Ditch	187.3	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
D15-1-S1	Yawberg Ditch	187.5	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	12	Dry Cut
D15-91-S1	Jeffers Ditch	187.7	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	10	Wet Cut
E15-9-S1	Laver Ditch	188.1	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
Henry County, OH									
E15-29-S1	Tributary to Harris Ditch	189.5	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
D15-56-S1	Tributary to Aumend Ditch	189.7	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
D15-7-S2	Tributary to Blue Creek	190.2	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	9	Dry Cut
D15-7-S1	Tributary to Blue Creek	190.2	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	6	Bore
D15-7-S1	Tributary to Blue Creek	190.2	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	6	Bore
Fulton County, OH									
E15-14-S1	Blue Creek	190.9	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	23	Dry Cut
E15-14-S2	Tributary to Blue Creek	191.1	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	4	Wet Cut
E15-45-S1	Tributary to Blue Creek	191.6	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	20	Dry Cut
D15-110-S1	Tributary to Blue Creek	192.3	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	9	Dry Cut
D15-111-S1	Tributary to Blue Creek	193.2	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	12	Dry Cut
D15-60-S1	Tributary to Fewless Creek	193.9	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
E15-37-S1	Tributary to Fewless Creek	195.0	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	35	Dry Cut
E15-36-S1	Fewless Creek	195.2	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	37	Dry Cut
D15-61-S1	Tributary to Fewless Creek	195.9	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Wet Cut
D15-17-S1	Swan Creek	196.4	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	20	Bore

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
D15-9-S1	Tributary to Swan Creek	197.3	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	12	Wet Cut
D15-98-S1	Tributary to Swan Creek	197.5	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	12	Dry Cut
D15-60A-S1	Tributary to Fewless Creek	197.9	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	12	Bore
D15-10-S1	Tributary to Swan Creek	198.6	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	12	Dry Cut
D15-13-S1	Tributary to Swan Creek	199.1	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Bore
E14-4-S1	Ai Creek	200.8	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	25	Dry Cut
E15-19-S1	Frankfort Ditch	202.1	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	6	Wet Cut
D14-24-S1	Tributary to McNett Ditch	202.7	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	5	Bore
E14-112-S1	McNett Ditch	203.4	Ephemeral	Intermediate	WWH	AWS and IWS	Primary Contact B	11	Wet Cut
D14-44-S1	Tributary to Langenderfer Ditch	203.9	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Dry Cut
E14-53-S1	Tributary to Langenderfer Ditch	205.2	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	12	Dry Cut
D15-82-S1	Tributary to Langenderfer Ditch	205.6	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	10	Dry Cut
D15-83-S1	Tributary to Langenderfer Ditch	206.0	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	10	Bore
E14-11-S1	Tributary to Schmitz Ditch	206.2	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	20	Dry Cut
E14-12-S1	Tributary to Tenmile Creek	207.0	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	8	Bore
D14-45-S1	Tenmile Creek	207.9	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	20	Dry Cut
Lenawee County, MI									
E14-113-S1	Tributary to Tenmile Creek	208.7	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	14	Dry Cut
E14-114-S1	Tributary to Tenmile Creek	209.0	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	11	Bore
AS-LE-607	Tributary to Tenmile Creek	210.0	Intermittent	Minor	WWH	AWS and IWS	Partial/Total	4	Bore
AS-LE-607	Tributary to Tenmile Creek	210.0	Intermittent	Minor	WWH	AWS and IWS	Partial/Total	5	Bore
E14-78-S1	Tributary to Tenmile Creek	211.0	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	4	Wet Cut
E14-56-S1	Tributary to Clement Drain	212.0	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	8	Wet Cut
E14-137-S1	Tributary to Clement Drain	213.0	Intermittent	Minor	WWH	AWS and IWS	Partial/Total	8	Dry Cut
E14-138-S1	Tributary to Clement Drain	213.5	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	11	Wet Cut
E14-139-S1	Tributary to Clement Drain	214.0	Perennial	Minor	WWH	AWS and IWS	Partial/Total	8	Dry Cut
E14-140-S1	River Raisin	215.2	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	80	HDD
D15-28-S1	Tributary to River Raisin	215.8	Intermittent	Minor	WWH	AWS and IWS	Partial/Total	7	Dry Cut
AS-LE-5	Tributary to River Raisin	216.3	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	7	Dry Cut
E14-58-S1	Goodrich Drain	216.8	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	15	Dry Cut

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
AS-LE-7	Tributary to Goodrich Drain	217.1	Intermittent	Minor	WWH	AWS and IWS	Partial/Total	7	Bore
E14-59-S1	Tributary to Goodrich Drain	217.5	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	16	Dry Cut
AS-LE-8	Hill Drain	218.1	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	13	Dry Cut
E14-141-S1	Pease Drain	218.5	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	12	Dry Cut
E14-142-S1	Colvin Drain	218.8	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	11	Dry Cut
AS-LE-9	Tributary to Little River Raisin	219.6	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	5	Bore
AS-LE-10	Tributary to Little River Raisin	220.1	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	5	Bore
E14-143-S1	Little River Raisin	220.5	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	18	Dry Cut
E14-64-S1	Fry Drain	220.7	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	13	Dry Cut
E14-69-S1	Isley Drain	222.1	Ephemeral	Intermediate	WWH	AWS and IWS	Partial/Total	15	Dry Cut
E14-76-S1	Swamp Raisin Creek	222.5	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	23	Dry Cut
E14-77-S1	Tributary to Swamp Raisin Creek	222.7	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	11	Dry Cut
E14-145-S1	Spring Brook	223.2	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	20	Dry Cut
E14-171-S1	Schwab Drain	223.8	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	12	Dry Cut
E14-70-S1	Kelly Drain	224.4	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	15	Bore
D15-38-S1	Wilson Drain	225.1	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	20	Dry Cut
E14-146-S1	Tributary to South Branch Macon Creek	225.6	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	13	Dry Cut
E14-147-S1	Dibble Drain	225.8	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	16	Dry Cut
E14-127-S1	South Branch Macon Creek	226.4	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	22	Dry Cut
E14-126-S1	Tributary to South Branch Macon Creek	226.7	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	22	Dry Cut
E14-74-S1	Schreeder Brook	226.8	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	10	Dry Cut
E14-75-S1	Tributary to Wahoo Prairie Drain	227.0	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	10	Dry Cut
E14-60-S1	Wahoo Prairie Drain	228.2	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	18	Dry Cut
E14-149-S1	Tributary to Middle Branch Macon Creek	228.8	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	13	Dry Cut
E14-150-S1	Tributary to Macon Creek	229.4	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	14	Dry Cut
E14-87-S1	Macon Creek	229.5	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	28	Dry Cut
E14-87-S2	Tributary to Macon Creek	229.5	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	3	N/A

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
E14-61-S1	Tributary to Richardson Drain	229.8	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	20	Dry Cut
E14-62-S1	Tributary to Richardson Drain	230.4	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	5	N/A
Monroe County, MI									
E14-63-S1	Tributary to Richardson Drain	230.7	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	16	Dry Cut
AS-MO-1	Richardson Drain	231.4	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	15	Dry Cut
E14-65-S1	Bear Swamp Creek	231.9	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	12	Dry Cut
E14-66-S1	Tributary to Bear Swamp Creek	232.4	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	8	Dry Cut
E14-67-S1	Tributary to Bear Swamp Creek	232.5	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	6	Bore
D15-132-S1	Tributary to Cone Drain	233.1	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	3	Bore
D15-40-S1	Cone Drain	233.3	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	25	Dry Cut
AS-MO-2	Tributary to Center Creek	233.7	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	15	Dry Cut
D15-117-S2	Tributary to Center Creek	234.3	Intermittent	Minor	WWH	AWS and IWS	Partial/Total	2	Bore
AS-MO-400	Center Creek	234.4	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	15	Dry Cut
D15-133-S1	Tributary to North Branch Macon Creek	235.4	Ephemeral	Intermediate	WWH	AWS and IWS	Partial/Total	12	Dry Cut
D15-128-S1	North Branch Macon Creek	236.0	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	20	Dry Cut
D15-134-S1	Tributary to North Branch Macon Creek	236.3	Intermittent	Minor	WWH	AWS and IWS	Partial/Total	5	Bore
Washtenaw County, MI									
E14-157-S1	Saline River	237.5	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	60	HDD
E14-159-S1	Tributary to McIntyre Drain	238.2	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	8	Bore
E14-88-S1	McIntyre Drain	239.1	Intermittent	Minor	WWH	AWS and IWS	Partial/Total	7	Dry Cut
E14-89-S1	Tributary to McIntyre Drain	239.2	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	12	Dry Cut
E14-90-S1	Tributary to McIntyre Drain	239.3	Ephemeral	Intermediate	WWH	AWS and IWS	Partial/Total	16	Bore
E14-165-S1	Tributary to McIntyre Drain	239.3	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	8	Bore
E14-91-S1	Tributary to Sugar Creek	239.7	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	15	Dry Cut
E14-92-S1	Sugar Creek	239.8	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	11	Dry Cut
E14-93-S1	Tributary to Buck Creek	240.6	Intermittent	Minor	WWH	AWS and IWS	Partial/Total	10	Dry Cut
E14-128-S3	Tributary to Buck Creek	240.8	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	4	N/A
E14-128-S1	Buck Creek	240.8	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	13	Dry Cut

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
E14-160-S1	Tributary to Stony Creek	241.5	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	12	Dry Cut
E14-131-S1	Tributary to Stony Creek	242.3	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	6	Wet Cut
E14-132-S1	Stony Creek	242.4	Perennial	Minor	WWH	AWS and IWS	Partial/Total	8	Dry Cut
E14-161-S1	Tributary to McCarthy Drain	243.8	Intermittent	Minor	WWH	AWS and IWS	Partial/Total	10	Dry Cut
E14-135-S1	McCarthy Drain	244.2	Perennial	Minor	WWH	AWS and IWS	Partial/Total	9.5	Dry Cut
E14-162-S1	West Branch Paint Creek	244.7	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	14	Dry Cut
E15-13-S1	Tributary to West Branch Paint Creek	245.0	Intermittent	Minor	WWH	AWS and IWS	Partial/Total	6	Bore
E14-99-S1	Tributary to Bird Drain	245.0	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	5	Wet Cut
D15-122-S1	Tributary to Bird Drain	245.8	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	6	N/A
E14-164-S1/ AS-WA-6	Paint Creek	246.3	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	25	Dry Cut
E14-176-S1	Tributary to Paint Creek	246.6	Intermittent	Minor	WWH	AWS and IWS	Partial/Total	7	Dry Cut
D15-30-S1	Tributary to Bradshaw Drain	247.2	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	15	Dry Cut
D15-29-S1	Tributary to North Branch Swan Creek	248.2	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	5	Bore
E15-40-S1	Tributary to North Branch Swan Creek	248.4	Intermittent	Minor	WWH	AWS and IWS	Partial/Total	8	Dry Cut
E14-102-S1	Tributary to North Branch Swan Creek	248.9	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	14	N/A
D15-21-S1	Huron River	250.9	Perennial	Major	WWH	AWS and IWS	Partial/Total	200	HDD
D15-25-S1	Tributary to Willow Run	251.8	Intermittent	Intermediate	WWH	AWS and IWS	Partial/Total	15	Dry Cut
E15-25-WB	Willow Run	253.4	Pond	Major	WWH	AWS and IWS	Partial/Total	140	Dry Cut
E15-25-WB/ AP-WA-502	Willow Run	253.6	Pond	Major	WWH	AWS and IWS	Partial/Total	140	Dry Cut
AS-WA-401	NA	254.3	NA	NA	NA	NA	NA	0	NA
D15-77-S1	Tributary to Willow Run	254.8	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	5	N/A
D15-43-WB2	Tributary to Willow Run	254.9	Pond	Major	WWH	AWS and IWS	Partial/Total	330	Dry Cut
D15-43-S2	Tributary to Willow Run	254.9	Perennial	Minor	WWH	AWS and IWS	Partial/Total	6	N/A
D15-43-S1	Tributary to Willow Run	255.0	Perennial	Intermediate	WWH	AWS and IWS	Partial/Total	15	Dry Cut
TGP interconnect									
Columbiana County, OH									
B15-17-S2	Tributary to Brush Creek	0.7	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	4	Dry Cut
B15-17-S2	Tributary to Brush Creek	0.7	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	4	Dry Cut

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
Access Roads									
Stark County, OH									
B15-109-S1 (TAR-15.4)	Tributary to Beech Creek	15.5	Intermittent	Intermediate	WWH	AWS and IWS	Primary Contact B	11	Bridge
B15-118-S1 (TAR-23.1)	NA	23.1	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	2.5	Bridge
Summit County, OH									
C15-102-S1 (TAR-44.1)	Tributary to Nimisila Creek	44.1	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	13	Dry Cut
Medina County, OH									
B15-83-S1 (TAR-64.9)	Tributary to Hubbard Creek	65.0	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	3	Bridge
C15-108-S1 (TAR-72.8)	Tributary to Mallet Creek	72.8	Ephemeral	Minor	WWH	AWS and IWS	Primary Contact B	4	Bridge
Erie County, OH									
E14-51-S1 (TAR-128.3)	Tributary to Mills Creek	128.4	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Bridge
E14-51-S3 (TAR-128.3)	Tributary to Mills Creek	128.4	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	5	Bridge
Wood County, OH									
D15-118-S1 (TAR-171.2)	Tributary to Packer Creek	171.2	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	4	Bridge
Lenawee County, MI									
D15-126-S1 (TAR-228)	Tributary to Middle Branch Macon Creek	228.6	Intermittent	Minor	WWH	AWS and IWS	Partial/Total	6	Bridge
Washtenaw County, MI									
D15-29-S1 (TAR-248.1)	Tributary to North Branch Swan Creek	248.2	Ephemeral	Minor	WWH	AWS and IWS	Partial/Total	5	Bore
TEAL PROJECT									
Loopline									
Monroe County, OH									
A15-03-S1/ A15-24-S1	Paine Run	0.8	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	20	Dry
A15-04-S1	Trib to Paine Run	0.8	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	6	Open
A15-07-S1	Trib to Paine Run	1.2	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	5	Open
A15-08-S1	Trib to Paine Run	1.6	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	4.5	Open

APPENDIX H-2 (cont'd)

Waterbodies Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Flow Type [a]	FERC Classification [b]	State Water Quality Classification [c]	State Water Supply Classification [d]	State Recreation Classification [e]	Waterbody Width (feet) [f]	Proposed Construction Method [g]
A15-10-S1	Trib to Paine Run	1.9	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	25	Dry
A15-11-S1	Trib to Paine Run	2.2	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	5	N/A
A15-11-S2	Trib to Paine Run	2.2	Perennial	Intermediate	WWH	AWS and IWS	Primary Contact B	15	Dry
A15-12-S1	Trib to Paine Run	2.4	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	4	Open
A15-14-S1	Trib to Salem Run	2.9	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	4.8	Open
A15-15-S1	Trib to Salem Run	3.0	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	5	Open
A15-15-S2	Trib to Salem Run	3.0	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3.3	Open
A15-18-S2	Trib to Stillhouse Run	4.2	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	6	Open
A15-18-S1	Stillhouse Run	4.3	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	4	Open
A15-19-S1	Trib to Stillhouse Run	4.3	Intermittent	Minor	WWH	AWS and IWS	Primary Contact B	3	Open
Connecting Pipeline									
Columbiana County, OH									
B15-17-S2	Trib to Brush Creek	0.2	Perennial	Minor	WWH	AWS and IWS	Primary Contact B	4	Open

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a Flow types:

Perennial – streams that flow continuously.

Intermittent – streams which flow only at certain times of the year when they receive water from springs or from some surface source such as melting snow in mountainous areas.

Ephemeral – streams that flow only in direct response to precipitation and whose channel is at all times above the water table.

b Minor – waterbodies less than or equal to 10 feet wide; Intermediate = waterbodies greater than 10 feet wide but less than or equal to 100 feet wide; Major = greater than 100 feet wide.

c WWH (Warmwater Habitat) – waters capable of supporting and maintaining a community of warmwater aquatic organisms

MWH (Modified Warmwater Habitat) – modified habitats capable of supporting a warmwater biological community, but fall short due primarily to altered macrohabitats.

d The states of Michigan and Ohio assume that all streams support agricultural and industrial uses. Only water supply designation types that are crossed by the NEXUS Project are defined below:

AWS (Agricultural) – waters suitable for irrigation and livestock watering without treatment.

IWS (Industrial) – waters suitable for commercial and industrial uses, with or without treatment.

e Primary Contact B – waters in Ohio that support, or potentially support, occasional Primary Contact Recreation activities. All surface waters of the state are designated as class B Primary Contact Recreation unless otherwise designated.

Partial – waters in Michigan that support, or potentially support, occasional partial body contact Recreation activities. Partial body recreation activities include paddling, canoeing, kayaking, etc. and are protected in all surface waters year round in Michigan.

Total – waters in Michigan that support, or potentially support, occasional total body contact Recreation activities. Total body contact recreation activities include activities such as swimming, and all surface waters in Michigan are protected from May 1 through October 1 for such activities.

f Waterbody widths estimated based on the average width located within NGT Project study corridor.

g Waterbodies located within the construction workspace but will not be crossed by the pipeline are listed as N/A (not applicable).

APPENDIX H-3

SURFACE PUBLIC WATER SUPPLY PROTECTION AREAS CROSSED BY THE NGT AND TEAL PROJECTS

APPENDIX H-3

Surface Public Water Supply Protection Areas Crossed by the NGT and TEAL Projects

Project, Facility	County	Milepost Start	Milepost End	Source	Municipality, County (Original)
NGT PROJECT					
TGP Interconnect					
	Columbiana County, OH	0	0.9	Ohio River	Wellsville, Columbiana Cincinnati, Hamilton East Liverpool, Columbiana Ironton, Lawrence Portsmouth, Scioto Steubenville, Jefferson Toronto, Jefferson
Mainline					
	Columbiana County, OH	0	7.6	Ohio River	Cincinnati, Hamilton Ironton, Lawrence Portsmouth, Scioto Alliance, Stark
				Mahoning River	Sebring, Mahoning Newton Falls, Trumbull Wellsville, Columbiana
		7.6	8.8	Ohio River	Cincinnati, Hamilton East Liverpool, Columbiana Ironton, Lawrence Portsmouth, Scioto Stuebenville, Jefferson Toronto, Jefferson
	Columbiana and Stark Counties, OH	8.8	14.3	Ohio River	Cincinnati, Hamilton Ironton, Lawrence Portsmouth, Scioto
				Mahoning River	Newton Falls, Trumbull Wellsville, Columbiana
	Stark County, OH	14.3	21.2	Ohio River	Cincinnati, Hamilton East Liverpool, Columbiana Ironton, Lawrence Portsmouth, Scioto Stuebenville, Jefferson Toronto, Jefferson
	Stark, Summit, Wayne, and Medina Counties, OH	21.2	73.2	Ohio River	Cincinnati, Hamilton Ironton, Lawrence Portsmouth, Scioto
	Lorain County, OH	91.4	94.7	West Branch of Black River Reservoir	Oberlin, Lorain
	Fulton County, OH	193.7	197.8	Swanton Reservoir	Swanton, Fulton

APPENDIX H-3 (cont'd)

Surface Public Water Supply Protection Areas Crossed by the NGT and TEAL Projects

Project, Facility	County	Milepost Start	Milepost End	Source	Municipality, County (Original)
Aboveground Facilities					
TGP MR01 Station	Columbiana County, OH	0	0.1	Ohio River	Wellsville, Columbiana Cincinnati, Hamilton East Liverpool, Columbiana Ironton, Lawrence Portsmouth, Scioto Steubenville, Jefferson Toronto, Jefferson
TGP MR02 (Kensington)	Columbiana County, OH	0	0.1	Ohio River	Wellsville, Columbiana Cincinnati, Hamilton East Liverpool, Columbiana Ironton, Lawrence Portsmouth, Scioto Steubenville, Jefferson Toronto, Jefferson
MR03 (Texas Eastern)	Columbiana County, OH	0.8	0.9	Ohio River	Cincinnati, Hamilton East Liverpool, Columbiana Ironton, Lawrence Portsmouth, Scioto Steubenville, Jefferson Toronto, Jefferson
Hanoverton Compressor Station (CS1)	Columbiana County, OH	1.3	1.5	Ohio River	Cincinnati, Hamilton Ironton, Lawrence Portsmouth, Scioto
Wadsworth Compressor Station (CS2)	Columbiana County, OH	63.3	63.6	Ohio River	Cincinnati, Hamilton Ironton, Lawrence Portsmouth, Scioto
TEAL PROJECT					
Loopline					
	Monroe County, OH	0.0	4.4	Ohio River	Cincinnati Public Water System, Hamilton Ironton PWS, Lawrence Portsmouth Public Water System, Scioto
Interconnecting Pipeline					
	Columbiana County, OH	0.0	0.3	Ohio River	Cincinnati Public Water System, Hamilton East Liverpool City, Columbiana Ironton PWS, Lawrence Portsmouth Public Water System, Scioto
Aboveground Facilities					
	Jefferson and Belmont Counties, OH	N/A	N/A	Ohio River	Cincinnati Public Water System, Hamilton Ironton PWS, Lawrence Portsmouth Public Water System, Scioto

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Sources: OEPA (2016); USGS and MDEQ (2002).

APPENDIX H-4

IMPAIRED SURFACE WATERS CROSSED BY THE NGT AND TEAL PROJECTS

APPENDIX H-4

Impaired Surface Waters Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Beneficial Use Impaired
NGT PROJECT			
Mainline			
Columbiana County, OH			
B15-17-S2	Tributary to Brush Creek	0.1	Aquatic Health
B15-17-S3	Tributary to Brush Creek [a]	0.1	Aquatic Health
B15-17-S4	Tributary to Brush Creek [a]	0.1	Aquatic Health
B15-28-S1	Tributary to Sandy Creek	0.7	Human Health, Recreation, Aquatic Health
B15-29-S1	Tributary to Sandy Creek	1.0	Human Health, Recreation, Aquatic Health
A14-5-S4	Tributary to Sandy Creek	2.0	Human Health, Recreation, Aquatic Health
A14-5-S3	Tributary to Sandy Creek	2.2	Human Health, Recreation, Aquatic Health
A14-8-S1	Tributary to Sandy Creek	3.9	Human Health, Recreation, Aquatic Health
A14-10-S1	Conser Run	4.9	Human Health, Recreation, Aquatic Health
A14-10-S2	Tributary Conser Run [a]	5.0	Human Health, Recreation, Aquatic Health
A14-11-S1	Tributary to Conser Run	5.3	Human Health, Recreation, Aquatic Health
A14-126-S1	Tributary to Conser Run [a]	5.6	Human Health, Recreation, Aquatic Health
A14-127-S1	Tributary to Conser Run	5.7	Human Health, Recreation, Aquatic Health
A14-12-S1	Tributary to Conser Run	6.5	Human Health, Recreation, Aquatic Health
B15-33-S1	Tributary to Lake Placentia	7.7	Recreation, Aquatic Health
A14-196-S1	Tributary to Middle Branch Sandy Creek	9.8	Human Health, Recreation
A14-13-S1	Tributary to Middle Branch Sandy Creek	10.1	Human Health, Recreation
A14-15-S1	Tributary to Middle Branch Sandy Creek	10.6	Human Health, Recreation
C15-65-S1	Tributary to Middle Branch Sandy Creek	11.0	Human Health, Recreation
A15-34-S1	Tributary to Middle Branch Sandy Creek	11.2	Human Health, Recreation
A15-34-S2	Sandy Creek	11.2	Human Health, Recreation
A14-17-S4	Tributary to Middle Branch Sandy Creek	11.8	Human Health, Recreation
A14-165-S2	Tributary to Woodland Lake	12.3	Human Health, Recreation
A14-165-S1	Tributary to Woodland Lake	12.3	Human Health, Recreation
Stark County, OH			
B15-63-S1	Tributary to Middle Branch Sandy Creek	13.4	Human Health, Recreation
B15-66-S1	Tributary to Middle Branch Sandy Creek	13.7	Human Health, Recreation
A15-47-S1	Tributary to Middle Branch Sandy Creek	13.9	Human Health, Recreation
B15-54-S2	Tributary to Middle Branch Sandy Creek	14.0	Human Health, Recreation
C15-92-S1	Tributary to Beech Creek [a]	15.3	Recreation, Aquatic Health
B15-109-S1	Tributary to Beech Creek [a]	15.5	Recreation, Aquatic Health
C15-116-S3	Tributary to Beech Creek	16.8	Recreation, Aquatic Health
C15-116-S5	Tributary to Beech Creek [a]	16.8	Recreation, Aquatic Health
C15-116-S2	Beech Creek	17.1	Recreation, Aquatic Health
C15-116-S1	Tributary to Beech Creek	17.2	Recreation, Aquatic Health
A14-105-S1	Tributary to Beech Creek	17.8	Recreation, Aquatic Health
A14-103-S1	Tributary to Beech Creek	18.2	Recreation, Aquatic Health

APPENDIX H-4 (cont'd)

Impaired Surface Waters Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Beneficial Use Impaired
C15-87-S1	Tributary to Beech Creek	19.4	Recreation, Aquatic Health
C15-87-S2	Tributary to Beech Creek	19.4	Recreation, Aquatic Health
A15-36-S1	Tributary to Red Pine Lake	20.5	Recreation, Aquatic Health
A15-36-S2	Tributary to Red Pine Lake [a]	20.5	Recreation, Aquatic Health
A14-25-S1	Middle Branch Nimishillen Creek	21.8	Human Health, Recreation, Aquatic Health
B15-41-S1	Tributary to Middle Branch Nimishillen Creek	22.0	Human Health, Recreation, Aquatic Health
B15-40-S1	Tributary to Middle Branch Nimishillen Creek	22.3	Human Health, Recreation, Aquatic Health
A14-175-S1	Tributary to Middle Branch Nimishillen Creek	22.8	Human Health, Recreation, Aquatic Health
A14-174-S1	Tributary to Middle Branch Nimishillen Creek	23.0	Human Health, Recreation, Aquatic Health
B15-118-S1	NA [a]	23.1	Human Health, Recreation, Aquatic Health
A14-27-S1	Tributary to Middle Branch Nimishillen River	24.1	Human Health, Recreation, Aquatic Health
A14-161-S1	Tributary to Middle Branch Nimishillen Creek	24.6	Human Health, Recreation, Aquatic Health
A14-161-S2	Tributary to Middle Branch Nimishillen River	24.6	Human Health, Recreation, Aquatic Health
A14-31-S1	Tributary to Middle Branch Nimishillen Creek	25.8	Human Health, Recreation, Aquatic Health
A14-100-S1	Tributary to Nimishillen Creek	26.7	Human Health, Recreation, Aquatic Health
B15-75-S1	Middle Branch Nimishillen Creek	26.8	Human Health, Recreation, Aquatic Health
B15-75-S1	Middle Branch Nimishillen Creek [a]	26.8	Human Health, Recreation, Aquatic Health
B15-45-S1	Tributary to Swartz Ditch	27.7	Human Health, Recreation, Aquatic Health
A14-168-S1	Tributary to West Branch Nimishillen Creek	28.9	Human Health, Recreation, Aquatic Health
B15-98-S1	Tributary to West Branck Nimishillen Creek	29.0	Human Health, Recreation, Aquatic Health
B15-101-S1	Tributary to West Branch Nimishillen Creek	29.3	Human Health, Recreation, Aquatic Health
B15-103-S1	Tributary to West Branch Nimishillen Creek	29.6	Human Health, Recreation, Aquatic Health
A14-157-S1	Tributary to West Branch Nimishillen Creek	30.3	Human Health, Recreation, Aquatic Health
A14-159-S1	Tributary to West Branch Nimishillen Creek	30.7	Human Health, Recreation, Aquatic Health
A14-158-S1	Tributary to West Branch Nimishillen Creek	30.9	Human Health, Recreation, Aquatic Health
A14-162-S1	Tributary to West Branch Nimishillen Creek	31.5	Human Health, Recreation, Aquatic Health
A14-163-S1	Tributary to West Branch Nimishillen Creek	31.6	Human Health, Recreation, Aquatic Health
A14-164-S2	West Branch Nimishillen Creek	32.0	Human Health, Recreation, Aquatic Health
A14-164-S1	Tributary to West Branch Nimishillen Creek	32.2	Human Health, Recreation, Aquatic Health
A15-68-S1	Tributary to Tuscarawas River	33.8	Human Health, Recreation, Aquatic Health

APPENDIX H-4 (cont'd)

Impaired Surface Waters Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Beneficial Use Impaired
Summit County, OH			
A15-71-S1	Tributary to Tuscarawas River	34.7	Human Health, Recreation, Aquatic Health
AS-SU-210	Tributary to Tuscarawas River	34.9	Human Health, Recreation, Aquatic Health
B15-68-S1	Tributary to Tuscarawas River	35.1	Human Health, Recreation, Aquatic Health
AS-SU-401	Tributary to Tuscarawas River	36.1	Human Health, Recreation, Aquatic Health
C15-106-S1	Tributary to Willowdale Lake	36.8	Recreation, Aquatic Health
B15-108-WB1	Tributary to Willowdale Lake [a]	36.9	Recreation, Aquatic Health
C15-122-S1	Tributary to Willowdale Lake	37.1	Recreation, Aquatic Health
C15-120-S1	Tributary to Willowdale Lake	37.5	Recreation, Aquatic Health
C15-113-S1	Tributary to Singer Lake	38.7	Recreation, Aquatic Health
F15-1-S1	Tributary to Nimisila Reservoir	39.4	Recreation, Aquatic Health
A14-112-S1	Tributary to Nimisila Reservoir	39.5	Recreation, Aquatic Health
A14-112-S1A	Tributary to Nimisila Reservoir	39.9	Recreation, Aquatic Health
AP-SU-336	Tributary to Nimisila Reservoir [a]	40.6	Recreation, Aquatic Health
AS-SU-200	Nimisila Reservoir	40.8	Recreation, Aquatic Health
A14-122-S2	Nimisilla Creek	41.7	Human Health, Recreation
A14-122-S4	Tributary to Nimisila Creek [a]	41.7	Human Health, Recreation
A14-122-S3	Tributary to Nimisilla Creek [a]	41.7	Human Health, Recreation
A14-122-S5	Tributary to Nimisila Creek	41.9	Human Health, Recreation
A14-122-S1	Tributary to Nimisila Creek	42.0	Human Health, Recreation
AS-SU-18	Tributary to Nimisila Creek	42.5	Human Health, Recreation
A14-117-S1	Tributary to Nimisila Creek	43.3	Human Health, Recreation
A15-16-S2	Tributary to Nimisila Creek [a]	43.8	Human Health, Recreation
A15-95-S1/AS-SU-22	Tributary to Nimisila Creek	43.9	Human Health, Recreation
C15-102-S1	Tributary to Nimisila Creek	44.1	Human Health, Recreation
AS-SU-29	Tributary to Tuscarawas River	45.9	Human Health, Recreation, Aquatic Health
A14-119-S1	Tributary to Tuscarawas River	46.4	Human Health, Recreation, Aquatic Health
C15-25-S1	Tributary to Tuscarawas River	46.8	Human Health, Recreation, Aquatic Health
A15-13-S1	Tributary to Tuscarawas River [a]	46.8	Human Health, Recreation, Aquatic Health
A15-14-S1	Tributary to Tuscarawas River	47.0	Human Health, Recreation, Aquatic Health
C15-28-S1	Tuscarawas River	48.1	Human Health, Recreation, Aquatic Health
AS-SU-40	Pancake Creek	48.9	Human Health, Recreation, Aquatic Health
AS-SU-43	Tributary to Willowdale Lake	49.2	Human Health, Recreation, Aquatic Health
A14-41-S3	Tributary to Pancake Creek	49.6	Human Health, Recreation, Aquatic Health
A14-41-S2	Tributary to Pancake Creek	49.8	Human Health, Recreation, Aquatic Health
A14-41-S1	Tributary to Pancake Creek	50.0	Human Health, Recreation, Aquatic Health
A14-42-S1	Tributary to Pancake Creek	50.1	Human Health, Recreation, Aquatic Health
A14-42-S2	Tributary to Pancake Creek	50.1	Human Health, Recreation, Aquatic Health

APPENDIX H-4 (cont'd)

Impaired Surface Waters Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Beneficial Use Impaired
Wayne County, OH			
A15-20-S1	Tributary to Pancake Creek	50.5	Human Health, Recreation, Aquatic Health
A15-21-S2	Tributary to Silver Creek [a]	51.5	Human Health, Recreation, Aquatic Health
A15-21-S1	Tributary to Silver Creek	51.6	Human Health, Recreation, Aquatic Health
C15-34-S1	Tributary to Silver Creek	52.2	Human Health, Recreation, Aquatic Health
A14-124-S2	Tributary to Silver Creek	52.6	Human Health, Recreation, Aquatic Health
A14-124-S1	Silver Creek	52.6	Human Health, Recreation, Aquatic Health
A15-52-S5	Tributary to Silver Creek	52.8	Human Health, Recreation, Aquatic Health
A15-52-S1	Tributary to Silver Creek	52.8	Human Health, Recreation, Aquatic Health
A15-53-S1	Tributary to Silver Creek	53.0	Human Health, Recreation, Aquatic Health
A15-54-S1	Tributary to Silver Creek [a]	53.0	Human Health, Recreation, Aquatic Health
B15-91-S1	Tributary to Silver Creek	53.5	Human Health, Recreation, Aquatic Health
B15-47-S1	Tributary to Mill Creek	54.9	Human Health, Recreation, Aquatic Health
A15-41-S1	Mill Creek	55.3	Human Health, Recreation, Aquatic Health
Medina County, OH			
B15-49-S1	Tributary to Styx River	57.2	Human Health, Recreation, Aquatic Health
Wayne County, OH			
B15-50-S3	Tributary to Styx River	57.2	Human Health, Recreation, Aquatic Health
B15-50-S2	Tributary to Styx River	57.3	Human Health, Recreation, Aquatic Health
AS-WA-603	NA [a]	57.3	Human Health, Recreation, Aquatic Health
B15-50-S1	Tributary to Styx River	57.4	Human Health, Recreation, Aquatic Health
B15-51-S1	Styx River	57.6	Human Health, Recreation, Aquatic Health
Medina County, OH			
B15-53-S1	Tributary to Styx River	57.7	Human Health, Recreation, Aquatic Health
B14-7-S1	Tributary to Styx River	58.4	Human Health, Recreation, Aquatic Health
A14-44-S1	Tributary to Styx River [a]	59.3	Human Health, Recreation, Aquatic Health
B15-02-S1	Tributary to Styx River	59.9	Human Health, Recreation, Aquatic Health
A14-39-S1	Tommy Run	60.7	Human Health, Recreation, Aquatic Health
A14-40-S1	Tributary to Tommy Run	60.9	Human Health, Recreation, Aquatic Health
A14-40-S2	Tributary to Tommy Run	60.9	Human Health, Recreation, Aquatic Health
B15-83-S1	Tributary to Hubbard Creek [a]	65.0	Human Health, Recreation, Aquatic Health
A14-116-S2	Tributary to Hubbard Creek	65.3	Human Health, Recreation, Aquatic Health
A14-116-S5	Tributary to Hubbard Creek	65.4	Human Health, Recreation, Aquatic Health
AS-ME-24	Tributary to Hubbard Creek	66.0	Human Health, Recreation, Aquatic Health
B14-4-S1	Tributary to Hubbard Creek	66.2	Human Health, Recreation, Aquatic Health
AS-ME-27	Tributary to Chippewa Creek	67.4	Human Health, Recreation, Aquatic Health
AS-ME-30	Tributary to Chippewa Creek	67.6	Human Health, Recreation, Aquatic Health
AS-ME-31	Tributary to Chippewa Creek	67.6	Human Health, Recreation, Aquatic Health
AS-ME-31A	Tributary to Chippewa Creek	67.7	Human Health, Recreation, Aquatic Health
B15-82-S1	Tributary to Chippewa Creek	67.9	Human Health, Recreation, Aquatic Health
AS-ME-34	Tributary to Chippewa Creek	68.1	Human Health, Recreation, Aquatic Health
A15-3-S1	McCabe Creek	68.8	Human Health, Recreation, Aquatic Health
C15-41-S1	Tributary to The Inlet	69.7	Human Health, Recreation, Aquatic Health
C15-6-S2	Tributary to The Inlet	69.9	Human Health, Recreation, Aquatic Health
C15-6-S1	Tributary to The Inlet	70.0	Human Health, Recreation, Aquatic Health
C15-42-S1	The Inlet	70.8	Human Health, Recreation, Aquatic Health
A15-72-S1	Tributary to The Inlet	70.9	Human Health, Recreation, Aquatic Health
C15-44-S1	Tributary to the Inlet	71.1	Human Health, Recreation, Aquatic Health

APPENDIX H-4 (cont'd)

Impaired Surface Waters Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Beneficial Use Impaired
A14-46-S2	Tributary to the Inlet	71.3	Human Health, Recreation, Aquatic Health
A14-46-S1	Tributary to the Inlet	71.4	Human Health, Recreation, Aquatic Health
B15-120-S1	NA	72.8	Human Health, Aquatic Health
C15-108-S1	Tributary to Mallet Creek [a]	72.8	Human Health, Aquatic Health
C15-24-S1	Tributary to Mallet Creek	72.9	Human Health, Aquatic Health
C15-24-S7	Tributary to Mallet Creek	73.3	Human Health, Aquatic Health
C15-24-S8	Tributary to Mallet Creek	73.4	Human Health, Aquatic Health
C15-24-S1-3	Mallet Creek	73.4	Human Health, Aquatic Health
C15-24-S1-3	Mallet Creek	73.5 [1]	Human Health, Aquatic Health
AS-ME-56	Tributary to Mallet Creek	73.7	Human Health, Aquatic Health
AS-ME-58A	Tributary to Mallet Creek	73.9	Human Health, Aquatic Health
B15-84-S1	Tributary to Mallet Creek	74.0	Human Health, Aquatic Health
B15-84-S2	Tributary to Mallet Creek	74.0 [1]	Human Health, Aquatic Health
B14-9-S1	Tributary to Mallet Creek	74.3 [1]	Human Health, Aquatic Health
B14-10-S1	Tributary to Mallet Creek	75.4	Human Health, Aquatic Health
B15-74-S3	Tributary to Mallet Creek	75.8	Human Health, Aquatic Health
B15-74-S1	Mallet Creek	76.0	Human Health, Aquatic Health
B15-74-S4	Tributary to Mallet Creek	76.3	Human Health, Aquatic Health
A15-76-S1	Tributary to Mallet Creek	76.9	Human Health, Aquatic Health
A15-76-S2	Tributary to Mallet Creek	77.0	Human Health, Aquatic Health
AS-ME-200	Tributary to Mallet Creek	78.0	Recreation, Aquatic Health
AS-ME-96	Tributary to West Branch Rocky River	78.9	Recreation, Aquatic Health
B15-85-S1	Tributary to West Branch Rocky River	79.1	Recreation, Aquatic Health
AS-ME-98	Tributary to West Branch Rocky River	79.4	Recreation, Aquatic Health
AS-ME-99	Tributary to West Branch Rocky River	79.5	Recreation, Aquatic Health
AS-LO-1	Tributary to East Branch Black River	80.3	Human Health, Recreation, Aquatic Health
B15-15-S1	Tributary to East Branch Black River	80.4	Human Health, Recreation, Aquatic Health
Lorain County, OH			
A15-28-S1	Tributary to East Branch Black River	81.4	Human Health, Recreation, Aquatic Health
A14-59-S1	Tributary to East Branch Black River [a]	82.0	Human Health, Recreation, Aquatic Health
A14-69-S6	Tributary to Salt Creek [a]	84.3	Human Health, Recreation, Aquatic Health
A14-69-S4	Salt Creek	84.4	Human Health, Recreation, Aquatic Health
A15-56-S1	Tributary to East Branch Black River	85.8	Human Health, Recreation, Aquatic Health
A15-63-S1	Tributary to East Branch Black River	86.0	Human Health, Recreation, Aquatic Health
A14-50-S1	East Branch Black River	86.7	Human Health, Recreation, Aquatic Health
B15-61-S1	Tributary to Finnegan Ditch	87.1	Human Health, Recreation, Aquatic Health
A14-55-S1	Tributary to Dent Ditch	87.3	Human Health, Recreation, Aquatic Health
B15-96-S1	Tributary to Dent Ditch	88.0	Human Health, Recreation, Aquatic Health
B15-97-S1	Tributary to Dent Ditch	88.2	Human Health, Recreation, Aquatic Health
A14-73-S1	King Ditch	88.6	Human Health, Recreation, Aquatic Health
A14-128-S1	Tributary to King Ditch	89.2	Human Health, Recreation, Aquatic Health

APPENDIX H-4 (cont'd)

Impaired Surface Waters Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Beneficial Use Impaired
A14-75-S1	Tributary to King Ditch	89.3	Human Health, Recreation, Aquatic Health
A14-75-S2	Tributary to King Ditch	89.3	Human Health, Recreation, Aquatic Health
A14-76-S1	Kelner Ditch	90.1	Human Health, Recreation, Aquatic Health
A14-76-S2	Tributary to Kelner Ditch [a]	90.1	Human Health, Recreation, Aquatic Health
AS-LO-402	Tributary to Elk Creek	91.2	Human Health, Recreation, Aquatic Health
C15-37-S1	Elk Creek	91.3	Human Health, Recreation, Aquatic Health
C15-35-S1	Wellington Creek	91.8	Recreation, Aquatic Health
C15-8-S2	Tributary to West Branch Black River	92.3	Human Health, Recreation, Aquatic Health
C15-8-S3	Tributary to West Branch Black River	92.3	Human Health, Recreation, Aquatic Health
C15-8-S4	West Branch Black River	92.4	Human Health, Recreation, Aquatic Health
C15-9-S1	Tributary to West Branch Black River	92.6	Human Health, Recreation, Aquatic Health
A14-140-S1	Tributary to West Branch Black River	93.4	Human Health, Recreation, Aquatic Health
A14-141-S1	Plum Creek	96.1	Human Health, Recreation, Aquatic Health
C15-57-S1	Tributary to Plum Creek	97.3	Human Health, Recreation, Aquatic Health
C15-61-S1	Tributary to East Fork Vermilion River	98.3	Human Health, Aquatic Health
A15-85-S1	Tributary to East Fork Vermillion River	98.9	Human Health, Aquatic Health
A15-85-S2	Tributary to East Fork Vermillion River	98.9	Human Health, Aquatic Health
C15-66-S1	East Fork Vermilion River	99.3	Human Health, Aquatic Health
C15-67-S1	Frankenburg Creek	101.3	Human Health, Aquatic Health
Huron County, OH			
C15-100-S1	Tributary to East Fork Frankenburg Creek	101.7	Human Health, Aquatic Health
C15-101-S1	Tributary to East Fork Frankenburg Creek	101.9	Human Health, Aquatic Health
A15-57-S1	Tributary to East Fork Frankenburg Creek	102.3	Human Health, Aquatic Health
C15-88-S1	Tributary to Frankenburg Creek	103.0	Human Health, Aquatic Health
C15-56-S1	Tributary to Vermillion River	104.2	Human Health, Aquatic Health
C15-56-S4	Vermillion River	104.4	Human Health, Aquatic Health
C15-56-S4B	Vermillion River	104.4	Human Health, Aquatic Health
C15-56-S4A	Tributary to Vermillion River	104.5	Human Health, Aquatic Health
Erie County, OH			
C15-69-S1	Chappel Creek	105.9	Aquatic Health
B15-115-S1	NA	110.3	Aquatic Health
B15-124-S2	Tributary to Old Woman Creek	112.1	Recreation, Aquatic Health
B15-124-S1	Tributary to Old Woman Creek [a]	112.1	Recreation, Aquatic Health
AS-ER-35	Tributary to Old Woman Creek	113.0	Recreation, Aquatic Health
A14-187-S1	Old Woman Creek	113.1	Recreation, Aquatic Health
A14-188-S1	Tributary to Old Woman Creek	113.3	Recreation, Aquatic Health

APPENDIX H-4 (cont'd)

Impaired Surface Waters Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Beneficial Use Impaired
A14-188-S2	Tributary to Old Woman Creek [a]	113.3	Recreation, Aquatic Health
AS-ER-12	Tributary to Old Woman Creek	113.8	Recreation, Aquatic Health
B15-07-S1	Tributary to Old Woman Creek	114.3	Recreation, Aquatic Health
C15-14-S1	Tributary to Huron River	115.4	Recreation, Aquatic Health
C15-15-S1	Tributary to Huron River	115.7	Recreation, Aquatic Health
B15-09-S1	Tributary to Huron River	116.0	Recreation, Aquatic Health
C15-17-S1	Tributary to Huron River [a]	116.1	Recreation, Aquatic Health
C15-16-S1	Tributary to Huron River	116.2	Recreation, Aquatic Health
A14-156-S2	Tributary to Huron River [a]	116.5	Recreation, Aquatic Health
A14-155-S1	Tributary to Huron River	116.5	Recreation, Aquatic Health
A14-186-S1	Huron River	116.9	Recreation, Aquatic Health
AS-ER-19	Huron River	116.9	Recreation, Aquatic Health
AS-ER-20A	Tributary to Huron River	117.0	Recreation, Aquatic Health
AS-ER-20	Tributary to Huron River	117.1	Recreation, Aquatic Health
C15-20-S1	Tributary to Mud Brook	117.6	Recreation, Aquatic Health
C15-18-S1	Tributary to Mud Brook	118.4	Recreation, Aquatic Health
B15-11-S1	Tributary to Mud Brook	118.8	Recreation, Aquatic Health
E14-97-S1	Mud Creek	119.0	Recreation, Aquatic Health
C15-21-S1	Zorn Beutal Ditch	120.0	Recreation
C15-22-S1	Sheerer Ditch	120.4	Recreation
C15-74-S1	Tributary to Sheerer Ditch	120.5	Recreation
B15-12-S1	Sherer Ditch	120.9	Recreation
B15-13-S1	Sherer Ditch	122.0	Recreation
AS-ER-205	Tributary to Sawmill Creek	122.1	Recreation
E14-96-S1	Tributary to Sherer Ditch	123.1	Recreation
A15-62-S1	Tributary to Pipe Creek	124.0	Recreation, Aquatic Health
C15-23-S1	Tributary to Pipe Creek	125.7	Recreation, Aquatic Health
E14-95-S1	Pipe Creek	125.9	Recreation, Aquatic Health
E14-49-S1	Tributary to Pipe Creek	127.4	Recreation, Aquatic Health
E14-50-S1	Tributary to Mills Creek	127.9	Recreation, Aquatic Health
E14-51-S1	Tributary to Mills Creek	128.4	Recreation, Aquatic Health
E14-51-S3	Tributary to Mills Creek [a]	128.4	Recreation, Aquatic Health
E14-94-S1	Mills Creek	129.3	Recreation, Aquatic Health
Sandusky County, OH			
D15-74-S1	Scherz Ditch	134.3	Recreation
D14-4-S1	Strong Creek	135.3	Recreation
D14-6-S1	Fuller Creek	136.0	Recreation, Aquatic Health
D14-7-S1	Tributary to Fuller Creek	136.4	Recreation, Aquatic Health
D15-49-S1	Tributary to Fuller Creek	136.9	Recreation, Aquatic Health
E14-105-S1	Pickerel Creek	138.0	Recreation, Aquatic Health
D14-9-S1	Little Raccoon Creek	138.7	Recreation, Aquatic Health
D14-10-S1	Tributary to Little Racoon Creek	139.1	Recreation, Aquatic Health
D14-8-S1	Raccoon Creek	139.9	Recreation, Aquatic Health
D14-8-S2	Tributary to Raccoon Creek [a]	139.9	Recreation, Aquatic Health
E14-103-S1	South Creek	140.5	Recreation, Aquatic Health

APPENDIX H-4 (cont'd)

Impaired Surface Waters Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Beneficial Use Impaired
D15-31-S1	Tributary to South Creek	141.2	Recreation, Aquatic Health
D14-11-S1	Green Creek	141.7	Recreation, Aquatic Health
D15-115-S1	Tributary to Buehler Creek	142.7	Aquatic Health
E14-36-S1	Tributary to Buehler Ditch	143.0	Aquatic Health
D15-47-S1	Buehler Ditch	143.3	Aquatic Health
D14-40-S1	Bark Creek	143.7	Aquatic Health
AS-SA-699	Sandusky River	145.9	Aquatic Health
AP-SA-700	NA [a]	146.0	Aquatic Health
D15-104-WB	Tributary to Sandusky River [a]	146.4	Aquatic Health
AS-SA-702	Tributary to Sandusky River	146.4	Aquatic Health
E15-39-S1	Greesman Ditch	146.7	Recreation, Aquatic Health
D14-33-S1	Tributary to Muskellunge Creek	147.5	Recreation, Aquatic Health
E14-121-S1	Tributary to Muskellunge Creek	147.7	Recreation, Aquatic Health
D15-34-S1	Tributary to Little Muddy Creek	148.8	Recreation, Aquatic Health
D15-52-S1	Little Muddy Creek	149.4	Recreation, Aquatic Health
D15-87-S1	Tributary to Muddy Creek	152.7	Human Health, Recreation, Aquatic Health
E14-43-S1	Muddy Creek	153.4	Human Health, Recreation, Aquatic Health
E14-181-S1	Tributary to Muddy Creek	153.8	Human Health, Recreation, Aquatic Health
D15-35-S1	Tributary to Muddy Creek	154.4	Human Health, Recreation, Aquatic Health
E14-109-S1	Tributary to Muddy Creek	154.7	Human Health, Recreation, Aquatic Health
E14-42-S1	Ninemile Creek	155.2	Human Health, Recreation, Aquatic Health
E14-3-S1	Tributary to Ninemile Creek	155.9	Human Health, Recreation, Aquatic Health
D15-51-S1	Tributary to Wolf Creek	156.6	Human Health, Recreation, Aquatic Health
D15-50-S1	Tributary to Wolf Creek	156.9	Human Health, Recreation, Aquatic Health
C15-79-S1	Wolf Creek	157.8	Human Health, Recreation, Aquatic Health
D14-25-S1	Sugar Creek	158.6	Human Health, Recreation, Aquatic Health
E14-107-S1	Tributary to Victoria Creek	160.8	Human Health, Recreation, Aquatic Health
E14-108-S1	Victoria Creek	161.3	Human Health, Recreation, Aquatic Health
D15-26-S1	Portage River	162.5	Human Health, Recreation, Aquatic Health
Wood			
E14-111-S1	Martin Ditch	163.8	Human Health, Recreation, Aquatic Health
D14-31-S1	Tributary to Martin Ditch	164.8	Human Health, Recreation, Aquatic Health
E14-85-S1	Tributary to Toussaint Creek	165.6	Human Health, Recreation, Aquatic Health
E14-153-S1	Tributary to Toussaint Creek	166.5	Human Health, Recreation, Aquatic Health
D14-34-S1	Tributary to Toussaint Creek	166.8	Human Health, Recreation, Aquatic Health
E14-175-S1	Toussaint Creek	167.3	Human Health, Recreation, Aquatic Health
E15-22-S1	Tributary to Toussaint Creek	167.8	Human Health, Recreation, Aquatic Health
E14-48-S3	Tributary to Toussaint Creek	168.2	Human Health, Recreation, Aquatic Health
E14-48-S4	Tributary to Toussaint Creek	168.3	Human Health, Recreation, Aquatic Health
E14-48-S2	Tributary to Toussaint Creek	168.4	Human Health, Recreation, Aquatic Health
E14-79-S1	Tributary to Packer Creek	170.4	Human Health, Aquatic Health
E14-80-S1	Tributary to Packer Creek	170.8	Human Health, Aquatic Health
E14-40-S1	Packer Creek	171.1	Human Health, Aquatic Health
D15-118-S1	Tributary to Packer Creek [a]	171.2	Human Health, Aquatic Health
D15-62-S1	Tributary to Cedar Creek	174.0	Recreation, Aquatic Health
E14-35-S1	Tributary to Cedar Creek	174.5	Recreation, Aquatic Health

APPENDIX H-4 (cont'd)

Impaired Surface Waters Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Beneficial Use Impaired
E15-32-S1	Tributary to Henry Creek	175.4	Recreation, Aquatic Health
E15-33-S1	Tributary to Henry Creek	175.6	Recreation, Aquatic Health
E15-34-S1	Tributary to Henry Creek	176.2	Recreation, Aquatic Health
E15-7-S1	Tributary to Maumee River	177.3	Recreation
D14-45A-S1	Tributary to Maumee River	178.1	Recreation
E15-8-S1	Tributary to Maumee River	179.9	Recreation
D15-101-S1	Tributary to Maumee River	180.0	Recreation
D15-99-S1	Tributary to Maumee River	180.1	Recreation
E14-46-S1	Tributary to Maumee River	180.7	Recreation
E14-44-S1	Tributary to Maumee River	180.8	Recreation
E14-47-S1	Tributary to Maumee River	181.0	Recreation
Lucas County, OH			
E14-55-S1	Maumee River	181.4	Recreation
Wood County, OH			
E14-55-S1	Maumee River	181.4	Recreation
Lucas County, OH			
D15-48-S1	Tributary to Maumee River [a]	181.9	Recreation
E14-116-S1	Blystone Ditch	182.7	Human Health, Recreation, Aquatic Health
E14-29-S1	Suter Ditch	183.3	Recreation, Aquatic Health
AS-LU-2	Tributary to Whitemeir Ditch	183.4	Recreation, Aquatic Health
E14-1-S1	Whitemeir Ditch	183.6	Recreation, Aquatic Health
E14-37-S1	Estworthy Ditch	183.7	Recreation, Aquatic Health
E14-38-S1	Disher Ditch	184.1	Recreation, Aquatic Health
E14-39-S1	Harris Ditch	185.3	Recreation, Aquatic Health
E14-22-S1	Tributary to Ruhm Ditch	186.6	Recreation, Aquatic Health
E15-21-S1	Doran Ditch	187.3	Recreation
D15-1-S1	Yawberg Ditch	187.5	Recreation
D15-91-S1	Jeffers Ditch	187.7	Recreation
E15-9-S1	Laver Ditch	188.1	Recreation
Henry County, OH			
E15-29-S1	Tributary to Harris Ditch	189.5	Recreation
D15-56-S1	Tributary to Aumend Ditch	189.7	Recreation
D15-7-S2	Tributary to Blue Creek	190.2	Recreation
D15-7-S1	Tributary to Blue Creek	190.2	Recreation
Fulton County, OH			
E15-14-S1	Blue Creek	190.9	Recreation
E15-14-S2	Tributary to Blue Creek	191.1	Recreation
E15-45-S1	Tributary to Blue Creek	191.6	Recreation
D15-110-S1	Tributary to Blue Creek	192.3	Recreation
D15-111-S1	Tributary to Blue Creek	193.2	Recreation
D15-60-S1	Tributary to Fewless Creek	193.9	Recreation, Aquatic Health
E15-37-S1	Tributary to Fewless Creek	195.0	Recreation, Aquatic Health
E15-36-S1	Fewless Creek	195.2	Recreation, Aquatic Health
D15-61-S1	Tributary to Fewless Creek	195.9	Recreation, Aquatic Health
D15-17-S1	Swan Creek	196.4	Recreation, Aquatic Health
D15-9-S1	Tributary to Swan Creek	197.3	Recreation, Aquatic Health
D15-98-S1	Tributary to Swan Creek	197.5	Recreation, Aquatic Health
D15-60A-S1	Tributary to Fewless Creek	197.9	Recreation, Aquatic Health

APPENDIX H-4 (cont'd)

Impaired Surface Waters Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Beneficial Use Impaired
D15-10-S1	Tributary to Swan Creek	198.6	Recreation, Aquatic Health
D15-13-S1	Tributary to Swan Creek	199.1	Recreation, Aquatic Health
E14-4-S1	Ai Creek	200.8	Recreation, Aquatic Health
E15-19-S1	Frankfort Ditch	202.1	Recreation, Aquatic Health
D14-24-S1	Tributary to McNett Ditch	202.7	Recreation, Aquatic Health
E14-112-S1	McNett Ditch	203.4	Recreation, Aquatic Health
D14-44-S1	Tributary to Langenderfer Ditch	203.9	Human Health, Recreation
E14-53-S1	Tributary to Langenderfer Ditch	205.2	Human Health, Recreation
D15-82-S1	Tributary to Langenderfer Ditch	205.6	Human Health, Recreation
D15-83-S1	Tributary to Langenderfer Ditch	206.0	Human Health, Recreation
E14-11-S1	Tributary to Schmitz Ditch	206.2	Human Health, Recreation, Aquatic Health
E14-12-S1	Tributary to Tenmile Creek	207.0	Human Health, Recreation, Aquatic Health
D14-45-S1	Tenmile Creek	207.9	Human Health, Recreation, Aquatic Health
Lenawee County, MI			
E14-140-S1	River Raisin	215.2	Fish Consumption
D15-28-S1	Tributary to River Raisin	215.8	Fish Consumption
AS-LE-5	Tributary to River Raisin	216.3	Fish Consumption
E14-143-S1	Little River Raisin	220.5	Fish Consumption
E14-64-S1	Fry Drain	220.7	Fish Consumption
E14-69-S1	Isley Drain	222.1	Fish Consumption
E14-76-S1	Swamp Raisin Creek	222.5	Fish Consumption
E14-77-S1	Tributary to Swamp Raisin Creek	222.7	Fish Consumption
AS-LE-203	Dibble Drain	225.8	Fish Consumption
AS-LE-202	Tributary to South Branch Macon Creek	225.6	Fish Consumption
AS-LE-204	South Branch Macon Creek	226.4	Fish Consumption
E14-126-S1/ AS-LE-205	Tributary to South Branch Macon Creek	226.7	Fish Consumption
E14-74-S1	Schreeder Brook	226.8	Fish Consumption
E14-149-S1/ AS-LE-12	Tributary to Middle Branch Macon Creek	228.8	Fish Consumption
E14-87-S1	Macon Creek	229.5	Fish Consumption, Aquatic Life and Wildlife
E14-61-S1	Tributary to Richardson Drain	229.8	Fish Consumption
Monroe County, MI			
E14-63-S1	Tributary to Richardson Drain	230.7	Fish Consumption
AS-MO-1	Richardson Drain	231.4	Fish Consumption
E14-65-S1	Bear Swamp Creek	231.9	Fish Consumption
E14-66-S1	Tributary to Bear Swamp Creek	232.4	Fish Consumption
D15-40-S1	Cone Drain	233.3	Fish Consumption
AS-MO-2	Tributary to Center Creek	233.7	Fish Consumption
AS-MO-10A	Tributary to Center Creek	234.3	Fish Consumption
AS-MO-10	Center Creek	234.4	Fish Consumption
AS-MO-4	North Branch Macon Creek	236.0	Fish Consumption

APPENDIX H-4 (cont'd)

Impaired Surface Waters Crossed by the NGT and TEAL Projects

Project, Facility, County, Waterbody ID	Waterbody Name	Milepost	Beneficial Use Impaired
Washtenaw County, MI			
E14-157-S1	Saline River	237.6	Fish Consumption
E14-135-S1	McCarthy Drain	244.2	Aquatic Life and Wildlife
E14-162-S1	West Branch Paint Creek	244.7	Aquatic Life and Wildlife
E15-13-S1	Tributary to West Branch Paint Creek	245.0	Aquatic Life and Wildlife
E14-99-S1	Tributary to Bird Drain	245.0	Aquatic Life and Wildlife
E14-164-S1/AS-WA-6	Paint Creek	246.3	Aquatic Life and Wildlife
E14-176-S1	Tributary to Paint Creek	246.6	Aquatic Life and Wildlife
TGP Interconnect			
Columbiana County, OH			
B15-17-S2	Tributary to Brush Creek	0.7	Aquatic Health
B15-17-S3	Tributary to Brush Creek	0.7	Aquatic Health
TEAL PROJECT			
Connecting Pipeline			
Columbiana County, OH			
B15-17-S2	Tributary to Brush Creek	0.2	Aquatic Health

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a Centerline does not cross the waterbody.

Sources: Ohio: OEPA, 2014b
Michigan: Data retrieved from Table 2.3-7 of the November 2015 Resource Report 2

APPENDIX H-5

FEMA FLOOD ZONES CROSSED BY THE NGT PROJECT

APPENDIX H-5

FEMA Flood Zones Crossed by the NGT Project

State, Facility, County	Milepost Enter	Milepost Exit	FEMA Flood Zone [a]
OHIO			
Mainline			
Columbiana	2.0	2.0	A
Columbiana	2.1	2.2	A
Columbiana	4.9	5.0	A
Columbiana	5.0	5.0	A
Columbiana	11.0	11.0	A
Columbiana	11.1	11.2	A
Stark	26.7	26.9	A
Stark	26.7	26.9	A
Stark	32.0	32.0	AE
Stark	32.0	32.0	AE
Stark	32.0	32.0	AE
Stark	32.0	32.0	AE
Stark	32.1	32.2	AE
Stark	32.1	32.2	AE
Stark	33.7	33.8	AE
Stark	33.7	33.8	AE
Stark	33.8	33.9	AE
Stark	33.8	33.9	AE
Stark	33.9	33.9	AE
Stark	33.9	33.9	AE
Stark	34.0	34.0	AE
Stark	34.0	34.0	AE
Stark	34.1	34.2	AE
Stark	34.1	34.2	AE
Summit	41.8	42.1	A
Summit	48.0	48.1	AE
Summit	48.1	48.2	AE
Summit	48.9	48.9	A
Wayne	57.4	57.6	AE
Wayne	57.6	57.7	AE
Medina	57.7	57.9	AE
Medina	60.7	60.7	AE
Medina	60.7	60.7	AE
Medina	68.8	68.8	A
Medina	71.1	71.1	AE
Medina	75.9	76.1	A
Lorain	84.4	84.5	A
Lorain	86.4	86.7	A
Lorain	88.6	88.8	A
Lorain	90.0	90.1	A
Lorain	91.3	91.4	A
Lorain	91.8	91.9	A
Lorain	92.2	92.8	A
Lorain	96.1	96.1	AE
Lorain	96.1	96.1	AE
Lorain	99.3	99.3	A

APPENDIX H-5 (cont'd)

FEMA Flood Zones Crossed by the NGT Project

State, Facility, County	Milepost Enter	Milepost Exit	FEMA Flood Zone [a]
Huron	104.3	104.5	A
Huron	104.5	104.5	A
Erie	105.8	105.9	A
Erie	113.1	113.2	A
Erie	113.8	113.9	A
Erie	114.2	114.3	A
Erie	115.4	115.4	A
Erie	115.7	115.7	A
Erie	116.5	116.5	AE
Erie	116.7	116.8	AE
Erie	116.8	117.0	AE
Erie	117.0	117.0	AE
Erie	117.6	117.6	A
Erie	118.4	118.4	A
Erie	118.8	118.8	A
Erie	119.0	119.0	A
Erie	125.7	125.7	A
Erie	125.8	125.9	A
Erie	129.0	129.4	A
Erie	129.4	129.4	A
Sandusky	131.5	131.7	A
Sandusky	135.3	135.4	A
Sandusky	136.0	136.0	A
Sandusky	137.9	138.1	A
Sandusky	139.8	140.0	A
Sandusky	140.5	140.5	A
Sandusky	141.1	141.2	A
Sandusky	141.5	141.7	A
Sandusky	143.7	143.8	A
Sandusky	145.3	145.4	AE
Sandusky	145.6	145.8	AE
Sandusky	145.8	145.9	AE
Sandusky	145.9	145.9	AE
Sandusky	146.0	146.1	AE
Sandusky	149.4	149.5	A
Sandusky	153.3	153.5	A
Sandusky	153.9	153.9	A
Sandusky	155.2	155.2	A
Sandusky	158.6	158.7	A
Sandusky	162.5	162.6	A
Wood	167.3	167.4	A
Wood	171.1	171.1	A
Wood	181.4	181.4	AE
Wood	181.4	181.4	AE
Lucas	181.5	181.7	AE
Lucas	182.6	182.7	AE
Lucas	182.7	182.8	AE
Lucas	185.3	185.3	AE
Lucas	185.3	185.3	A

APPENDIX H-5 (cont'd)

FEMA Flood Zones Crossed by the NGT Project

State, Facility, County	Milepost Enter	Milepost Exit	FEMA Flood Zone [a]
Fulton	190.8	190.9	AE
Fulton	190.9	191.0	AE
Fulton	195.2	195.3	AE
Fulton	195.3	195.3	AE
Fulton	195.9	196.0	AE
Fulton	196.3	196.3	AE
Fulton	196.3	196.4	AE
Fulton	200.8	200.8	AE
Fulton	200.8	200.9	AE
Fulton	207.9	207.9	AE
Fulton	207.9	207.9	AE
MICHIGAN			
Mainline			
Monroe	232.4	232.4	A
Monroe	233.2	233.4	A
Monroe	234.1	234.1	A
Monroe	234.1	234.2	A
Monroe	234.4	234.5	A
Monroe	236.0	236.1	A
Washtenaw	237.4	237.6	A
Washtenaw	244.7	244.8	AE
Washtenaw	244.8	244.9	AE
Washtenaw	246.2	246.3	AE
Washtenaw	246.3	246.3	AE
Washtenaw	246.3	246.3	AE
Washtenaw	250.8	250.9	AE
Washtenaw	250.9	250.9	AE
Washtenaw	253.4	253.4	A
Washtenaw	253.6	253.6	A

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[a] Flood hazard areas identified on the Flood Insurance Rate Map are identified as a Special Flood Hazard Area, which are defined as the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year.
FEMA Flood Zone A – Areas subject to inundation by the 1-percent-annual-chance (100 year) flood event generally determined using approximate methodologies.
FEMA Flood Zone AE – Areas subject to inundation by the 1-percent-annual-chance (100 year). Flood event determined by detailed methods.

Source: FEMA, 2016.

APPENDIX H-6

ATWS WITHIN 50 FEET OF WETLANDS AND WATERBODIES ON THE NGT AND TEAL PROJECTS

APPENDIX H-5

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
NGT PROJECT							
Mainline							
Columbiana County, OH	ATWS-2570	2.0	Yes	Yes	A14-5/A14-5-S4	0/20.1	Road, waterbody and wetland crossing. HWY 30 and waterbody bored crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in a wetland. Wetland has been partially classified as AG-PEM.
Columbiana County, OH	ATWS-2618	2.0	Yes	No	A14-5	0	Road, waterbody and wetland crossing. HWY 30 and waterbody bored crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in a wetland. Wetland has been partially classified as AG-PEM.
Columbiana County, OH	ATWS-4199	3.9	No	Yes	A14-8-S1/A14-8	47.9/30.4	Waterbody crossing. ATWS in Non-disturbed area and inside 50-ft waterbody buffer. ATWS required at this location due to slope for spoil storage, equipment placement, and dewatering activities associated with an open-cut waterbody crossing.
Columbiana County, OH	ATWS-3050	4.9	Yes	Yes	A14-10 /A14-10-S1/A14-10-S2	0/14.0/16.6	Kettering Road and waterbody bore crossing. ATWS is located in delineated wetland.
Columbiana County, OH	ATWS-3049	4.9	Yes	No	A14-10	0	Road and wetland crossing. Kettering Road and waterbody bored crossing. Also proposed open cut of Weaver Road. ATWS also designed for equipment and material movement. ATWS is located in delineated wetland.
Columbiana County, OH	ATWS-4201	5.0	Yes	Yes	A14-10 /A14-10-S2	0/12.9	Road and wetland crossing. Proposed open cut of Weaver Rd. ATWS is located in delineated wetland.
Columbiana County, OH	ATWS-3694	6.3	Yes	No	C15-118	0	Bend installation and existing pipeline crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in a wetland.
Columbiana County, OH	ATWS-2493	11.1	Yes	Yes	A15-34//A15-34-S1/A15-34-S2	0/25.9/14.2	Bend installation, waterbody, rail (bored crossing) and wetland crossing. ATWS is located in delineated wetland.
Columbiana County, OH	ATWS-2635	11.1	Yes	Yes	A15-34/A15-34-S1	0/21.5	Bend installation, waterbody, rail (bored crossing) and wetland crossing. ATWS is located in delineated wetland.

APPENDIX H-6 (cont'd)

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
Columbiana County, OH	ATWS-2492	11.2	Yes	No	A15-31	0	Bend installation, waterbody, rail (bore crossing) and wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in a wetland.
Columbiana County, OH	ATWS-2279	11.2	Yes	No	A15-31	0	Bend installation, waterbody, rail (bored crossing) and wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in a wetland.
Columbiana County, OH	ATWS-2285	11.3	Yes	No	A15-31	0	Homeworth Rd bored crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in a wetland.
Stark County, OH	ATWS-3319	13.3	Yes	No	B15-64	0	Bend installation. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in a delineated wetland.
Stark County, OH	ATWS-35	14.0	Yes	Yes	B15-54 /B15-54-S2	42.1/12.3	Road, waterbody and wetland crossing. ATWS in Non-disturbed area.
Stark County, OH	ATWS-3726	14.0	No	Yes	B15-54-S2	12.7	Road and waterbody crossing. Salem Church Rd bore crossing. ATWS partially located within 50-ft waterbody buffer.
Stark County, OH	ATWS-550	25.2	No	Yes	A14-28-WB1	40	Extra room for bend/fitting. ATWS located in non-disturbed area.
Stark County, OH	ATWS-4015	27.8	Yes	No	A14-34	0	Topsoil segregation. Rail road bored crossing.
Stark County, OH	ATWS-4017	27.9	Yes	No	A14-34	0	Bend installation.
Stark County, OH	ATWS-735	28.0	Yes	No	A14-34	0	Rail bore crossing, bend installation, existing pipeline and wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in a wetland.
Stark County, OH	ATWS-500	28.0	Yes	No	A14-34	0	Rail bore crossing, bend installation, existing pipeline and wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in a wetland.
Stark County, OH	ATWS-2260	33.3	No	Yes	C15-125-S1	36.4	Bend installation and additional room for installation of long bored crossing. ATWS partially located in disturbed land and partially in undisturbed land.

APPENDIX H-6 (cont'd)

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
Stark County, OH	ATWS-4021	33.5	No	Yes	B15-67-S1	32.0	Waterbody and wetland crossing. ATWS in non-disturbed area. Long wetland crossing with waterbodies in wetland. Extra width required to move crews/equipment down row.
Stark County, OH	ATWS-2628	33.7	Yes	No	B15-67-S1	15.9	Waterbody and wetland crossing. ATWS in non-disturbed area. Long wetland crossing with waterbodies in wetland. Extra width required to move crews/equipment down row.
Stark County, OH	ATWS-2629	33.8	Yes	No	B15-73	0	Waterbody and wetland crossing. ATWS in non-disturbed area. Long wetland crossing with waterbodies in wetland. Extra width required to move crews/equipment down row.
Stark County, OH	ATWS-2630	33.8	Yes	Yes	B15-73/A15-68-S1/B15-67-S1	19.4/19.3/11.4	Waterbody and wetland crossing. ATWS in non-disturbed area. Long wetland crossing with waterbodies in wetland. Extra width required to move crews/equipment down row.
Summit County, OH	ATWS-2385	34.3	Yes	No	A15-71	0	Rail bore crossing, wetland crossing and truck turnaround. ATWS located in a wetland.
Summit County, OH	ATWS-2384	34.3	Yes	No	A15-71	0	Rail bore crossing, wetland crossing and truck turnaround. ATWS located in a wetland.
Summit County, OH	ATWS-2386	34.3	Yes	No	A15-71	0	Rail bore crossing, wetland crossing and truck turnaround. ATWS located in a wetland.
Summit County, OH	ATWS-2382	34.3	Yes	No	A15-71	0	Rail bore crossing, wetland crossing and truck turnaround. ATWS located in a wetland.
Summit County, OH	ATWS-3265	34.4	Yes	No	A15-71	0	Pipeline crossing. ATWS in non-disturbed delineated wetland.
Summit County, OH	ATWS-4229	34.4	Yes	No	A15-71/AWB-SU-213	0/0	Long wetland crossing. Extra width required to move crews/equipment down ROW.
Summit County, OH	ATWS-3264	34.4	Yes	No	A15-71	0	Pipeline crossing. ATWS in non-disturbed delineated wetland.
Summit County, OH	ATWS-2359	34.6	Yes	No	A15-71	0	Waterbody and wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in delineated wetland.
Summit County, OH	ATWS-94	35.5	Yes	No	AWB-SU-4	16.9	Road and wetland crossing. ATWS in non-disturbed area.
Summit County, OH	ATWS-4231	35.6	Yes	No	AWB-SU-4/A15-90	0/9.9	Wetland crossing and equipment access to I-77 bore crossing. ATWS located in a wetland.

APPENDIX H-6 (cont'd)

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
Summit County, OH	ATWS-4024	36.2	Yes	No	AWB-SU-401	12.0	Bend installation. ATWS in non-disturbed area and within 50-ft wetland buffer.
Summit County, OH	ATWS-3082	36.6	Yes	No	C15-106	0	Long wetland crossing. Extra width required to move crews/equipment down ROW. ATWS located inside delineated wetland.
Summit County, OH	ATWS-4025	36.7	Yes	Yes	C15-106/C15-106-S1	11.2/17.2	Waterbody crossing. ATWS located partially in disturbed upland area and partially inside 50-ft wetland buffer. ATWS has been reshaped due to route variation filed in the Supplemental Filing.
Summit County, OH	ATWS-2325	37.4	Yes	No	C15-120	11.4	Massillon Rd bored crossing. Waterbody and wetland crossing. ATWS within 50-ft wetland buffer in non-disturbed area.
Summit County, OH	ATWS-2324	37.4	Yes	No	C15-120	10.7	Massillon Rd bored crossing. Waterbody and wetland crossing. ATWS within 50-ft wetland buffer in non-disturbed area.
Summit County, OH	ATWS-4234	38.0	Yes	No	AWB-SU-204	14.5	ATWS within 50-ft wetland buffer in non-disturbed area. This ATWS is required at this location to store the spoil associated with wetland construction, to store the cleared vegetation from the upland area, and also to accommodate additional spoil storage due to the foreign line crossing.
Summit County, OH	ATWS-577	39.6	Yes	No	A14-112	12.2	Wetland crossing. ATWS within 50-ft wetland buffer in non-disturbed area.
Summit County, OH	ATWS-3274	39.8	Yes	No	A14-112	0	Arlington Rd bored crossing and wetland crossing. ATWS located within delineated wetland
Summit County, OH	ATWS-99	39.8	Yes	No	A14-112	0	Arlington Rd bored crossing and wetland crossing. ATWS located within delineated wetland
Summit County, OH	ATWS-4505	39.8	Yes	No	A14-112	21.8	Arlington Rd bored crossing. ATWS in non-disturbed area and within 50-ft wetland buffer.
Summit County, OH	ATWS-3171	39.8	Yes	Yes	A14-112/A14-112-S1A	0/10.9	Arlington Rd bored crossing and wetland crossing. ATWS located within delineated wetland.
Summit County, OH	ATWS-1986	45.3	Yes	Yes	B14-1/B14-1-S1	0/44.3	Bend installation, pipeline and wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located within delineated wetland.

APPENDIX H-6 (cont'd)

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
Summit County, OH	ATWS-2479	45.4	Yes	No	B14-1	0	Bend/fitting installation and 6 foreign pipeline crossings. Wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in delineated wetland.
Summit County, OH	ATWS-1985	45.4	Yes	No	B14-1	0	Bend/fitting installation and 6 foreign pipeline crossing. Road and wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in delineated wetland.
Summit County, OH	ATWS-3288	45.4	Yes	No	B14-1	0	Road, pipeline and wetland crossing.
Summit County, OH	ATWS-121	46.8	No	Yes	A15-13-S1	11.9	Center Road bore crossing. ATWS partially located in disturbed upland area with a small corner located in non-disturbed upland area. ATWS is within 50-ft waterbody. This ATWS is required to be this size in order to place equipment needed for the road bore, to safely dig the bore pits and to store spoil associated with the road bore.
Summit County, OH	ATWS-3233	49.3	Yes	No	AWB-SU-43	0	Cleveland Massillon Rd bored crossing and bend/fitting installation. Bore pull back string.
Summit County, OH	ATWS-3232	49.3	Yes	No	AWB-SU-43	0	Bend installation. ATWS in non-disturbed area.
Summit County, OH	ATWS-4237	49.3	Yes	No	AWB-SU-43	0	Road and wetland crossing. ATWS in non-disturbed area.
Summit County, OH	ATWS-4535	49.9	Yes	No	A14-41	10.7	Kungle Rd bored crossing. ATWS in non-disturbed area and within 50-ft wetland buffer.
Summit County, OH	ATWS-128	49.9	No	Yes	A14-41-S1	19.8	Road and waterbody crossing. ATWS in non-disturbed area and within 50-ft waterbody buffer
Summit County, OH	ATWS-4536	49.9	Yes	No	A14-41	46.9	Waterbody and wetland crossing. ATWS in non-disturbed area and within 50-ft wetland buffer.

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
Summit County, OH	ATWS-127	50.0	No	Yes	A14-41-S1	17.6	Waterbody and wetland crossing. ATWS in non-disturbed area and within 50-ft waterbody buffer. This ATWS is required in this location to accommodate pre-installation of the drag section and for the equipment associated with the bend installation, to accommodate additional spoil storage required for the foreign line crossing, and to accommodate additional spoil storage and additional equipment necessary to safely construct the waterbody and wetland crossing.
Summit County, OH	ATWS-3331	50.0	No	Yes	A14-41-S1	36.7	Waterbody and wetland crossing. ATWS in non-disturbed area and within 50-ft wetland and waterbody buffers. This ATWS is required at this location for additional spoil storage associated with the foreign line crossing, and to accommodate additional spoil storage and additional equipment necessary to safely construct the waterbody and wetland crossing. It cannot be shifted further from the resource as it would then overlap the existing pipeline.
Wayne County, OH	ATWS-3753	52.6	Yes	Yes	A14-124/A14-124-S2/A14-124-S1	0/26.6/41.3	Bend installation, waterbody and wetland crossing. ATWS is located in delineated wetland.
Wayne County, OH	ATWS-2599	52.8	Yes	Yes	A15-52-S1	25.9	Calaboone Road crossing. ATWS located in non-disturbed area and within 50-ft of waterbody buffer.
Wayne County, OH	ATWS-2515	53.5	No	Yes	B15-91-S1	16.5	Waterbody and Gates Rd bored crossing. ATWS in non-disturbed area and within 50-ft waterbody buffer.
Wayne County, OH	ATWS-2930	53.5	No	Yes	B15-91-S1	18.2	Waterbody and Gates Rd bored crossing. ATWS in non-disturbed area and within 50-ft waterbody buffer.
Wayne County, OH	ATWS-3351	55.6	Yes	No	C15-89	9.7	Topsoil segregation. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in non-disturbed area.
Wayne County, OH	ATWS-271	57.3	Yes	No	AWB-WA-400/B15-50	8.4/0	State Hwy 57 and wetland crossing. ATWS located in non-disturbed area and within estimated wetland
Medina County, OH	ATWS-155	62.6	Yes	No	B15-70	0	Greenwich Rd bored crossing and wetland crossing. ATWS located in delineated wetland.

APPENDIX H-6 (cont'd)

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
Medina County, OH	ATWS-4247	67.6	Yes	No	AWB-ME-31	0	Waterbody, side slope and steep terrain construction. ATWS located in non-disturbed area and approximated wetland. At the time of this response approximated wetland AWB-ME-31 has not been field delineated. This ATWS located based on terrain and is required for the storage of additional spoil resulting from side slope construction techniques, to accommodate topsoil storage at the wetland, and to accommodate additional spoil storage and additional equipment necessary to safely construct the waterbody crossing.
Medina County, OH	ATWS-4248	67.7	Yes	No	AWB-ME-31	12.8	Wetland and waterbody crossing. At the time of this response approximated Wetland AWB-ME-31 has not been field delineated. This ATWS is required to accommodate topsoil storage at the wetland, and to accommodate additional spoil storage and additional equipment necessary to safely construct the waterbody crossing.
Medina County, OH	ATWS-4249	67.8	Yes	No	B15-111	12.0	Waterbody and wetland crossing and side slope construction. ATWS located in non-disturbed area and within 50-ft wetland buffer. This ATWS is required to accommodate topsoil storage, to accommodate additional spoil storage and the additional equipment necessary to safely construct the waterbody and wetlands crossing. This ATWS is also required to due to the side slope construction techniques that will be utilized in this area. The ATWS size has been reduced as much as possible considering these constraints.
Medina County, OH	ATWS-172	67.9	Yes	Yes	B15-82/B15-110-WB1	1.1/17.3	Bend installation. ATWS located in non-disturbed and within 50-ft wetland and waterbody buffers.
Medina County, OH	ATWS-4050	68.8	No	Yes	A15-3-S1	17.6	Waterbody crossing. ATWS in non-disturbed area and within 50-ft waterbody buffer
Medina County, OH	ATWS-4052	68.8	No	Yes	A15-3-S1	12.1	Chippewa Rail Trail and waterbody crossing. ATWS in non-disturbed area and within 50-ft waterbody buffer
Medina County, OH	ATWS-4054	68.8	No	Yes	A15-3-S1/A15-3-S3	15.9/21.3	Chippewa Rail Trail and waterbody crossing. ATWS in non-disturbed area

APPENDIX H-6 (cont'd)

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
Medina County, OH	ATWS-281	69.5	Yes	No	C15-40	6.8	Rail and wetland crossing. ATWS located in upland consisting of cultivated or rotated cropland or disturbed land. ATWS located within 10-ft delineated wetland buffer.
Medina County, OH	ATWS-3372	69.4	Yes	No	AWB-ME-701	8.4	Lake Road and railroad and wetland crossing. ATWS located in upland consisting of cultivated or rotated cropland or disturbed land. ATWS located within 10-ft estimated wetland buffer.
Medina County, OH	ATWS-3374	69.4	Yes	No	AWB-ME-701	4.3	Lake Road and railroad and wetland crossing. ATWS located in upland consisting of cultivated or rotated cropland or disturbed land. ATWS located within 10-ft estimated wetland buffer.
Medina County, OH	ATWS-181	72.5	Yes	No	A14-48	0	Carlton Rd bored crossing and bend/fitting installation and wetland crossing.
Medina County, OH	ATWS-3392	72.5	Yes	No	A14-48	0	Carlton Rd bored crossing and bend/fitting installation and wetland crossing.
Medina County, OH	ATWS-3393	72.5	Yes	No	A14-48	0	Bend installation. ATWS located in non-disturbed area and within delineated wetland.
Medina County, OH	ATWS-3729	72.5	Yes	No	A14-48	0	Bend installation. ATWS located in non-disturbed area and within delineated wetland.
Medina County, OH	ATWS-2219	73.2	Yes	No	C15-24-W8	0	Bend installation and wetland crossing.
Medina County, OH	ATWS-3735	73.2	Yes	No	C15-24-W8/C15-24-W9	0/0	Bend installation, and wetland crossing.
Medina County, OH	ATWS-3734	73.3	Yes	Yes	C15-24-W8/C15-24-S1-2	0/24.8	Wetland crossing and equipment movement. Extra width required to move crews/equipment down ROW. ATWS in non-disturbed area and within delineated wetland.
Medina County, OH	ATWS-3733	73.3	Yes	Yes	C15-24-W7/C15-24-W8/C15-24-S7	0/0/0	Wetland crossing and equipment movement. Extra width required to move crews/equipment down row. ATWS in non-disturbed area and within delineated wetland
Medina County, OH	ATWS-285	73.7	No	Yes	AS-ME-56	25.4	Road and waterbody crossing. ATWS in non-disturbed area
Medina County, OH	ATWS-2592	76.3	Yes	Yes	B15-74/B15-74-S4	0/18.0	Beck Rd bored crossing, waterbody and wetland crossing. ATWS located in non-disturbed area and located within delineated wetland.

APPENDIX H-6 (cont'd)

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
Medina County, OH	ATWS-2591	76.3	Yes	No	B15-74	13.2	Beck Rd bored crossing, waterbody and wetland crossing. ATWS located in non-disturbed area and within 50-ft wetland buffer
Medina County, OH	ATWS-3398	77.0	Yes	Yes	A15-76/A15-76-S1/A15-76-S2	0/8.7/17.1	Waterbody and wetland crossing. ATWS is between two waterbodies and partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located inside non-forested delineated emergent wetland. This ATWS is required at the wetland to accommodate topsoil storage, and to accommodate additional spoil storage and additional equipment necessary to safely construct the waterbody and wetland crossing. Matting will be used in ATWS in emergent wetland to minimize potential temporary disturbance during use.
Lorain County, OH	ATWS-593	82.7	Yes	No	A14-63	0	Law Rd bored crossing and wetland crossing. Extra ATWS needed on the working side due to power line collocation on spoil side. ATWS located in non-disturbed area and delineated wetland area.
Lorain County, OH	ATWS-3764	83.5	Yes	No	A14-68	0	Wetland crossing, Bend installation and equipment movement. ATWS in non-disturbed area and inside delineated wetland.
Lorain County, OH	ATWS-771	83.6	Yes	No	A14-67	0	Bend installation. ATWS in non-disturbed area and partially located inside delineated wetland.
Lorain County, OH	ATWS-3768	84.4	Yes	No	A14-69	31.6	Waterbody and wetland crossing. ATWS in non-disturbed area and inside the 50-ft wetland buffer...
Lorain County, OH	ATWS-3770	85.1	Yes	No	A14-71	13.1	Bend installation. ATWS located in upland.
Lorain County, OH	ATWS-3773	87.0	Yes	Yes	A14-52/B15-61-S1	0/16.7	Rail, road, waterbody and wetland crossing. ATWS in non-disturbed area. ATWS was not sited under the existing power line transmission corridor to provide a safe working location.
Lorain County, OH	ATWS-773	87.7	Yes	No	B15-95	0	Bend installation. ATWS located within cultivation but also within delineated wetland.
Lorain County, OH	ATWS-2733	87.8	Yes	No	B15-95	0	Bend installation and wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in delineated wetland.
Lorain County, OH	ATWS-209	90.1	No	Yes	A14-76-S1	29.6	Waterbody crossing and Whitehead Rd bored crossing and wetland crossing.

APPENDIX H-6 (cont'd)

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
Lorain County, OH	ATWS-4473	92.4	No	Yes	AS-LO-758A/C15-8-S4	12.8/8.5	Access to hydrostatic test water. Workspace parallels waterbody and is within 50-ft buffer of waterbody.
Lorain County, OH	ATWS-4077	93.4	No	Yes	A14-140-S1	16.1	Road and waterbody crossing. ATWS in non-disturbed area
Lorain County, OH	ATWS-1893	94.3	Yes	No	A14-178	12.3	Pipeline. ATWS in non-disturbed area
Lorain County, OH	ATWS-4406	96.3	Yes	No	C15-58	0	Abandoned rail, waterbody and wetland crossing. ATWS in non-disturbed.
Lorain County, OH	ATWS-4405	96.3	Yes	No	C15-58	0	Abandoned rail bored crossing and wetland crossing. ATWS in non-disturbed.
Lorain County, OH	ATWS-2871	96.7	Yes	No	A15-38	0	Quarry Rd bored crossing.
Lorain County, OH	ATWS-2970	100.6	Yes	No	B15-105	43.7	Gore Orphanage Road crossing. ATWS in non-disturbed area and within 50-ft wetland buffer.
Lorain County, OH	ATWS-2432	100.6	Yes	No	B15-105	0	Gore Orphanage Road crossing. ATWS in non-disturbed area and partially located within delineated wetland.
Huron County, OH	ATWS-2781	102.3	No	Yes	A15-57-S1	16.1	Road, and waterbody crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in non-disturbed land. ATWS located partially within 50-ft waterbody buffer.
Erie County, OH	ATWS-2819	105.8	Yes	No	C15-70	0	Road and wetland crossing. ATWS located within delineated wetland
Erie County, OH	ATWS-2791	105.8	Yes	No	C15-70	0	Waterbody and Florence Wakemen Rd crossing and wetland crossing. ATWS located within delineated wetland.
Erie County, OH	ATWS-4098	111.4	Yes	No	B15-60	0	Bend installation. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located inside delineated wetland.
Erie County, OH	ATWS-3809	116.5	Yes	Yes	A14-156/A14-156-S2	0/0	Rail /trail and wetland crossing. ATWS in non-disturbed area and within delineated wetland.
Erie County, OH	ATWS-3810	116.5	Yes	Yes	A14-156/A14-155-S1	0/49.1	Rail /trail, waterbody and wetland crossing. ATWS in non-disturbed area and inside delineated wetland and 50-ft wetland buffer
Erie County, OH	ATWS-1554	117.4	No	Yes	C15-20-S1	0	HDD pull back string for Huron River crossing. Spoil will be stored at least 10-ft from water's edge.

APPENDIX H-6 (cont'd)

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
Erie County, OH	ATWS-821	120.4	Yes	No	C15-22-W2	0	Road and wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in a delineated wetland.
Sandusky County, OH	ATWS-3521	138.6	Yes	No	AWB-SA-604/D14-9	14.7/0	N STATE ROUTE 510 bored crossing and wetland crossing. ATWS in non-disturbed area and within delineated wetland.
Sandusky County, OH	ATWS-3522	138.6	Yes	Yes	D14-9/D14-9-S1	0/15.5	Road, waterbody and wetland crossing. ATWS in non-disturbed area and within delineated wetland.
Sandusky County, OH	ATWS-2838	139.2	Yes	No	D15-71	0	Road and wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in a delineated wetland.
Sandusky County, OH	ATWS-3859	141.6	Yes	No	D15-32	0	County RD 239 bored crossing and wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located within delineated wetland.
Sandusky County, OH	ATWS-2509	141.6	Yes	No	D15-32	0	County RD 239 bored crossing and wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located within delineated wetland
Sandusky County, OH	ATWS-2472	145.1	Yes	No	AWB-SA-706	0	HDD pull back string. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in estimated wetland.
Sandusky County, OH	ATWS-2474	146.2	Yes	No	AWB-SA-701	0	Wetland crossing. ATWS partially located within estimated wetland.
Sandusky County, OH	ATWS-4353	146.2	Yes	No	AWB-SA-701	0	Wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located within estimated wetland. .
Sandusky County, OH	ATWS-3862	146.3	Yes	Yes	AS-SA-702/AWB-SA-701/AWB-SA-702/D15-104-WB/D15-104-S1/D15-104	22.5/0/4.7/0/8.6/36.9	Waterbody and wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located within estimated wetland.

APPENDIX H-6 (cont'd)

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
Sandusky County, OH	ATWS-3864	146.4	Yes	Yes	AS-SA-702/AWB-SA-702/D15-104-S1/D15-104	40.3/28.6/40.4/0	Waterbody and wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially within delineated wetland.
Sandusky County, OH	ATWS-3863	146.4	Yes	Yes	AWB-SA-701/AWB-SA-702/AS-SA-702	0/13.3/17.8	Waterbody and wetland crossing. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially within estimated wetland.
Sandusky County, OH	ATWS-4125	157.6	Yes	No	D14-41	0	Road and wetland crossing. ATWS in non-disturbed area.
Sandusky County, OH	ATWS-4127	158.1	Yes	No	E14-123/E14-124/D14-42	0/11.4/20.3	N STATE ROUTE 300 bored crossing and wetland crossing. ATWS in non-disturbed area and partially within delineated wetland.
Sandusky County, OH	ATWS-1948	158.1	Yes	No	E14-123/D14-42	0/8.4	N STATE ROUTE 300 bored crossing and wetland crossing. ATWS in non-disturbed area and within delineated wetland.
Sandusky County, OH	ATWS-347	158.2	Yes	No	D14-42/E14-123	0/8.4	Road and wetland crossing. ATWS in non-disturbed area and within delineated wetland.
Sandusky County, OH	ATWS-4128	158.2	Yes	No	D14-42	0	N STATE ROUTE 300 bored crossing and wetland crossing. ATWS located within delineated wetland.
Sandusky County, OH	ATWS-4129	158.6	Yes	Yes	D14-25/D14-25-S1	0/35.4	Waterbody and wetland crossing. ATWS located within delineated wetland.
Wood County, OH	ATWS-2903	166.7	Yes	No	E14-152/D15-62A	0/33.1	Rail and wetland crossing. ATWS partially in disturbed area and partially in non-disturbed area. ATWS located partially in AG-PEM Wetland and partially within delineated wetland
Wood County, OH	ATWS-4435	181.3	Yes	Yes	D15-107/E14-55-S1	0/0	Access to hydrotest water at Maumee River. Spoil will be stored at least 10-ft from water's edge (if applicable). ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in non-disturbed area.
Henry County, OH	ATWS-4169	189.3	Yes	No	E15-27	0	COUNTY RD 1 bored crossing and wetland crossing and Bend. ATWS located in upland consisting of cultivated or rotated cropland or disturbed land.
Henry County, OH	ATWS-2032	189.8	Yes	No	D15-54	2.3	Wetland and existing pipeline crossing. ATWS located in upland.
Henry County, OH	ATWS-4174	190.0	Yes	No	AWB-HE-400	46.7	Wetland and existing pipeline and rail/trail crossing. ATWS partially located in undisturbed area.

APPENDIX H-6 (cont'd)

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
Lenawee County, MI	ATWS-452	209.9	Yes	Yes	AWB-LE-612/AS-LE-607	34.5/0	Railroad, road, waterbody and foreign pipeline crossing. ATWS located in upland consisting of cultivated or rotated cropland or disturbed land. The ATWS is required for the additional equipment and storage of spoil required to safely construct the railroad, road, waterbody, and foreign pipeline crossings. ATWS also to be utilized to gain access to E Mulberry Rd via temporary driveway and culvert installation under permit of local jurisdiction to allow equipment to move around past the railroad.
Washtenaw County, OH	ATWS-4375	237.4	No	Yes	E14-157-S1	0	Access to hydrotest water. Spoil will be stored at least 10-ft from water's edge.
Washtenaw County, OH	ATWS-4390	245.2	Yes	No	E14-167/AWB-WA-4	0/25.9	Road and wetland crossing. ATWS located within delineated wetland.
Washtenaw County, OH	ATWS-2675	245.8	No	Yes	D15-122-S1	27.7	Topsoil segregation, waterbody crossing and bend installation. ATWS partially located in upland consisting of cultivated or rotated cropland or disturbed land and partially located in non-disturbed area within 50-ft waterbody buffer.
Washtenaw County, OH	ATWS-2676	248.1	No	Yes	D15-29-S1	19.1	Road and waterbody crossing. ATWS in non-disturbed area and within 50-ft waterbody buffer.
Washtenaw County, OH	ATWS-1619	250.6	Yes	No	D15-79	15.0	Hydro Park HDD entry workspace. ATWS in non-disturbed area and within 50-ft wetland buffer.
Washtenaw County, OH	ATWS-1621	251.1	No	Yes	D15-58A-WB1	0	Access to hydrotest water. Spoil will be stored at least 10-ft from water's edge. ATWS in non-disturbed area and within 50-ft waterbody buffers.
Washtenaw County, OH	ATWS-3873	254.3	Yes	No	D15-77	0	HDD entry location. ATWS in non-disturbed area and within delineated wetland.
Washtenaw County, OH	ATWS-4513	254.3	Yes	No	D15-77	0	HDD entry location. ATWS in non-disturbed area and within delineated wetland.
Washtenaw County, OH	ATWS-2721	254.7	Yes	Yes	D15-77/D15-77-S1	9.4/13.3	Bend installation and existing pipeline and waterbody crossing. ATWS partially located in disturbed area and partially located in non-disturbed area and within 50-ft wetland and waterbody buffers.
Washtenaw County, OH	ATWS-4508	254.5	Yes	No	D15-77	0	Bend installation. ATWS in non-disturbed area and within delineated wetland.
Washtenaw County, OH	ATWS-4539	254.5	Yes	No	D15-77	0	Tie-in location to adjacent HDD entry point and equipment movement/access. ATWS in non-disturbed area and within delineated wetland.

APPENDIX H-6 (cont'd)

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
Washtenaw County, OH	ATWS-4541	254.5	Yes	No	D15-77	0	Material/Equipment access. ATWS in non-disturbed area and within delineated wetland.
Washtenaw County, OH	ATWS-4540	254.7	Yes	No	D15-77	0	Material/Equipment access. ATWS in non-disturbed area and partially located within delineated wetland.
Washtenaw County, OH	ATWS-2740	254.8	Yes	Yes	D15-44/D15-43-S1/D15-43-WB2	0/48.5/2.9	Waterbody and wetland crossing. ATWS partially located within delineated wetland.
Washtenaw County, OH	ATWS-4413	255.0	Yes	No	D15-42/D15-41	0/0	Willow Run M&R workspace. Trench spoil will be stored at least 10-ft from water's edge.
TEAL PROJECT							
Loopline							
Monroe County, OH	ATWS-04	0.75	Yes	Yes	A15-03-S1/A15-24-S1/A15-24/A15-03	5/30/10	Access road entry, and wetland and stream(s) crossing. Parking, spoil storage, timber mat storage (for wetlands), prefabricate pipe segment for crossing, and maintain access of pipeline construction equipment and personnel. Severe slope. Prepare level work site, spoil storage (additional area due to minimum of 30% expansion of material once excavated), parking, and maintain access of pipeline construction equipment and personnel.
Monroe County, OH	ATWS-08	1.2	Yes	Yes	A15-07-S1/A15-07	10/0	Wetland and stream(s) crossing. Parking, spoil storage, timber mat storage (for wetlands), prefabricate pipe segment for crossing, and maintain access of pipeline construction equipment and personnel. Severe slope. Prepare level work site, spoil storage (additional area due to minimum of 30% expansion of material once excavated), parking, and maintain access of pipeline construction equipment and personnel.
Monroe County, OH	ATWS-10	1.2	Yes	Yes	A15-07-S1/A15-07	10/0	Road, wetland and stream(s) crossing. Parking, spoil storage, timber mat storage (for wetlands), road crossing materials storage, prefabricate pipe segment for crossing, and maintain access of pipeline construction equipment and personnel. Severe slope. Prepare level work site, spoil storage (additional area due to minimum of 30% expansion of material once excavated), parking, and maintain access of pipeline construction equipment and personnel.

APPENDIX H-6 (cont'd)

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
Monroe County, OH	ATWS-11	1.6	Yes	Yes	A15-08-S1/A15-08	10/5	Wetland and stream(s) crossing. Parking, spoil storage, timber mat storage (for wetlands), prefabricate pipe segment for crossing, and maintain access of pipeline construction equipment and personnel. Severe slope. Prepare level work site, spoil storage (additional area due to minimum of 30% expansion of material once excavated), parking, and maintain access of pipeline construction equipment and personnel.
Monroe County, OH	ATWS-12	1.6	Yes	Yes	A15-08-S1/A15-08/A15-09	35/25/20	Wetland and stream(s) crossing. Parking, spoil storage, timber mat storage (for wetlands), prefabricate pipe segment for crossing, and maintain access of pipeline construction equipment and personnel. Severe slope. Prepare level work site, spoil storage (additional area due to minimum of 30% expansion of material once excavated), parking, and maintain access of pipeline construction equipment and personnel.
Monroe County, OH	ATWS-13	1.65	Yes	No	A15-09	0	Wetland crossing. Parking, spoil storage, timber mat storage, prefabricate wetland and stream pipe segment, and maintain through access of pipeline construction equipment and personnel. Severe slope. Prepare level work site, spoil storage (additional area due to minimum of 30% expansion of material once excavated), parking, and maintain access of pipeline construction equipment and personnel.
Monroe County, OH	ATWS-14	1.65	Yes	No	A15-09	30	Wetland crossing. Parking, spoil storage, timber mat storage, prefabricate wetland and stream pipe segment, and maintain through access of pipeline construction equipment and personnel. Severe slope. Prepare level work site, spoil storage (additional area due to minimum of 30% expansion of material once excavated), parking, and maintain access of pipeline construction equipment and personnel.

APPENDIX H-6 (cont’d)

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
Monroe County, OH	ATWS-15	2.05	Yes	No	A15-21	40	Access road entry. Parking, prefabricate access road crossing pipe segment, spoil storage, and maintain access of pipeline construction equipment and personnel.
Monroe County, OH	ATWS-16	2.05	Yes	No	A15-21	1	Access road entry. Parking, prefabricate access road crossing pipe segment, spoil storage, and maintain access of pipeline construction equipment and personnel.
Monroe County, OH	ATWS-18	2.1	No	Yes	A15-11-S1/A15-11-S2	0/10	Wetland crossing and stream(s) crossing. Parking, spoil storage, timber mat storage (for wetlands), prefabricate pipe segment for crossing, and maintain access of pipeline construction equipment and personnel. Severe slope. Prepare level work site, spoil storage (additional area due to minimum of 30% expansion of material once excavated), parking, and maintain access of pipeline construction equipment and personnel.
Monroe County, OH	ATWS-19	2.15	No	Yes	A15-11-S2	15	Wetland and stream(s) crossing. Parking, spoil storage, timber mat storage (for wetlands), prefabricate pipe segment for crossing, and maintain access of pipeline construction equipment and personnel. Severe slope. Prepare level work site, spoil storage (additional area due to minimum of 30% expansion of material once excavated), parking, and maintain access of pipeline construction equipment and personnel.
Monroe County, OH	ATWS-22	2.5	No	Yes	A15-13-S1	5	Road and overhead powerline crossing. Parking, spoil storage, road crossing materials storage, additional construction equipment to install the pipeline segment under overhead powerlines, prefabricate pipe segment to be installed, and maintain access of pipeline construction equipment and personnel. Severe slope. Prepare level work site, spoil storage (additional area due to minimum of 30% expansion of material once excavated), parking, and maintain access of pipeline construction equipment and personnel.

APPENDIX H-6 (cont'd)

ATWS Within 50 feet of Wetlands and Waterbodies on the NGT and TEAL Projects

Project, Facility, County	ATWS ID	Milepost	Within 50 feet of a Wetland	Within 50 feet of a Waterbody	Feature ID	Distance from Resource Area (feet)	Justification
Monroe County, OH	ATWS-34	4.0	Yes	No	B15-20/B15-21	0/5	Wetland crossing. Parking, spoil storage, timber mat storage, prefabricate wetland and stream pipe segment, and maintain through access of pipeline construction equipment and personnel. Severe slope. Prepare level work site, spoil storage (additional area due to minimum of 30% expansion of material once excavated), parking, and maintain access of pipeline construction equipment and personnel.
Monroe County, OH	ATWS-35	4.1	Yes	Yes	A15-18-S2/B15-21	10/0	Wetland and stream(s) crossing. Parking, spoil storage, timber mat storage (for wetlands), prefabricate pipe segment for crossing, and maintain access of pipeline construction equipment and personnel. Severe slope. Prepare level work site, spoil storage (additional area due to minimum of 30% expansion of material once excavated), parking, and maintain access of pipeline construction equipment and personnel.
Monroe County, OH	ATWS-36	4.25	Yes	Yes	A15-18-S2/A15-18-S1/A15-18	10/40/0	Wetland and stream(s) crossing. Parking, spoil storage, timber mat storage (for wetlands), prefabricate pipe segment for crossing, and maintain access of pipeline construction equipment and personnel. Severe slope. Prepare level work site, spoil storage (additional area due to minimum of 30% expansion of material once excavated), parking, and maintain access of pipeline construction equipment and personnel.
Monroe County, OH	ATWS-37	4.3	No	Yes	A15-19-S1	40	Wetland and stream(s) crossing. Parking, spoil storage, timber mat storage (for wetlands), prefabricate pipe segment for crossing, and maintain access of pipeline construction equipment and personnel. Severe slope. Prepare level work site, spoil storage (additional area due to minimum of 30% expansion of material once excavated), parking, and maintain access of pipeline construction equipment and personnel.

APPENDIX I

WETLAND TABLES

I-1: NGT PROJECT WETLAND IMPACTS
I-2: TEAL PROJECT WETLAND IMPACTS

APPENDIX I-1

NGT PROJECT WETLAND IMPACTS

APPENDIX I-1

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
MAINLINE						
Ohio						
Columbiana	0.1	B15-17	PFO	0.0	0.0	0.0
Columbiana	0.1	B15-17	PFO	42.2	0.1	0.0
Columbiana	0.1	B15-17	PFO	42.2	0.1	0.1
Columbiana	0.6	B15-28	PSS	0.0	0.0	0.0
Columbiana	0.6	B15-28	PSS	182.2	0.2	0.0
Columbiana	0.6	B15-28	PSS	182.2	0.2	0.2
Columbiana	0.7	B15-28	PEM	0.0	0.0	0.0
Columbiana	0.7	B15-17	PEM	0.0	0.0	0.0
Columbiana	0.7	B15-17	PEM	20.8	0.0	0.0
Columbiana	0.7	B15-17	PEM	20.8	0.0	0.0
Columbiana	1.0	B15-29	PEM	0.0	0.1	0.0
Columbiana	1.0	B15-29	PEM	216.6	0.2	0.0
Columbiana	1.0	B15-29	PEM	216.6	0.2	0.0
Columbiana	1.2	C15-84	PSS	0.0	0.1	0.0
Columbiana	1.2	C15-84	PSS	135.7	0.1	0.0
Columbiana	1.2	C15-84	PSS	135.7	0.1	0.1
Columbiana	1.2	C15-84	PEM	0.0	0.0	0.0
Columbiana	1.2	C15-84	PEM	31.5	0.0	0.0
Columbiana	1.2	C15-84	PEM	31.5	0.0	0.0
Columbiana	1.2	C15-84	PFO	0.0	0.0	0.0
Columbiana	1.2	C15-84	PFO	0.0	0.0	0.0
Columbiana	2.0	A14-5	PEM	0.0	0.0	0.0
Columbiana	2.0	A14-5	PEM	25.7	0.0	0.0
Columbiana	2.0	A14-5	PEM	25.7	0.0	0.0
Columbiana	2.1	A14-5	AG-PEM	0.0	0.0	0.0
Columbiana	2.1	A14-5	AG-PEM	21.7	0.0	0.0
Columbiana	2.1	A14-5	AG-PEM	21.7	0.0	0.0
Columbiana	2.1	A14-5	PEM	0.0	0.2	0.0
Columbiana	2.1	A14-5	PEM	297.9	0.3	0.0
Columbiana	2.1	A14-5	PEM	297.9	0.3	0.0
Columbiana	2.2	A14-5	AG-PEM	0.0	0.3	0.0
Columbiana	2.2	A14-5	AG-PEM	257.9	0.3	0.0
Columbiana	2.2	A14-5	AG-PEM	257.9	0.3	0.0
Columbiana	2.2	A14-5	AG-PEM	0.0	0.0	0.0
Columbiana	2.2	A14-5	AG-PEM	16.6	0.0	0.0
Columbiana	2.2	A14-5	AG-PEM	16.6	0.0	0.0
Columbiana	2.2	A14-5	AG-PEM	0.0	0.1	0.0
Columbiana	2.2	A14-5	AG-PEM	65.4	0.1	0.0
Columbiana	2.2	A14-5	AG-PEM	65.4	0.1	0.0
Columbiana	4.9	A14-10	PEM	0.0	0.0	0.0
Columbiana	4.9	A14-10	PSS	0.0	0.1	0.0
Columbiana	4.9	A14-10	PSS	126.6	0.2	0.0
Columbiana	4.9	A14-10	PSS	126.6	0.2	0.2
Columbiana	4.9	A14-10	PFO	0.0	0.0	0.0
Columbiana	4.9	A14-10	PEM	0.0	0.1	0.0
Columbiana	4.9	A14-10	PEM	174.9	0.2	0.0
Columbiana	4.9	A14-10	PEM	174.9	0.2	0.0
Columbiana	5.0	A14-10	PSS	0.0	0.2	0.0
Columbiana	5.0	A14-10	PSS	305.4	0.3	0.0
Columbiana	5.0	A14-10	PSS	305.4	0.3	0.3

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Columbiana	5.2	A14-11	PEM	0.0	0.0	0.0
Columbiana	5.2	A14-11	PEM	44.4	0.0	0.0
Columbiana	5.2	A14-11	PEM	44.4	0.0	0.0
Columbiana	5.3	A14-11	PFO	0.0	0.0	0.0
Columbiana	5.3	A14-11	PFO	30.7	0.0	0.0
Columbiana	5.3	A14-11	PFO	30.7	0.0	0.0
Columbiana	5.3	A15-25	PEM	0.0	0.0	0.0
Columbiana	5.6	A14-126	PEM	0.0	0.0	0.0
Columbiana	5.6	A14-126	PEM	17.5	0.0	0.0
Columbiana	5.6	A14-126	PEM	17.5	0.0	0.0
Columbiana	5.6	A14-126	PEM	0.0	0.0	0.0
Columbiana	5.6	A14-126	PEM	0.0	0.0	0.0
Columbiana	5.6	A14-126	PEM	0.0	0.0	0.0
Columbiana	5.7	A14-127	PEM	0.0	0.0	0.0
Columbiana	5.7	A14-127	PEM	0.0	0.0	0.0
Columbiana	5.7	A14-127	PEM	0.0	0.0	0.0
Columbiana	6.4	C15-118	PEM	0.0	0.0	0.0
Columbiana	6.4	C15-118	PEM	60.4	0.1	0.0
Columbiana	6.4	C15-118	PEM	60.4	0.1	0.0
Columbiana	6.4	C15-118	PEM	0.0	0.0	0.0
Columbiana	6.4	C15-118	PEM	82.2	0.1	0.0
Columbiana	6.4	C15-118	PEM	82.2	0.1	0.0
Columbiana	6.4	C15-117	PEM	0.0	0.0	0.0
Columbiana	6.4	A14-12	PEM	0.0	0.0	0.0
Columbiana	6.4	A14-12	PEM	33.7	0.1	0.0
Columbiana	6.4	A14-12	PEM	33.7	0.1	0.0
Columbiana	8.0	B15-31	PEM	0.0	0.0	0.0
Columbiana	8.1	B15-31	PEM	342.5	0.4	0.0
Columbiana	8.1	B15-31	PUB	153.5	0.2	0.0
Columbiana	10.3	A14-14	PEM	0.0	0.1	0.0
Columbiana	10.3	A14-14	PEM	167.4	0.2	0.0
Columbiana	10.3	A14-14	PEM	167.4	0.2	0.0
Columbiana	10.6	A14-15	PEM	0.0	0.0	0.0
Columbiana	10.6	A14-15	PEM	26.3	0.0	0.0
Columbiana	10.6	A14-15	PEM	26.3	0.0	0.0
Columbiana	11.0	C15-65	PSS	0.0	0.0	0.0
Columbiana	11.0	C15-65	PSS	26.3	0.0	0.0
Columbiana	11.0	C15-65	PSS	26.3	0.0	0.0
Columbiana	11.0	A15-33	PSS	0.0	0.0	0.0
Columbiana	11.0	A15-33	PSS	45.4	0.0	0.0
Columbiana	11.0	A15-33	PSS	45.4	0.0	0.0
Columbiana	11.0	A15-33	PEM	0.0	0.0	0.0
Columbiana	11.0	A15-33	PEM	26.6	0.0	0.0
Columbiana	11.0	A15-33	PEM	26.6	0.0	0.0
Columbiana	11.0	A15-33	PSS	0.0	0.0	0.0
Columbiana	11.0	A15-33	PSS	0.0	0.0	0.0
Columbiana	11.0	A15-33	PSS	0.0	0.0	0.0
Columbiana	11.0	A15-33	PSS	2.4	0.0	0.0
Columbiana	11.0	A15-33	PSS	2.4	0.0	0.0
Columbiana	11.0	A15-33	AG-PEM	0.0	0.0	0.0
Columbiana	11.0	A15-33	AG-PEM	0.0	0.0	0.0
Columbiana	11.0	A15-33	PEM	0.0	0.0	0.0
Columbiana	11.0	A15-33	PEM	43.3	0.0	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Columbiana	11.0	A15-33	PEM	43.3	0.0	0.0
Columbiana	11.2	A15-34	PEM	0.0	0.1	0.0
Columbiana	11.2	A15-34	PEM	269.0	0.3	0.0
Columbiana	11.2	A15-34	PEM	269.0	0.3	0.0
Columbiana	11.3	A15-31	PEM	0.0	0.0	0.0
Columbiana	11.3	A15-31	PEM	47.9	0.1	0.0
Columbiana	11.3	A15-31	PEM	47.9	0.1	0.0
Columbiana	11.3	A15-31	PEM	0.0	0.0	0.0
Columbiana	11.3	A15-31	PEM	41.2	0.0	0.0
Columbiana	11.3	A15-31	PEM	41.2	0.0	0.0
Columbiana	11.4	A15-32	PEM	0.0	0.1	0.0
Columbiana	11.4	A15-32	PEM	0.0	0.0	0.0
Columbiana	11.4	A15-32	PEM	0.0	0.0	0.0
Columbiana	11.7	A14-17	PEM	0.0	0.0	0.0
Columbiana	11.7	A14-17	PEM	43.2	0.0	0.0
Columbiana	11.7	A14-17	PEM	43.2	0.0	0.0
Columbiana	11.8	A14-17	PEM	0.0	0.0	0.0
Columbiana	11.8	A14-17	PEM	24.3	0.0	0.0
Columbiana	11.8	A14-17	PEM	24.3	0.0	0.0
Stark	13.0	A14-108	PEM	0.0	0.0	0.0
Stark	13.0	A14-108	PEM	85.3	0.1	0.0
Stark	13.0	A14-108	PEM	85.3	0.1	0.0
Stark	13.1	A14-108	PEM	0.0	0.2	0.0
Stark	13.1	A14-108	PEM	350.0	0.4	0.0
Stark	13.1	A14-108	PEM	350.0	0.4	0.0
Stark	13.3	B15-64	PEM	0.0	0.1	0.0
Stark	13.3	B15-64	PEM	238.8	0.3	0.0
Stark	13.3	B15-64	PEM	238.8	0.3	0.0
Stark	13.8	A15-47	PFO	0.0	0.0	0.0
Stark	14.0	B15-55	PEM	0.0	0.0	0.0
Stark	14.0	B15-55	PEM	0.0	0.0	0.0
Stark	14.0	B15-55	PEM	0.0	0.0	0.0
Stark	14.8	A14-20	AG-PEM	0.0	0.0	0.0
Stark	15.0	A14-21	PEM	0.0	0.0	0.0
Stark	15.0	A14-21	PEM	73.8	0.1	0.0
Stark	15.0	A14-21	PEM	73.8	0.1	0.0
Stark	15.1	A14-21	AG-PEM	0.0	0.3	0.0
Stark	15.1	A14-21	AG-PEM	281.2	0.3	0.0
Stark	15.1	A14-21	AG-PEM	281.2	0.3	0.0
Stark	15.4	C15-92	PSS	0.0	0.2	0.0
Stark	15.4	C15-92	PSS	380.2	0.5	0.0
Stark	15.4	C15-92	PSS	380.2	0.5	0.5
Stark	15.4	C15-92	PEM	0.0	0.1	0.0
Stark	15.4	C15-92	PEM	163.3	0.2	0.0
Stark	15.4	C15-92	PEM	163.3	0.2	0.0
Stark	15.6	A15-64	AG-PEM	0.0	0.0	0.0
Stark	15.6	A15-64	AG-PEM	0.0	0.0	0.0
Stark	15.6	A15-64	AG-PEM	0.0	0.0	0.0
Stark	15.8	A15-27	PEM	0.0	0.0	0.0
Stark	15.8	A15-27	PEM	38.3	0.0	0.0
Stark	15.8	A15-27	PEM	38.3	0.0	0.0
Stark	16.4	B15-119	AG-PEM	0.0	0.0	0.0
Stark	16.4	B15-119	AG-PEM	0.0	0.0	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Stark	16.4	B15-119	AG-PEM	0.0	0.0	0.0
Stark	16.5	B15-119	PEM	0.0	0.1	0.0
Stark	16.5	B15-119	PEM	216.7	0.2	0.0
Stark	16.5	B15-119	PEM	216.7	0.2	0.0
Stark	16.6	C15-116	PEM	0.0	0.0	0.0
Stark	16.6	C15-116	PEM	79.0	0.1	0.0
Stark	16.6	C15-116	PEM	79.0	0.1	0.0
Stark	16.7	C15-116	PEM	0.0	0.1	0.0
Stark	16.7	C15-116	PEM	0.0	0.0	0.0
Stark	16.7	C15-116	PEM	0.0	0.0	0.0
Stark	16.8	C15-116	PEM	0.0	0.2	0.0
Stark	16.8	C15-116	PEM	264.4	0.3	0.0
Stark	16.8	C15-116	PEM	264.4	0.3	0.0
Stark	17.0	C15-116	PEM	0.0	0.0	0.0
Stark	17.0	C15-116	PEM	48.4	0.1	0.0
Stark	17.0	C15-116	PEM	48.4	0.1	0.0
Stark	17.0	C15-116	PFO	0.0	0.0	0.0
Stark	17.0	C15-116	PFO	36.3	0.0	0.0
Stark	17.0	C15-116	PFO	36.3	0.0	0.0
Stark	17.2	C15-116	PFO	0.0	0.4	0.0
Stark	17.2	C15-116	PFO	677.9	0.8	0.0
Stark	17.2	C15-116	PFO	677.9	0.8	0.8
Stark	17.3	A14-107	AG-PEM	0.0	0.1	0.0
Stark	17.3	A14-107	AG-PEM	35.3	0.1	0.0
Stark	17.3	A14-107	AG-PEM	35.3	0.1	0.0
Stark	17.6	A14-106	PSS	0.0	0.0	0.0
Stark	17.6	A14-106	PSS	85.7	0.1	0.0
Stark	17.6	A14-106	PSS	85.7	0.1	0.1
Stark	18.0	A14-104	PEM	0.0	0.0	0.0
Stark	18.0	A14-104	PEM	16.9	0.0	0.0
Stark	18.0	A14-104	PEM	16.9	0.0	0.0
Stark	19.0	C15-85	AG-PEM	0.0	0.0	0.0
Stark	19.0	C15-85	AG-PEM	0.0	0.0	0.0
Stark	19.0	C15-85	AG-PEM	0.0	0.0	0.0
Stark	19.0	C15-85	AG-PEM	0.0	0.0	0.0
Stark	19.0	C15-85	AG-PEM	33.4	0.1	0.0
Stark	19.0	C15-85	AG-PEM	33.4	0.1	0.0
Stark	19.4	C15-87	PSS	0.0	0.1	0.0
Stark	19.4	C15-87	PSS	145.8	0.1	0.0
Stark	19.4	C15-87	PSS	145.8	0.1	0.1
Stark	20.4	B15-42	PEM	0.0	0.0	0.0
Stark	22.3	B15-40	PEM	0.0	0.1	0.0
Stark	22.3	B15-40	PEM	101.6	0.1	0.0
Stark	22.3	B15-40	PEM	101.6	0.1	0.0
Stark	24.3	C15-124	PEM	0.0	0.0	0.0
Stark	24.6	A14-161	PFO	0.0	0.0	0.0
Stark	24.6	A14-161	PFO	17.0	0.0	0.0
Stark	24.6	A14-161	PFO	17.0	0.0	0.0
Stark	24.6	A14-161	PFO	0.0	0.0	0.0
Stark	24.6	A14-161	PFO	59.3	0.1	0.0
Stark	24.6	A14-161	PFO	59.3	0.1	0.1
Stark	25.4	A14-167	PSS	0.0	0.0	0.0
Stark	25.4	A14-167	PSS	27.0	0.0	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Stark	25.4	A14-167	PSS	27.0	0.0	0.0
Stark	26.7	A14-100	PEM	0.0	0.1	0.0
Stark	26.7	A14-100	PEM	65.9	0.0	0.0
Stark	26.7	A14-100	PEM	65.9	0.0	0.0
Stark	26.7	A14-100	PEM	0.0	0.0	0.0
Stark	27.4	B15-46	PEM	0.0	0.0	0.0
Stark	27.4	B15-46	PEM	28.4	0.0	0.0
Stark	27.4	B15-46	PEM	28.4	0.0	0.0
Stark	27.9	A14-34	PEM	0.0	0.5	0.0
Stark	27.9	A14-34	PEM	927.6	1.1	0.0
Stark	27.9	A14-34	PEM	927.6	1.1	0.0
Stark	28.0	A14-34	PEM	0.0	0.0	0.0
Stark	28.0	A14-34	PEM	20.7	0.0	0.0
Stark	28.0	A14-34	PEM	20.7	0.0	0.0
Stark	28.0	A14-34	PEM	20.7	0.0	0.0
Stark	28.9	A14-168	PFO	0.0	0.0	0.0
Stark	28.9	A14-168	PFO	0.0	0.1	0.0
Stark	28.9	A14-168	PFO	131.0	0.1	0.0
Stark	28.9	A14-168	PFO	131.0	0.1	0.1
Stark	29.0	A14-168	PEM	26.1	0.0	0.0
Stark	29.0	A14-168	PEM	26.1	0.0	0.0
Stark	29.3	B15-58	PFO	0.0	0.0	0.0
Stark	29.3	B15-58	PFO	44.8	0.1	0.0
Stark	29.3	B15-58	PFO	44.8	0.1	0.1
Stark	29.9	B15-104	PEM	0.0	0.0	0.0
Stark	29.9	B15-104	PEM	16.8	0.0	0.0
Stark	29.9	B15-104	PEM	16.8	0.0	0.0
Stark	30.0	C15-114	PSS	0.0	0.0	0.0
Stark	30.0	C15-114	PSS	12.5	0.0	0.0
Stark	30.0	C15-114	PSS	12.5	0.0	0.0
Stark	30.0	C15-115	PFO	0.0	0.0	0.0
Stark	30.0	C15-115	PFO	0.0	0.0	0.0
Stark	30.0	C15-115	PFO	0.0	0.0	0.0
Stark	31.3	A15-2	PFO	0.0	0.0	0.0
Stark	31.3	A15-2	PFO	71.4	0.1	0.0
Stark	31.3	A15-2	PFO	71.4	0.1	0.1
Stark	32.1	A14-164	PEM	0.0	0.0	0.0
Stark	32.1	A14-164	AG-PEM	0.0	0.2	0.0
Stark	32.1	A14-164	AG-PEM	181.7	0.2	0.0
Stark	32.1	A14-164	AG-PEM	181.7	0.2	0.0
Stark	32.2	A14-164	AG-PEM	0.0	0.1	0.0
Stark	32.2	A14-164	AG-PEM	74.8	0.1	0.0
Stark	32.2	A14-164	AG-PEM	74.8	0.1	0.0
Stark	32.3	A14-164	PEM	0.0	0.2	0.0
Stark	32.3	A14-164	PEM	231.2	0.2	0.0
Stark	32.3	A14-164	PEM	231.2	0.2	0.0
Stark	33.5	A15-94	PEM	0.0	0.0	0.0
Stark	33.5	A15-94	PEM	55.9	0.1	0.0
Stark	33.5	A15-94	PEM	55.9	0.1	0.0
Stark	33.6	B15-73	PFO	0.0	0.1	0.0
Stark	33.6	B15-73	PFO	251.8	0.2	0.0
Stark	33.6	B15-73	PFO	251.8	0.2	0.2
Stark	33.8	B15-73	PFO	0.0	0.0	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Stark	33.8	B15-73	PFO	61.4	0.1	0.0
Stark	33.8	B15-73	PFO	61.4	0.1	0.1
Stark	33.8	B15-73	PFO	0.0	0.1	0.0
Stark	33.8	B15-73	PFO	292.3	0.3	0.0
Stark	33.8	B15-73	PFO	292.3	0.3	0.3
Stark	34.1	C15-103	AG-PEM	0.0	0.0	0.0
Summit	34.3	A15-71	PSS	0.0	0.0	0.0
Summit	34.3	A15-71	PSS	141.6	0.2	0.0
Summit	34.3	A15-71	PSS	141.6	0.2	0.2
Summit	34.3	A15-71	PEM	0.0	0.1	0.0
Summit	34.3	A15-71	PEM	153.0	0.2	0.0
Summit	34.3	A15-71	PEM	153.0	0.2	0.0
Summit	34.3	A15-71	PSS	0.0	0.0	0.0
Summit	34.3	A15-71	PSS	78.5	0.1	0.0
Summit	34.3	A15-71	PSS	78.5	0.1	0.1
Summit	34.4	A15-71	PSS	0.0	0.4	0.0
Summit	34.4	A15-71	PSS	670.5	0.7	0.0
Summit	34.4	A15-71	PSS	670.5	0.7	0.7
Summit	34.5	AWB-SU-213	PFO	0.0	0.1	0.0
Summit	34.5	AWB-SU-213	PFO	233.1	0.3	0.0
Summit	34.5	AWB-SU-213	PFO	233.1	0.3	0.3
Summit	34.6	A15-71	PSS	0.0	0.3	0.0
Summit	34.6	A15-71	PSS	466.5	0.6	0.0
Summit	34.6	A15-71	PSS	466.5	0.6	0.6
Summit	34.6	A15-71	PEM	0.0	0.1	0.0
Summit	34.6	A15-71	PEM	108.9	0.1	0.0
Summit	34.6	A15-71	PEM	108.9	0.1	0.0
Summit	34.7	A15-71	PEM	0.0	0.0	0.0
Summit	34.7	A15-71	PEM	153.6	0.1	0.0
Summit	34.7	A15-71	PEM	153.6	0.1	0.0
Summit	35.1	B15-68	PFO	0.0	0.0	0.0
Summit	35.1	B15-68	PFO	64.2	0.1	0.0
Summit	35.1	B15-68	PFO	64.2	0.1	0.1
Summit	35.4	AWB-SU-3	PFO	0.0	0.1	0.0
Summit	35.4	AWB-SU-3	PFO	200.6	0.2	0.0
Summit	35.4	AWB-SU-3	PFO	200.6	0.2	0.2
Summit	35.6	AWB-SU-4	PEM/PSS	0.0	0.1	0.0
Summit	35.6	AWB-SU-4	PFO	0.0	0.2	0.0
Summit	35.6	AWB-SU-4	PFO	210.6	0.2	0.0
Summit	35.6	AWB-SU-4	PFO	210.6	0.2	0.2
Summit	35.6	A15-90	PEM	0.0	0.0	0.0
Summit	35.6	A15-90	PEM	31.7	0.0	0.0
Summit	35.6	A15-90	PEM	31.7	0.0	0.0
Summit	35.6	A15-90	AG-PEM	0.0	0.0	0.0
Summit	35.9	AWB-SU-400	PEM	0.0	0.2	0.0
Summit	35.9	AWB-SU-400	PEM	288.7	0.2	0.0
Summit	35.9	AWB-SU-400	PEM	288.7	0.2	0.0
Summit	35.9	A15-91	PFO	45.7	0.2	0.0
Summit	35.9	A15-91	PFO	45.7	0.2	0.2
Summit	36.0	AWB-SU-401	PEM	0.0	0.0	0.0
Summit	36.0	AWB-SU-401	PEM	43.3	0.0	0.0
Summit	36.0	AWB-SU-401	PEM	43.3	0.0	0.0
Summit	36.1	AWB-SU-401	PEM	0.0	0.1	0.0

APPENDIX I-1 (cont’d)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Summit	36.1	AWB-SU-401	PEM	141.2	0.1	0.0
Summit	36.1	AWB-SU-401	PEM	141.2	0.1	0.0
Summit	36.4	B15-125	PEM	0.0	0.0	0.0
Summit	36.4	B15-125	PEM	31.4	0.0	0.0
Summit	36.4	B15-125	PEM	31.4	0.0	0.0
Summit	36.5	C15-104	PSS	0.0	0.1	0.0
Summit	36.5	C15-104	PSS	341.6	0.2	0.0
Summit	36.5	C15-104	PSS	341.6	0.2	0.2
Summit	36.7	C15-106	PSS	0.0	0.2	0.0
Summit	36.7	C15-106	PSS	210.5	0.2	0.0
Summit	36.7	C15-106	PSS	210.5	0.2	0.2
Summit	36.7	C15-106	PEM	0.0	0.1	0.0
Summit	36.7	C15-106	PEM	338.1	0.4	0.0
Summit	36.7	C15-106	PEM	338.1	0.4	0.0
Summit	37.1	C15-122	PFO	0.0	0.0	0.0
Summit	37.1	C15-122	PFO	92.7	0.1	0.0
Summit	37.1	C15-122	PFO	92.7	0.1	0.1
Summit	37.1	AWB-SU-214	PFO	10.9	0.0	0.0
Summit	37.1	AWB-SU-214	PFO	10.9	0.0	0.0
Summit	37.1	C15-122	PEM	0.0	0.0	0.0
Summit	37.1	C15-122	PEM	0.0	0.0	0.0
Summit	37.1	C15-122	PEM	0.0	0.0	0.0
Summit	37.5	C15-120	PFO	0.0	0.2	0.0
Summit	37.5	C15-120	PFO	336.5	0.4	0.0
Summit	37.5	C15-120	PFO	336.5	0.4	0.4
Summit	37.7	AWB-SU-205	PFO	0.0	0.0	0.0
Summit	37.7	AWB-SU-205	PFO	50.6	0.1	0.0
Summit	37.7	AWB-SU-205	PFO	50.6	0.1	0.1
Summit	37.8	AWB-SU-205	PFO	0.0	0.1	0.0
Summit	37.8	AWB-SU-205	PFO	109.7	0.1	0.0
Summit	37.8	AWB-SU-205	PFO	109.7	0.1	0.1
Summit	38.0	C15-123	PSS	0.0	0.0	0.0
Summit	38.0	C15-123	PSS	34.0	0.0	0.0
Summit	38.0	C15-123	PSS	34.0	0.0	0.0
Summit	38.1	AWB-SU-204	PFO	0.0	0.3	0.0
Summit	38.1	AWB-SU-204	PFO	528.9	0.6	0.0
Summit	38.1	AWB-SU-204	PFO	528.9	0.6	0.6
Summit	38.3	AWB-SU-203	PFO	0.0	0.0	0.0
Summit	38.3	AWB-SU-203	PFO	24.1	0.0	0.0
Summit	38.3	AWB-SU-203	PFO	24.1	0.0	0.0
Summit	38.5	AWB-SU-222	PSS	0.0	0.0	0.0
Summit	38.6	AWB-SU-221	PFO	0.0	0.0	0.0
Summit	38.6	AWB-SU-221	PFO	18.0	0.0	0.0
Summit	38.6	AWB-SU-221	PFO	18.0	0.0	0.0
Summit	39.7	A14-112	PEM	0.0	0.0	0.0
Summit	39.7	A14-112	PEM	0.0	0.0	0.0
Summit	39.7	A14-112	PEM	50.1	0.1	0.0
Summit	39.7	A14-112	PEM	50.1	0.1	0.0
Summit	39.8	A14-112	PSS	0.0	0.3	0.0
Summit	39.8	A14-112	PSS	522.4	0.6	0.0
Summit	39.8	A14-112	PSS	522.4	0.6	0.6
Summit	39.9	A14-112	PSS	0.0	0.1	0.0
Summit	39.9	A14-112	PSS	81.3	0.1	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Summit	39.9	A14-112	PSS	81.3	0.1	0.1
Summit	39.9	A14-112	PSS	0.0	0.0	0.0
Summit	39.9	A14-112	PSS	0.0	0.0	0.0
Summit	39.9	A14-112	PEM	0.0	0.1	0.0
Summit	39.9	A14-112	PEM	116.5	0.1	0.0
Summit	39.9	A14-112	PEM	116.5	0.1	0.0
Summit	40.0	B15-128	PSS	0.0	0.1	0.0
Summit	40.0	B15-128	PSS	145.0	0.2	0.0
Summit	40.0	B15-128	PSS	145.0	0.2	0.2
Summit	40.0	B15-128	PEM	0.0	0.0	0.0
Summit	40.0	B15-128	PSS	0.0	0.0	0.0
Summit	40.0	B15-128	PEM	0.6	0.0	0.0
Summit	40.0	B15-128	PSS	0.6	0.0	0.0
Summit	40.0	B15-128	PEM	0.6	0.0	0.0
Summit	40.0	B15-128	PSS	0.6	0.0	0.0
Summit	40.0	B15-128	PEM	0.0	0.0	0.0
Summit	40.0	B15-128	PEM	85.5	0.1	0.0
Summit	40.0	B15-128	PEM	85.5	0.1	0.0
Summit	40.7	AWB-SU-336	PEM	0.0	0.2	0.0
Summit	40.7	AWB-SU-336	PEM	395.0	0.4	0.0
Summit	40.7	AWB-SU-336	PEM	395.0	0.4	0.0
Summit	41.0	AWB-SU-200	PEM/PSS	171.8	0.2	0.0
Summit	41.0	AWB-SU-200	PEM/PSS	171.8	0.2	0.2
Summit	41.2	AWB-SU-200	PEM/PSS	22.2	0.0	0.0
Summit	41.2	A15-49	AG-PEM	0.0	0.0	0.0
Summit	41.2	A15-49	AG-PEM	5.2	0.0	0.0
Summit	41.2	A15-49	AG-PEM	5.2	0.0	0.0
Summit	41.7	A14-122	PSS	0.0	0.0	0.0
Summit	41.7	A14-122	PSS	88.6	0.1	0.0
Summit	41.7	A14-122	PSS	88.6	0.1	0.1
Summit	41.7	A14-122	PEM	0.0	0.0	0.0
Summit	41.8	A14-122	PSS	0.0	0.1	0.0
Summit	41.8	A14-122	PSS	0.0	0.0	0.0
Summit	41.8	A14-122	PSS	227.3	0.3	0.0
Summit	41.8	A14-122	PSS	227.3	0.3	0.3
Summit	41.8	A14-122	PEM	0.0	0.1	0.0
Summit	41.8	A14-122	PEM	0.0	0.0	0.0
Summit	41.8	A14-122	PEM	164.5	0.2	0.0
Summit	41.8	A14-122	PEM	164.5	0.2	0.0
Summit	41.9	A14-122	PSS	0.0	0.0	0.0
Summit	41.9	A14-122	PSS	9.8	0.0	0.0
Summit	41.9	A14-122	PSS	9.8	0.0	0.0
Summit	41.9	A14-122	PSS	0.0	0.2	0.0
Summit	41.9	A14-122	PSS	0.0	0.0	0.0
Summit	41.9	A14-122	PSS	454.3	0.5	0.0
Summit	41.9	A14-122	PSS	454.3	0.5	0.5
Summit	42.0	A14-122	PEM	0.0	0.4	0.0
Summit	42.0	A14-122	PEM	556.0	0.7	0.0
Summit	42.0	A14-122	PEM	556.0	0.7	0.0
Summit	42.3	A14-123	PEM	0.0	0.0	0.0
Summit	42.3	A14-123	PEM	55.2	0.1	0.0
Summit	42.3	A14-123	PEM	55.2	0.1	0.0
Summit	43.8	A15-16	PEM	0.0	0.0	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Summit	43.8	A15-16	PEM	40.1	0.0	0.0
Summit	43.8	A15-16	PEM	40.1	0.0	0.0
Summit	43.8	A15-16	PEM	0.0	0.1	0.0
Summit	43.8	A15-16	PEM	120.2	0.1	0.0
Summit	43.8	A15-16	PEM	120.2	0.1	0.0
Summit	43.9	A15-95	PEM	0.0	0.0	0.0
Summit	43.9	A15-95	PEM	0.0	0.0	0.0
Summit	43.9	A15-95	PEM	0.0	0.0	0.0
Summit	44.0	AWB-SU-21	PEM/PSS	0.0	0.0	0.0
Summit	44.0	AWB-SU-21	PEM/PSS	0.0	0.0	0.0
Summit	44.0	AWB-SU-21	PEM/PSS	0.0	0.0	0.0
Summit	44.0	AWB-SU-21	PEM/PSS	0.0	0.0	0.0
Summit	44.1	AWB-SU-44	PEM/PSS	0.0	0.0	0.0
Summit	44.7	B15-88	PEM	0.0	0.0	0.0
Summit	44.7	B15-88	PEM	21.3	0.0	0.0
Summit	44.7	B15-88	PEM	21.3	0.0	0.0
Summit	45.1	AWB-SU-24	PEM	0.0	0.0	0.0
Summit	45.2	AWB-SU-24	PFO	0.0	0.1	0.0
Summit	45.2	AWB-SU-24	PFO	295.9	0.3	0.0
Summit	45.2	AWB-SU-24	PFO	295.9	0.3	0.3
Summit	45.3	B14-1	PFO	0.0	0.2	0.0
Summit	45.3	B14-1	PFO	419.0	0.5	0.0
Summit	45.3	B14-1	PFO	419.0	0.5	0.5
Summit	45.4	B14-1	PEM	0.0	0.1	0.0
Summit	45.4	B14-1	PEM	53.2	0.0	0.0
Summit	45.4	B14-1	PEM	53.2	0.0	0.0
Summit	45.4	B14-1	PEM	0.0	0.2	0.0
Summit	45.4	B14-1	PEM	353.7	0.4	0.0
Summit	45.4	B14-1	PEM	353.7	0.4	0.0
Summit	45.6	A15-15	PEM	0.0	0.1	0.0
Summit	45.6	A15-15	PEM	0.0	0.0	0.0
Summit	45.6	A15-15	PEM	0.0	0.0	0.0
Summit	45.7	AWB-SU-27	PEM/PSS	0.0	0.0	0.0
Summit	45.7	AWB-SU-27	PEM/PSS	105.6	0.2	0.0
Summit	45.7	AWB-SU-27	PEM/PSS	105.6	0.2	0.2
Summit	45.7	AWB-SU-27	PFO	24.0	0.0	0.0
Summit	45.7	AWB-SU-27	PFO	24.0	0.0	0.0
Summit	45.8	AWB-SU-28	PFO	0.0	0.0	0.0
Summit	45.8	AWB-SU-28	PFO	38.4	0.0	0.0
Summit	45.8	AWB-SU-28	PFO	38.4	0.0	0.0
Summit	45.8	AWB-SU-28	PEM/PSS	0.0	0.0	0.0
Summit	45.8	AWB-SU-28	PEM/PSS	0.0	0.0	0.0
Summit	45.9	AWB-SU-29	PFO	0.0	0.0	0.0
Summit	45.9	AWB-SU-29	PFO	0.0	0.0	0.0
Summit	45.9	AWB-SU-29	PFO	0.0	0.0	0.0
Summit	46.4	A14-119	PEM	0.0	0.0	0.0
Summit	46.4	A14-119	PEM	19.4	0.0	0.0
Summit	46.4	A14-119	PEM	19.4	0.0	0.0
Summit	46.4	C15-27	PFO	0.0	0.1	0.0
Summit	46.4	C15-27	PFO	132.6	0.2	0.0
Summit	46.4	C15-27	PFO	132.6	0.2	0.2
Summit	46.8	C15-25	PEM	0.0	0.0	0.0
Summit	46.8	C15-25	PEM	0.0	0.0	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Summit	46.8	C15-25	PEM	0.0	0.0	0.0
Summit	46.8	C15-25	PEM	0.0	0.0	0.0
Summit	46.8	C15-25	PEM	53.4	0.0	0.0
Summit	46.8	C15-25	PEM	53.4	0.0	0.0
Summit	47.8	C15-30	PEM	0.0	0.0	0.0
Summit	47.8	C15-30	PEM	0.0	0.0	0.0
Summit	48.1	C15-28	AG-PEM	66.9	0.1	0.0
Summit	48.1	C15-28	AG-PEM	66.9	0.1	0.0
Summit	48.2	B15-56	PEM	18.6	0.0	0.0
Summit	48.9	A15-83	PSS	6.9	0.0	0.0
Summit	48.9	A15-83	PSS	6.9	0.0	0.0
Summit	48.9	AWB-SU-406	PEM	0.0	0.0	0.0
Summit	48.9	AWB-SU-406	PEM	37.3	0.0	0.0
Summit	48.9	AWB-SU-406	PEM	37.3	0.0	0.0
Summit	49.3	AWB-SU-43	PSS	0.0	0.1	0.0
Summit	49.3	AWB-SU-43	PSS	205.7	0.2	0.0
Summit	49.3	AWB-SU-43	PSS	205.7	0.2	0.2
Summit	49.3	AWB-SU-43	PEM	0.0	0.2	0.0
Summit	49.3	AWB-SU-43	PEM	302.9	0.3	0.0
Summit	49.3	AWB-SU-43	PEM	302.9	0.3	0.0
Summit	49.6	A14-41	PEM	0.0	0.0	0.0
Summit	49.6	A14-41	PEM	60.3	0.1	0.0
Summit	49.6	A14-41	PEM	60.3	0.1	0.0
Summit	49.8	A14-41	PSS	0.0	0.0	0.0
Summit	49.8	A14-41	PEM	0.0	0.0	0.0
Summit	49.8	A14-41	PEM	76.5	0.0	0.0
Summit	49.8	A14-41	PEM	76.5	0.0	0.0
Summit	49.8	A14-41	PEM	0.0	0.0	0.0
Summit	49.8	A14-41	PEM	0.0	0.0	0.0
Summit	49.8	A14-41	PEM	0.0	0.0	0.0
Summit	50.0	A14-41	PEM	0.0	0.0	0.0
Summit	50.0	A14-41	PEM	37.6	0.0	0.0
Summit	50.0	A14-41	PEM	37.6	0.0	0.0
Summit	50.1	A14-42	PEM	0.0	0.0	0.0
Summit	50.1	A14-42	PEM	17.2	0.0	0.0
Summit	50.1	A14-42	PEM	17.2	0.0	0.0
Wayne	51.2	A15-23	AG-PEM	0.0	0.1	0.0
Wayne	51.2	A15-23	AG-PEM	54.8	0.1	0.0
Wayne	51.2	A15-23	AG-PEM	54.8	0.1	0.0
Wayne	51.5	A15-21	PEM	0.0	0.0	0.0
Wayne	51.5	A15-21	PEM	109.9	0.1	0.0
Wayne	51.5	A15-21	PEM	109.9	0.1	0.0
Wayne	51.6	A15-21	PEM	0.0	0.0	0.0
Wayne	51.7	A15-21	PEM	0.0	0.1	0.0
Wayne	51.7	A15-21	PEM	28.8	0.0	0.0
Wayne	51.7	A15-21	PEM	28.8	0.0	0.0
Wayne	52.2	C15-34	PSS	0.0	0.0	0.0
Wayne	52.2	C15-34	PSS	25.8	0.0	0.0
Wayne	52.2	C15-34	PSS	25.8	0.0	0.0
Wayne	52.2	C15-34	PEM	0.0	0.0	0.0
Wayne	52.6	A14-124	PEM	0.0	0.2	0.0
Wayne	52.6	A14-124	PEM	195.7	0.2	0.0
Wayne	52.6	A14-124	PEM	195.7	0.2	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Wayne	52.6	A14-124	PSS	0.0	0.0	0.0
Wayne	52.6	A14-124	PSS	88.4	0.1	0.0
Wayne	52.6	A14-124	PSS	88.4	0.1	0.1
Wayne	52.6	A14-124	PEM	0.0	0.0	0.0
Wayne	52.6	A14-124	PEM	38.0	0.0	0.0
Wayne	52.6	A14-124	PEM	38.0	0.0	0.0
Wayne	53.0	A15-53	PSS	0.0	0.0	0.0
Wayne	55.3	A15-42	PEM	0.0	0.0	0.0
Wayne	55.3	A15-42	PEM	20.8	0.0	0.0
Wayne	55.3	A15-42	PEM	20.8	0.0	0.0
Wayne	55.3	A15-41	PEM	0.0	0.0	0.0
Wayne	55.3	A15-41	PEM	0.0	0.0	0.0
Wayne	55.5	C15-89	PEM	0.0	0.0	0.0
Wayne	55.5	C15-89	PEM	14.2	0.0	0.0
Wayne	55.5	C15-89	PEM	14.2	0.0	0.0
Wayne	55.6	C15-89	PEM	0.0	0.0	0.0
Wayne	55.6	C15-89	PEM	0.0	0.0	0.0
Wayne	55.6	C15-89	PEM	0.0	0.0	0.0
Wayne	55.6	C15-89	AG-PEM	0.0	0.0	0.0
Wayne	55.6	C15-89	AG-PEM	0.0	0.0	0.0
Wayne	55.6	C15-89	AG-PEM	0.0	0.0	0.0
Wayne	55.7	B15-48	PEM	0.0	0.1	0.0
Wayne	55.7	B15-48	PEM	125.0	0.1	0.0
Wayne	55.7	B15-48	PEM	125.0	0.1	0.0
Wayne	57.3	AWB-WA-400	PEM	0.0	0.1	0.0
Wayne	57.3	AWB-WA-400	PEM	223.9	0.2	0.0
Wayne	57.3	AWB-WA-400	PEM	223.9	0.2	0.0
Wayne	57.3	B15-50	PEM	0.0	0.0	0.0
Wayne	57.3	B15-50	PEM	30.0	0.0	0.0
Wayne	57.3	B15-50	PEM	30.0	0.0	0.0
Wayne	57.3	B15-50	PEM	0.0	0.0	0.0
Wayne	57.3	B15-50	PSS	0.0	0.0	0.0
Wayne	57.3	B15-50	PEM	0.0	0.0	0.0
Wayne	57.3	B15-50	PSS	0.0	0.0	0.0
Wayne	57.4	B15-50	PEM	0.0	0.0	0.0
Wayne	57.4	B15-50	PEM	28.4	0.0	0.0
Wayne	57.4	B15-50	PEM	28.4	0.0	0.0
Wayne	57.4	B15-50	PEM	<Null>	0.0	0.0
Wayne	57.4	B15-50	PSS	<Null>	0.0	0.0
Wayne	57.4	B15-50	PEM	<Null>	0.0	0.0
Wayne	57.4	B15-50	PSS	<Null>	0.0	0.0
Wayne	57.4	B15-50	PSS	0.0	0.0	0.0
Wayne	57.4	B15-50	PSS	43.6	0.0	0.0
Wayne	57.4	B15-50	PSS	43.6	0.0	0.0
Wayne	57.7	B15-52	AG-PEM	0.0	0.1	0.0
Wayne	57.7	B15-52	AG-PEM	51.1	0.0	0.0
Wayne	57.7	B15-52	AG-PEM	51.1	0.0	0.0
Medina	58.3	C15-90	PEM	0.0	0.0	0.0
Medina	58.3	C15-90	PEM	130.3	0.2	0.0
Medina	58.3	C15-90	PEM	130.3	0.2	0.0
Medina	58.4	B14-7	PEM	0.0	0.2	0.0
Medina	58.4	B14-7	PEM	263.3	0.3	0.0
Medina	58.4	B14-7	PEM	263.3	0.3	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Medina	58.5	B14-7	AG-PEM	0.0	0.0	0.0
Medina	58.5	B14-7	AG-PEM	21.0	0.0	0.0
Medina	58.5	B14-7	AG-PEM	21.0	0.0	0.0
Medina	58.9	C15-91	AG-PEM	0.0	0.0	0.0
Medina	59.9	B15-02	PEM	0.0	0.1	0.0
Medina	59.9	B15-02	PEM	121.2	0.1	0.0
Medina	59.9	B15-02	PEM	121.2	0.1	0.0
Medina	60.7	A14-39	PEM	0.0	0.0	0.0
Medina	60.7	A14-39	PEM	0.0	0.0	0.0
Medina	60.7	A14-39	PEM	0.0	0.0	0.0
Medina	60.7	A14-39	PEM	0.0	0.0	0.0
Medina	60.7	A14-39	PEM	1.6	0.0	0.0
Medina	60.7	A14-39	PEM	1.6	0.0	0.0
Medina	61.9	C15-107	PEM	0.0	0.0	0.0
Medina	61.9	C15-107	PEM	18.1	0.0	0.0
Medina	61.9	C15-107	PEM	18.1	0.0	0.0
Medina	62.7	B15-70	PEM	26.0	0.0	0.0
Medina	62.7	B15-70	PEM	26.0	0.0	0.0
Medina	62.7	B15-70	PEM	0.0	0.0	0.0
Medina	62.7	B15-70	PEM	125.1	0.2	0.0
Medina	62.7	B15-70	PEM	125.1	0.2	0.0
Medina	62.8	B15-70	PEM	0.0	0.0	0.0
Medina	62.8	B15-70	PEM	34.8	0.1	0.0
Medina	62.8	B15-70	PEM	34.8	0.1	0.0
Medina	62.8	B15-70	PEM	0.0	0.0	0.0
Medina	62.8	B15-70	PEM	9.8	0.0	0.0
Medina	62.8	B15-70	PEM	9.8	0.0	0.0
Medina	62.9	B15-23	PEM	0.0	0.2	0.0
Medina	62.9	B15-23	PEM	206.1	0.2	0.0
Medina	62.9	B15-23	PEM	206.1	0.2	0.0
Medina	64.6	A14-114	PEM	0.0	0.0	0.0
Medina	64.6	A14-114	PEM	45.2	0.0	0.0
Medina	64.6	A14-114	PEM	45.2	0.0	0.0
Medina	64.9	B15-22	PEM	0.0	0.0	0.0
Medina	66.0	AWB-ME-23	PEM	17.8	0.0	0.0
Medina	66.2	B14-4	PSS	0.0	0.0	0.0
Medina	66.2	B14-4	PFO	0.0	0.0	0.0
Medina	66.2	B14-4	PFO	47.1	0.0	0.0
Medina	66.2	B14-4	PFO	47.1	0.0	0.0
Medina	66.2	B14-4	PFO	0.0	0.0	0.0
Medina	66.2	B14-4	PFO	47.2	0.1	0.0
Medina	66.2	B14-4	PFO	47.2	0.1	0.1
Medina	66.6	A14-129	AG-PEM	0.0	0.0	0.0
Medina	66.6	A14-129	AG-PEM	45.5	0.0	0.0
Medina	66.6	A14-129	AG-PEM	45.5	0.0	0.0
Medina	67.2	AWB-ME-26	PFO	0.0	0.1	0.0
Medina	67.2	AWB-ME-26	PFO	157.9	0.1	0.0
Medina	67.2	AWB-ME-26	PFO	157.9	0.1	0.1
Medina	67.4	AWB-ME-27	PFO	0.0	0.0	0.0
Medina	67.4	AWB-ME-27	PFO	1.1	0.0	0.0
Medina	67.4	AWB-ME-27	PFO	1.1	0.0	0.0
Medina	67.4	AWB-ME-27	PFO	0.0	0.0	0.0
Medina	67.4	AWB-ME-27	PFO	50.3	0.0	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Medina	67.4	AWB-ME-27	PFO	50.3	0.0	0.0
Medina	67.5	AWB-ME-29	PFO	0.0	0.0	0.0
Medina	67.6	AWB-ME-30	PFO	0.0	0.1	0.0
Medina	67.6	AWB-ME-30	PFO	74.1	0.1	0.0
Medina	67.6	AWB-ME-30	PFO	74.1	0.1	0.1
Medina	67.7	AWB-ME-31	PEM/PSS	0.0	0.1	0.0
Medina	67.7	AWB-ME-31	PEM/PSS	9.0	0.0	0.0
Medina	67.7	AWB-ME-31	PEM/PSS	9.0	0.0	0.0
Medina	67.7	AWB-ME-31	PFO	0.0	0.1	0.0
Medina	67.7	AWB-ME-31	PFO	203.9	0.2	0.0
Medina	67.7	AWB-ME-31	PFO	203.9	0.2	0.2
Medina	67.8	B15-111	PEM	0.0	0.1	0.0
Medina	67.8	B15-111	PEM	149.3	0.2	0.0
Medina	67.8	B15-111	PEM	149.3	0.2	0.0
Medina	67.8	B15-82	PFO	0.0	0.0	0.0
Medina	67.8	B15-82	PFO	22.9	0.0	0.0
Medina	67.8	B15-82	PFO	22.9	0.0	0.0
Medina	67.9	B15-82	PEM	0.0	0.0	0.0
Medina	67.9	B15-82	PEM	12.5	0.0	0.0
Medina	67.9	B15-82	PEM	12.5	0.0	0.0
Medina	68.1	AWB-ME-33	PFO	0.0	0.0	0.0
Medina	68.1	AWB-ME-33	PFO	0.0	0.0	0.0
Medina	68.1	AWB-ME-33	PFO	0.0	0.0	0.0
Medina	68.1	AWB-ME-33	PFO	0.0	0.0	0.0
Medina	68.1	AWB-ME-33	PFO	54.3	0.1	0.0
Medina	68.1	AWB-ME-33	PFO	54.3	0.1	0.1
Medina	68.5	B15-100	PFO	0.0	0.1	0.0
Medina	68.5	B15-100	PFO	95.4	0.1	0.0
Medina	68.5	B15-100	PFO	95.4	0.1	0.1
Medina	68.5	B15-100	PSS	0.0	0.0	0.0
Medina	68.5	B15-100	PSS	0.0	0.0	0.0
Medina	68.5	AWB-ME-35	PEM/PSS	0.0	0.1	0.0
Medina	68.5	AWB-ME-35	PEM/PSS	126.5	0.1	0.0
Medina	68.5	AWB-ME-35	PEM/PSS	126.5	0.1	0.1
Medina	68.6	B15-100	PFO	0.0	0.0	0.0
Medina	68.6	B15-100	PFO	1.9	0.0	0.0
Medina	68.6	B15-100	PFO	1.9	0.0	0.0
Medina	68.6	AWB-ME-35	PFO	0.0	0.0	0.0
Medina	68.6	B15-100	PFO	0.0	0.1	0.0
Medina	68.6	B15-100	PFO	186.1	0.3	0.0
Medina	68.6	B15-100	PFO	186.1	0.3	0.3
Medina	69.5	AWB-ME-701	PEM/PSS	42.2	0.1	0.1
Medina	69.5	C15-40	PEM	8.5	0.0	0.0
Medina	69.8	C15-06-W2	PEM	0.0	0.0	0.0
Medina	69.8	C15-06-W2	PEM	53.2	0.1	0.0
Medina	69.8	C15-06-W2	PEM	53.2	0.1	0.0
Medina	69.9	C15-06-W2	PEM	0.0	0.0	0.0
Medina	69.9	C15-06-W2	PEM	0.0	0.0	0.0
Medina	69.9	C15-06-W2	PEM	0.0	0.0	0.0
Medina	69.9	C15-06-W2	PEM	15.0	0.0	0.0
Medina	69.9	C15-06-W2	PEM	15.0	0.0	0.0
Medina	69.9	C15-06-W2	PEM	0.0	0.0	0.0
Medina	69.9	C15-06-W2	PEM	0.0	0.0	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Medina	69.9	C15-06-W2	PEM	0.0	0.0	0.0
Medina	69.9	C15-06-W2	PEM	0.0	0.0	0.0
Medina	69.9	C15-06-W3	PFO	0.0	0.1	0.0
Medina	69.9	C15-06-W3	PFO	0.0	0.1	0.1
Medina	70.0	C15-06-W4	PFO	0.0	0.0	0.0
Medina	70.0	C15-06-W4	PFO	0.0	0.0	0.0
Medina	70.0	C15-06-W4	PFO	0.0	0.0	0.0
Medina	70.0	C15-6	PFO	0.0	0.1	0.0
Medina	70.0	C15-6	PFO	83.2	0.1	0.0
Medina	70.0	C15-6	PFO	83.2	0.1	0.1
Medina	70.4	AWB-ME-754	PEM	0.0	0.3	0.0
Medina	70.4	AWB-ME-754	PEM	478.5	0.5	0.0
Medina	70.4	AWB-ME-754	PEM	478.5	0.5	0.0
Medina	70.4	B15-27	PEM	0.0	0.1	0.0
Medina	70.4	B15-27	PEM	330.2	0.4	0.0
Medina	70.4	B15-27	PEM	330.2	0.4	0.0
Medina	70.5	B15-27	AG-PEM	0.0	0.0	0.0
Medina	70.6	C15-42	AG-PEM	0.0	1.1	0.0
Medina	70.6	C15-42	AG-PEM	1029.9	1.2	0.0
Medina	70.6	C15-42	AG-PEM	1029.9	1.2	0.0
Medina	71.2	C15-44	PFO	1009.5	1.2	1.2
Medina	71.6	A15-73	PEM	0.0	0.0	0.0
Medina	71.6	A15-73	PEM	0.6	0.0	0.0
Medina	71.6	A15-73	PEM	0.6	0.0	0.0
Medina	72.3	C15-50	PFO	0.0	0.3	0.0
Medina	72.3	C15-50	PFO	498.4	0.6	0.0
Medina	72.3	C15-50	PFO	498.4	0.6	0.6
Medina	72.5	A14-48	PFO	0.0	0.2	0.0
Medina	72.5	A14-48	PFO	344.3	0.4	0.0
Medina	72.5	A14-48	PFO	344.3	0.4	0.4
Medina	72.8	B15-120	PFO	10.4	0.0	0.0
Medina	72.8	B15-120	PEM	0.0	0.0	0.0
Medina	72.8	B15-120	PEM	0.0	0.0	0.0
Medina	73.3	C15-24-W8	PSS	0.0	0.1	0.0
Medina	73.3	C15-24-W8	PSS	291.1	0.3	0.0
Medina	73.3	C15-24-W8	PSS	291.1	0.3	0.3
Medina	73.3	C15-24-W8	PFO	0.0	0.0	0.0
Medina	73.3	C15-24-W8	PFO	0.0	0.0	0.0
Medina	73.3	C15-24-W7	PSS	0.0	0.1	0.0
Medina	73.3	C15-24-W7	PSS	19.5	0.0	0.0
Medina	73.3	C15-24-W7	PSS	19.5	0.0	0.0
Medina	73.3	C15-24-W7	PFO	0.0	0.0	0.0
Medina	73.3	C15-24-W7	PFO	69.1	0.1	0.0
Medina	73.3	C15-24-W7	PFO	69.1	0.1	0.1
Medina	73.4	C15-24-W10	PEM	0.0	0.0	0.0
Medina	73.4	C15-24-W10	PEM	0.0	0.0	0.0
Medina	73.4	C15-24-W10	PEM	19.9	0.1	0.0
Medina	73.4	C15-24-W10	PEM	19.9	0.1	0.0
Medina	73.9	AWB-ME-58	PEM/PSS	0.0	0.0	0.0
Medina	73.9	AWB-ME-58	PEM/PSS	26.7	0.0	0.0
Medina	73.9	AWB-ME-58	PEM/PSS	26.7	0.0	0.0
Medina	73.9	AWB-ME-58	PEM/PSS	0.0	0.0	0.0
Medina	73.9	AWB-ME-58	PEM/PSS	25.1	0.0	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Medina	73.9	AWB-ME-58	PEM/PSS	25.1	0.0	0.0
Medina	73.9	C15-54	PFO	0.0	0.0	0.0
Medina	73.9	C15-54	PFO	24.7	0.0	0.0
Medina	73.9	C15-54	PFO	24.7	0.0	0.0
Medina	74.0	B15-84	PEM	12.6	0.0	0.0
Medina	74.0	B15-84	PEM	12.6	0.0	0.0
Medina	74.0	B15-84	PEM	0.0	0.0	0.0
Medina	74.0	B15-84	PEM	0.0	0.0	0.0
Medina	74.0	B15-84	PEM	0.0	0.0	0.0
Medina	74.0	B14-8	PEM	0.0	0.0	0.0
Medina	74.7	C15-109	PEM	0.0	0.0	0.0
Medina	74.8	C15-111	PEM	0.0	0.0	0.0
Medina	74.8	C15-111	PEM	0.0	0.0	0.0
Medina	74.8	C15-111	PEM	0.0	0.0	0.0
Medina	75.8	B15-74	PFO	0.0	0.0	0.0
Medina	75.8	B15-74	PFO	62.1	0.1	0.0
Medina	75.8	B15-74	PFO	62.1	0.1	0.1
Medina	75.8	B15-74	PEM	0.0	0.0	0.0
Medina	75.8	B15-74	PEM	0.0	0.0	0.0
Medina	76.3	B15-74	PEM	0.0	0.1	0.0
Medina	76.3	B15-74	PEM	110.8	0.1	0.0
Medina	76.3	B15-74	PEM	110.8	0.1	0.0
Medina	76.9	A15-76	PEM	0.0	0.0	0.0
Medina	76.9	A15-76	PEM	43.5	0.1	0.0
Medina	76.9	A15-76	PEM	43.5	0.1	0.0
Medina	77.4	A15-74	AG-PEM	0.0	0.0	0.0
Medina	77.4	A15-74	PEM	0.0	0.1	0.0
Medina	77.4	A15-74	PEM	233.3	0.2	0.0
Medina	77.4	A15-74	PEM	233.3	0.2	0.0
Medina	77.7	A15-75	PEM	2.5	0.0	0.0
Medina	77.7	A15-75	PEM	2.5	0.0	0.0
Medina	77.7	A15-75	AG-PEM	0.0	0.0	0.0
Medina	77.7	A15-75	AG-PEM	2.5	0.0	0.0
Medina	77.7	A15-75	AG-PEM	2.5	0.0	0.0
Medina	77.8	A15-75	AG-PEM	0.0	0.0	0.0
Medina	77.8	A15-75	AG-PEM	7.7	0.0	0.0
Medina	77.8	A15-75	AG-PEM	7.7	0.0	0.0
Medina	77.8	A15-75	PEM	0.0	0.0	0.0
Medina	77.8	A15-75	PEM	23.0	0.0	0.0
Medina	77.8	A15-75	PEM	23.0	0.0	0.0
Medina	78.0	AWB-ME-90	PEM	0.0	0.0	0.0
Medina	78.0	AWB-ME-90	PEM	20.8	0.0	0.0
Medina	78.0	AWB-ME-90	PEM	20.8	0.0	0.0
Medina	78.3	AWB-ME-95	PEM	0.0	0.0	0.0
Medina	78.3	AWB-ME-95	PEM	22.9	0.0	0.0
Medina	78.3	AWB-ME-95	PEM	22.9	0.0	0.0
Medina	78.4	AWB-ME-95	PEM	0.0	0.0	0.0
Medina	78.4	AWB-ME-95	PEM	0.0	0.0	0.0
Medina	78.4	AWB-ME-95	PEM	0.0	0.0	0.0
Medina	79.5	AWB-ME-99	PEM/PSS	0.0	0.0	0.0
Medina	79.5	AWB-ME-99	PEM/PSS	0.0	0.0	0.0
Medina	79.5	AWB-ME-99	PEM/PSS	0.0	0.0	0.0
Medina	80.3	AWB-LO-1	PFO	0.0	0.0	0.0

APPENDIX I-1 (cont’d)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Medina	80.3	AWB-LO-1	PFO	44.1	0.0	0.0
Medina	80.3	AWB-LO-1	PFO	44.1	0.0	0.0
Medina	80.4	B15-15	PFO	0.0	0.0	0.0
Medina	80.4	B15-15	PFO	0.0	0.0	0.0
Medina	80.4	B15-15	PFO	100.4	0.1	0.0
Medina	80.4	B15-15	PFO	100.4	0.1	0.1
Medina	80.4	B15-15	PEM	0.0	0.1	0.0
Medina	80.4	B15-15	PEM	94.4	0.1	0.0
Medina	80.4	B15-15	PEM	94.4	0.1	0.0
Medina	80.5	B15-15	PFO	0.0	0.0	0.0
Medina	80.5	B15-15	PFO	72.0	0.1	0.0
Medina	80.5	B15-15	PFO	72.0	0.1	0.1
Medina	80.5	B15-15	PSS	0.0	0.1	0.0
Medina	80.5	B15-15	PSS	132.3	0.1	0.0
Medina	80.5	B15-15	PSS	132.3	0.1	0.1
Lorain	80.5	B15-15	PFO	0.0	0.0	0.0
Lorain	80.5	B15-15	PFO	12.2	0.0	0.0
Lorain	80.5	B15-15	PFO	12.2	0.0	0.0
Lorain	80.5	B15-15	PSS	0.0	0.0	0.0
Lorain	80.5	B15-15	PFO	0.0	0.0	0.0
Lorain	80.5	B15-15	PFO	210.5	0.2	0.0
Lorain	80.5	B15-15	PFO	210.5	0.2	0.2
Lorain	80.5	B15-15	PEM	0.0	0.1	0.0
Lorain	81.0	C15-82	PEM	0.0	0.0	0.0
Lorain	81.0	C15-82	PEM	33.2	0.1	0.0
Lorain	81.0	C15-82	PEM	33.2	0.1	0.0
Lorain	81.5	A15-55	PEM	0.0	0.0	0.0
Lorain	81.5	A15-55	PEM	138.1	0.1	0.0
Lorain	81.5	A15-55	PEM	138.1	0.1	0.0
Lorain	81.6	A15-29	PEM	0.0	0.0	0.0
Lorain	81.6	A15-29	PEM	0.0	0.0	0.0
Lorain	81.6	A15-29	PEM	0.0	0.0	0.0
Lorain	82.0	A14-59	AG-PEM	0.0	0.0	0.0
Lorain	82.0	A14-59	AG-PEM	0.0	0.0	0.0
Lorain	82.0	A14-59	AG-PEM	0.0	0.0	0.0
Lorain	82.0	A14-59	PFO	0.0	0.0	0.0
Lorain	82.0	A14-59	PFO	0.0	0.0	0.0
Lorain	82.0	A14-59	PFO	0.0	0.0	0.0
Lorain	82.0	A14-59	PEM	0.0	0.0	0.0
Lorain	82.0	A14-59	PEM	0.0	0.0	0.0
Lorain	82.0	A14-59	PEM	0.0	0.0	0.0
Lorain	82.0	A14-59	PFO	0.0	0.0	0.0
Lorain	82.6	C15-83	PEM	0.0	0.0	0.0
Lorain	82.6	C15-83	PEM	10.0	0.0	0.0
Lorain	82.6	C15-83	PEM	10.0	0.0	0.0
Lorain	82.6	A14-62	AG-PEM	0.0	0.0	0.0
Lorain	82.6	A14-62	AG-PEM	0.0	0.0	0.0
Lorain	82.6	A14-62	AG-PEM	0.0	0.0	0.0
Lorain	82.7	A14-62	PEM	0.0	0.1	0.0
Lorain	82.7	A14-62	PEM	163.5	0.2	0.0
Lorain	82.7	A14-62	PEM	163.5	0.2	0.0
Lorain	82.8	A14-63	PFO	0.0	0.1	0.0
Lorain	82.8	A14-63	PFO	455.9	0.6	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Lorain	82.8	A14-63	PFO	455.9	0.6	0.6
Lorain	82.9	A14-63	AG-PEM	0.0	0.1	0.0
Lorain	83.0	A14-63	AG-PEM	0.0	0.0	0.0
Lorain	83.0	A14-63	PFO	0.0	0.0	0.0
Lorain	83.0	A14-63	PFO	100.0	0.1	0.0
Lorain	83.0	A14-63	PFO	100.0	0.1	0.1
Lorain	83.4	C15-4	PEM	0.0	0.0	0.0
Lorain	83.4	C15-4	PEM	57.9	0.1	0.0
Lorain	83.4	C15-4	PEM	57.9	0.1	0.0
Lorain	83.4	C15-2	PFO	0.0	0.0	0.0
Lorain	83.4	C15-2	PFO	46.2	0.1	0.0
Lorain	83.4	C15-2	PFO	46.2	0.1	0.1
Lorain	83.5	C15-1	PFO	0.0	0.0	0.0
Lorain	83.5	C15-1	PFO	0.0	0.0	0.0
Lorain	83.5	C15-1	PFO	0.0	0.0	0.0
Lorain	83.5	A14-68	PEM	0.0	0.0	0.0
Lorain	83.5	A14-68	PFO	0.0	0.1	0.0
Lorain	83.5	A14-68	PFO	219.7	0.3	0.0
Lorain	83.5	A14-68	PFO	219.7	0.3	0.3
Lorain	83.6	A14-67	PFO	0.0	0.0	0.0
Lorain	83.6	A14-67	PFO	46.4	0.0	0.0
Lorain	83.6	A14-67	PFO	46.4	0.0	0.0
Lorain	83.7	A14-67	PEM	0.0	0.0	0.0
Lorain	83.7	A14-67	PEM	110.0	0.1	0.0
Lorain	83.7	A14-67	PEM	110.0	0.1	0.0
Lorain	83.8	A14-67	PFO	0.0	0.4	0.0
Lorain	83.8	A14-67	PFO	708.2	0.8	0.0
Lorain	83.8	A14-67	PFO	708.2	0.8	0.8
Lorain	84.3	A14-69	PEM	0.0	0.0	0.0
Lorain	84.3	A14-69	PEM	0.0	0.0	0.0
Lorain	84.3	A14-69	PEM	0.0	0.0	0.0
Lorain	84.4	A14-69	PFO	0.0	0.0	0.0
Lorain	84.4	A14-69	PFO	41.8	0.0	0.0
Lorain	84.4	A14-69	PFO	41.8	0.0	0.0
Lorain	84.5	A15-30	PEM	0.0	0.0	0.0
Lorain	84.5	A15-30	PEM	12.4	0.0	0.0
Lorain	84.5	A15-30	PEM	12.4	0.0	0.0
Lorain	84.5	B15-25	PFO	0.0	0.0	0.0
Lorain	84.5	B15-25	PFO	66.3	0.0	0.0
Lorain	84.5	B15-25	PFO	66.3	0.0	0.0
Lorain	84.5	B15-25	PEM	0.0	0.0	0.0
Lorain	84.8	B15-90	AG-PEM	0.0	0.0	0.0
Lorain	84.9	A15-51	AG-PEM	0.0	0.1	0.0
Lorain	84.9	A15-51	AG-PEM	54.2	0.1	0.0
Lorain	84.9	A15-51	AG-PEM	54.2	0.1	0.0
Lorain	85.0	A14-71	AG-PEM	0.0	0.0	0.0
Lorain	85.0	A14-71	AG-PEM	0.0	0.0	0.0
Lorain	85.0	A14-71	PFO	0.0	0.0	0.0
Lorain	85.0	A14-71	PFO	23.1	0.1	0.0
Lorain	85.0	A14-71	PFO	23.1	0.1	0.1
Lorain	85.1	A14-71	PFO	0.0	0.0	0.0
Lorain	85.1	A14-71	PFO	503.4	0.5	0.0
Lorain	85.1	A14-71	PFO	503.4	0.5	0.5

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Lorain	85.1	A14-71	PEM	0.0	0.0	0.0
Lorain	85.1	A14-71	PEM	0.0	0.0	0.0
Lorain	85.1	A14-71	PEM	0.0	0.0	0.0
Lorain	85.2	A14-71	PEM	0.0	0.1	0.0
Lorain	85.2	A14-71	PEM	0.0	0.0	0.0
Lorain	85.2	A14-71	PEM	0.0	0.0	0.0
Lorain	85.8	A15-56	PFO	0.0	0.0	0.0
Lorain	85.8	A15-56	PFO	0.0	0.1	0.0
Lorain	85.8	A15-56	PFO	94.4	0.1	0.0
Lorain	85.8	A15-56	PFO	94.4	0.1	0.1
Lorain	86.5	C15-94	AG-PEM	0.0	0.0	0.0
Lorain	86.6	A14-51	PEM	6.9	0.0	0.0
Lorain	86.6	A14-51	AG-PEM	26.2	0.0	0.0
Lorain	86.6	A14-51	PSS	81.4	0.1	0.1
Lorain	86.6	A14-51	PFO	185.2	0.2	0.2
Lorain	86.7	A14-51	PFO	30.1	0.0	0.0
Lorain	86.8	A14-52	PEM	284.7	0.3	0.0
Lorain	86.8	A14-52	AG-PEM	58.1	0.1	0.0
Lorain	87.7	B15-95	PFO	0.0	0.0	0.0
Lorain	87.7	B15-95	PFO	374.1	0.5	0.0
Lorain	87.7	B15-95	PFO	374.1	0.5	0.5
Lorain	87.8	B15-95	PEM	0.0	0.2	0.0
Lorain	87.8	B15-95	PEM	340.7	0.4	0.0
Lorain	87.8	B15-95	PEM	340.7	0.4	0.0
Lorain	88.1	B15-96	PEM	0.0	0.3	0.0
Lorain	88.1	B15-96	PEM	179.6	0.2	0.0
Lorain	88.1	B15-96	PEM	179.6	0.2	0.0
Lorain	88.5	A14-73	PEM	0.0	0.1	0.0
Lorain	88.5	A14-73	PEM	0.0	0.0	0.0
Lorain	88.5	A14-73	PEM	0.0	0.0	0.0
Lorain	88.7	A14-73	PFO	0.0	0.1	0.0
Lorain	88.7	A14-73	PFO	353.9	0.5	0.0
Lorain	88.7	A14-73	PFO	353.9	0.5	0.5
Lorain	90.0	A14-76	PEM	0.0	0.0	0.0
Lorain	91.4	C15-37	PEM	0.0	0.0	0.0
Lorain	91.4	C15-37	PEM	0.0	0.0	0.0
Lorain	91.4	C15-37	PEM	0.0	0.0	0.0
Lorain	91.4	C15-37	PEM	0.0	0.0	0.0
Lorain	91.4	C15-37	PSS	33.9	0.0	0.0
Lorain	91.4	C15-37	PSS	33.9	0.0	0.0
Lorain	91.7	C15-36	PEM	0.0	0.0	0.0
Lorain	92.6	C15-9	PEM	0.0	0.1	0.0
Lorain	92.6	C15-9	PEM	0.0	0.0	0.0
Lorain	92.6	C15-9	PEM	112.9	0.1	0.0
Lorain	92.6	C15-9	PEM	112.9	0.1	0.0
Lorain	92.6	C15-9	PFO	0.0	0.0	0.0
Lorain	92.6	C15-9	PFO	0.0	0.0	0.0
Lorain	92.6	C15-9	PFO	20.0	0.0	0.0
Lorain	92.6	C15-9	PFO	20.0	0.0	0.0
Lorain	92.6	C15-9	PFO	0.0	0.0	0.0
Lorain	92.6	C15-9	PFO	0.0	0.0	0.0
Lorain	92.6	C15-9	PFO	15.3	0.0	0.0
Lorain	92.6	C15-9	PFO	15.3	0.0	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Lorain	93.9	A14-78	AG-PEM	0.0	0.1	0.0
Lorain	93.9	A14-78	AG-PEM	0.0	0.0	0.0
Lorain	93.9	A14-78	AG-PEM	0.0	0.0	0.0
Lorain	94.2	A14-178	PEM	0.0	0.0	0.0
Lorain	94.2	A14-178	PEM	0.0	0.0	0.0
Lorain	94.2	A14-178	PEM	0.0	0.0	0.0
Lorain	94.2	A14-178	PSS	0.0	0.1	0.0
Lorain	94.2	A14-178	PSS	236.0	0.2	0.0
Lorain	94.2	A14-178	PSS	236.0	0.2	0.2
Lorain	94.3	A14-178	PSS	0.0	0.0	0.0
Lorain	94.3	A14-178	PSS	44.1	0.0	0.0
Lorain	94.3	A14-178	PSS	44.1	0.0	0.0
Lorain	94.4	A14-178	PSS	0.0	0.0	0.0
Lorain	94.7	B15-57	AG-PEM	0.0	0.0	0.0
Lorain	94.7	B15-57	PEM	0.0	0.0	0.0
Lorain	94.7	B15-57	PEM	0.0	0.0	0.0
Lorain	94.7	B15-57	AG-PEM	0.0	0.3	0.0
Lorain	94.7	B15-57	AG-PEM	185.5	0.2	0.0
Lorain	94.7	B15-57	AG-PEM	185.5	0.2	0.0
Lorain	95.1	A14-179	PEM	0.0	0.0	0.0
Lorain	95.1	A14-179	PSS	0.0	0.0	0.0
Lorain	95.1	A14-179	PSS	0.0	0.0	0.0
Lorain	95.1	A14-179	PSS	0.0	0.0	0.0
Lorain	95.4	A14-181	PEM	0.0	0.0	0.0
Lorain	95.4	A14-181	PEM	38.4	0.0	0.0
Lorain	95.4	A14-181	PEM	38.4	0.0	0.0
Lorain	95.4	A14-181	AG-PEM	0.0	0.0	0.0
Lorain	95.4	A14-181	AG-PEM	74.1	0.1	0.0
Lorain	95.4	A14-181	AG-PEM	74.1	0.1	0.0
Lorain	95.5	A14-181	AG-PEM	0.0	0.1	0.0
Lorain	95.5	A14-181	AG-PEM	0.0	0.0	0.0
Lorain	95.5	A14-181	AG-PEM	0.0	0.0	0.0
Lorain	95.7	A14-182	PEM	0.0	0.1	0.0
Lorain	95.7	A14-182	PEM	264.5	0.3	0.0
Lorain	95.7	A14-182	PEM	264.5	0.3	0.0
Lorain	95.7	A14-182	PEM	0.0	0.0	0.0
Lorain	95.7	A14-182	PEM	229.3	0.3	0.0
Lorain	95.7	A14-182	PEM	229.3	0.3	0.0
Lorain	96.1	A14-141	AG-PEM	0.0	0.0	0.0
Lorain	96.1	A14-141	AG-PEM	27.6	0.0	0.0
Lorain	96.1	A14-141	AG-PEM	27.6	0.0	0.0
Lorain	96.1	A14-141	PFO	0.0	0.0	0.0
Lorain	96.1	A14-141	PFO	9.5	0.0	0.0
Lorain	96.1	A14-141	PFO	9.5	0.0	0.0
Lorain	96.1	A14-141	PEM	0.0	0.0	0.0
Lorain	96.1	A14-141	PEM	162.1	0.2	0.0
Lorain	96.1	A14-141	PEM	162.1	0.2	0.0
Lorain	96.1	A14-141	PEM	0.0	0.0	0.0
Lorain	96.1	A14-141	PFO	0.0	0.0	0.0
Lorain	96.1	C15-58	PFO	0.0	0.0	0.0
Lorain	96.1	C15-58	PFO	2.3	0.0	0.0
Lorain	96.1	C15-58	PFO	2.3	0.0	0.0
Lorain	96.3	C15-58	PFO	0.0	0.3	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Lorain	96.3	C15-58	PFO	481.2	0.6	0.0
Lorain	96.3	C15-58	PFO	481.2	0.6	0.6
Lorain	96.3	C15-58	PEM	0.0	0.3	0.0
Lorain	96.3	C15-58	PEM	43.9	0.0	0.0
Lorain	96.3	C15-58	PEM	43.9	0.0	0.0
Lorain	96.3	C15-58	PEM	0.0	0.0	0.0
Lorain	96.8	A15-38	PEM	0.0	0.0	0.0
Lorain	96.8	A15-38	PEM	48.9	0.0	0.0
Lorain	96.8	A15-38	PEM	48.9	0.0	0.0
Lorain	96.8	A15-38	PSS	0.0	0.0	0.0
Lorain	96.8	A15-38	AG-PEM	0.0	0.1	0.0
Lorain	96.8	A15-38	AG-PEM	64.9	0.0	0.0
Lorain	96.8	A15-38	AG-PEM	64.9	0.0	0.0
Lorain	96.9	A15-39	AG-PEM	0.0	0.0	0.0
Lorain	96.9	A15-39	AG-PEM	0.0	0.0	0.0
Lorain	96.9	A15-39	AG-PEM	0.0	0.0	0.0
Lorain	97.3	C15-57	PSS	0.0	0.0	0.0
Lorain	97.3	C15-57	PSS	24.9	0.0	0.0
Lorain	97.3	C15-57	PSS	24.9	0.0	0.0
Lorain	98.4	C15-61	PEM	0.0	0.0	0.0
Lorain	98.4	C15-61	PEM	19.5	0.0	0.0
Lorain	98.4	C15-61	PEM	19.5	0.0	0.0
Lorain	98.9	A15-85	PSS	0.0	0.0	0.0
Lorain	98.9	A15-85	PEM	0.0	0.0	0.0
Lorain	100.2	C15-63	AG-PEM	0.0	0.1	0.0
Lorain	100.2	C15-63	AG-PEM	125.1	0.1	0.0
Lorain	100.2	C15-63	AG-PEM	125.1	0.1	0.0
Lorain	100.3	C15-99	AG-PEM	0.0	0.1	0.0
Lorain	100.3	C15-99	AG-PEM	80.1	0.1	0.0
Lorain	100.3	C15-99	AG-PEM	80.1	0.1	0.0
Lorain	100.4	C15-99	AG-PEM	0.0	0.0	0.0
Lorain	100.4	C15-99	AG-PEM	21.1	0.0	0.0
Lorain	100.4	C15-99	AG-PEM	21.1	0.0	0.0
Lorain	100.4	C15-99	PEM	0.0	0.0	0.0
Lorain	100.4	C15-99	PEM	11.0	0.0	0.0
Lorain	100.4	C15-99	PEM	11.0	0.0	0.0
Lorain	100.5	C15-99	PFO	0.0	0.1	0.0
Lorain	100.5	C15-99	PFO	6.2	0.0	0.0
Lorain	100.5	C15-99	PFO	6.2	0.0	0.0
Lorain	100.6	B15-105	PFO	0.0	0.0	0.0
Lorain	100.6	B15-105	PFO	87.9	0.1	0.0
Lorain	100.6	B15-105	PFO	87.9	0.1	0.1
Lorain	100.9	B15-99	PSS	0.0	0.6	0.0
Lorain	100.9	B15-99	PSS	1029.3	1.2	0.0
Lorain	100.9	B15-99	PSS	1029.3	1.2	1.2
Huron	102.3	A15-57	PEM	0.0	0.0	0.0
Huron	102.3	A15-57	PEM	6.8	0.0	0.0
Huron	102.3	A15-57	PEM	6.8	0.0	0.0
Huron	102.3	A15-57	PSS	0.0	0.0	0.0
Huron	104.3	C15-56-W1	PFO	545.6	0.6	0.6
Huron	104.5	C15-56-W2	PEM	14.3	0.0	0.0
Huron	104.5	C15-56-W2	PFO	118.9	0.1	0.1
Huron	104.5	C15-56-W2	PEM	110.6	0.1	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Huron	104.5	C15-56-W2	PFO	179.8	0.2	0.2
Erie	105.9	C15-70	PEM	0.0	0.1	0.0
Erie	105.9	C15-70	PEM	217.9	0.3	0.0
Erie	105.9	C15-70	PEM	217.9	0.3	0.0
Erie	105.9	C15-69	PSS	0.0	0.0	0.0
Erie	106.5	C15-10	PFO	0.0	0.3	0.0
Erie	106.5	C15-10	PFO	568.8	0.7	0.0
Erie	106.5	C15-10	PFO	568.8	0.7	0.7
Erie	106.5	C15-10	PEM	0.0	0.0	0.0
Erie	106.5	C15-10	PEM	0.0	0.0	0.0
Erie	106.7	C15-10	PFO	0.0	0.5	0.0
Erie	106.7	C15-10	PFO	815.3	0.8	0.0
Erie	106.7	C15-10	PFO	815.3	0.8	0.8
Erie	106.8	C15-10	PEM	0.0	0.1	0.0
Erie	106.8	C15-10	PEM	0.0	0.1	0.0
Erie	109.4	AWB-ER-43	PFO	0.0	0.1	0.0
Erie	109.4	AWB-ER-43	PFO	164.1	0.2	0.0
Erie	109.4	AWB-ER-43	PFO	164.1	0.2	0.2
Erie	109.8	B15-05	PEM	0.0	0.0	0.0
Erie	109.8	B15-05	PEM	23.7	0.0	0.0
Erie	109.8	B15-05	PEM	23.7	0.0	0.0
Erie	109.8	B15-05	PFO	0.0	0.0	0.0
Erie	109.8	B15-05	PFO	14.5	0.0	0.0
Erie	109.8	B15-05	PFO	14.5	0.0	0.0
Erie	110.3	B15-115	PEM	24.9	0.0	0.0
Erie	111.0	C15-12	AG-PEM	0.0	0.0	0.0
Erie	111.4	A14-111	PEM	0.0	0.0	0.0
Erie	111.4	A14-111	PEM	0.0	0.0	0.0
Erie	111.4	A14-111	PEM	0.0	0.0	0.0
Erie	111.4	B15-60	PEM	0.0	0.0	0.0
Erie	111.4	B15-60	PEM	2.4	0.0	0.0
Erie	111.4	B15-60	PEM	2.4	0.0	0.0
Erie	111.7	B15-38	PFO	0.0	0.0	0.0
Erie	111.7	B15-38	PFO	21.3	0.0	0.0
Erie	111.7	B15-38	PFO	21.3	0.0	0.0
Erie	111.7	B15-39	PEM	0.0	0.0	0.0
Erie	111.7	B15-39	PEM	29.8	0.0	0.0
Erie	111.7	B15-39	PEM	29.8	0.0	0.0
Erie	112.8	A14-154	AG-PEM	0.0	0.0	0.0
Erie	112.8	A14-154	AG-PEM	113.3	0.0	0.0
Erie	112.8	A14-154	AG-PEM	113.3	0.0	0.0
Erie	112.8	A14-154	PEM	43.7	0.0	0.0
Erie	112.8	A14-154	PEM	43.7	0.0	0.0
Erie	113.0	AWB-ER-35	PFO	4.2	0.0	0.0
Erie	113.0	AWB-ER-35	PFO	4.2	0.0	0.0
Erie	113.2	A14-187	PEM	0.0	0.0	0.0
Erie	113.2	A14-187	PEM	14.2	0.0	0.0
Erie	113.2	A14-187	PEM	14.2	0.0	0.0
Erie	113.2	A14-188	PFO	0.0	0.1	0.0
Erie	113.2	A14-188	PFO	162.3	0.2	0.0
Erie	113.2	A14-188	PFO	162.3	0.2	0.2
Erie	113.3	A14-188	PEM	0.0	0.1	0.0
Erie	113.3	A14-188	PEM	0.0	0.1	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Erie	113.3	A14-188	PSS	0.0	0.1	0.0
Erie	113.3	A14-188	PSS	176.4	0.1	0.0
Erie	113.3	A14-188	PSS	176.4	0.1	0.1
Erie	113.8	AWB-ER-12	PFO	0.0	0.0	0.0
Erie	113.8	AWB-ER-12	PFO	34.8	0.0	0.0
Erie	113.8	AWB-ER-12	PFO	34.8	0.0	0.0
Erie	113.9	AWB-ER-12	PFO	0.0	0.1	0.0
Erie	113.9	AWB-ER-12	PFO	203.8	0.2	0.0
Erie	113.9	AWB-ER-12	PFO	203.8	0.2	0.2
Erie	114.2	B15-07	PSS	0.0	0.0	0.0
Erie	114.2	B15-07	PSS	8.7	0.0	0.0
Erie	114.2	B15-07	PSS	8.7	0.0	0.0
Erie	114.3	B15-07	PEM	0.0	0.0	0.0
Erie	114.3	B15-07	PEM	60.9	0.1	0.0
Erie	114.3	B15-07	PEM	60.9	0.1	0.0
Erie	114.3	B15-07	PSS	0.0	0.0	0.0
Erie	114.3	B15-07	PSS	0.0	0.0	0.0
Erie	114.3	B15-07	PSS	0.0	0.0	0.0
Erie	114.5	B15-08	PEM	0.0	0.0	0.0
Erie	114.5	B15-08	PEM	101.7	0.1	0.0
Erie	114.5	B15-08	PEM	101.7	0.1	0.0
Erie	115.4	C15-14	PFO	33.5	0.1	0.0
Erie	115.4	C15-14	PFO	33.5	0.1	0.1
Erie	115.4	C15-14	PEM	0.0	0.0	0.0
Erie	115.4	C15-14	PEM	39.8	0.0	0.0
Erie	115.4	C15-14	PEM	39.8	0.0	0.0
Erie	116.1	B15-10	PEM	0.0	0.0	0.0
Erie	116.2	C15-16	PEM	0.0	0.0	0.0
Erie	116.2	C15-16	PEM	0.0	0.0	0.0
Erie	116.2	C15-16	PEM	0.0	0.0	0.0
Erie	116.4	A14-156	PEM	0.0	0.1	0.0
Erie	116.4	A14-156	PEM	55.3	0.0	0.0
Erie	116.4	A14-156	PEM	55.3	0.0	0.0
Erie	116.5	A14-156	PFO	0.0	0.0	0.0
Erie	116.5	A14-156	PFO	47.3	0.1	0.0
Erie	116.5	A14-156	PFO	47.3	0.1	0.1
Erie	118.2	C15-19	PEM	0.0	0.2	0.0
Erie	118.2	C15-19	PEM	383.5	0.4	0.0
Erie	118.2	C15-19	PEM	383.5	0.4	0.0
Erie	120.4	C15-22	PEM	0.0	0.0	0.0
Erie	120.4	C15-22	PEM	0.0	0.0	0.0
Erie	120.4	C15-22	PEM	0.0	0.0	0.0
Erie	120.4	C15-22-W2	PEM	0.0	0.0	0.0
Erie	120.4	C15-22-W2	PEM	13.1	0.0	0.0
Erie	120.4	C15-22-W2	PEM	13.1	0.0	0.0
Erie	120.5	C15-73	PSS	0.0	0.0	0.0
Erie	120.5	C15-73	PSS	5.1	0.0	0.0
Erie	120.5	C15-73	PSS	5.1	0.0	0.0
Erie	120.5	C15-73	PEM	0.0	0.0	0.0
Erie	120.5	C15-73	PEM	7.9	0.0	0.0
Erie	120.5	C15-73	PEM	7.9	0.0	0.0
Erie	120.5	C15-75	PSS	0.0	0.0	0.0
Erie	120.5	C15-75	PEM	0.0	0.0	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Erie	120.5	C15-75	PEM	9.9	0.0	0.0
Erie	120.5	C15-75	PEM	9.9	0.0	0.0
Erie	120.5	C15-76	PEM	0.0	0.0	0.0
Erie	120.5	C15-76	PEM	7.0	0.0	0.0
Erie	120.5	C15-76	PEM	7.0	0.0	0.0
Erie	120.9	B15-12	PEM	0.0	0.0	0.0
Erie	120.9	B15-12	PEM	12.8	0.0	0.0
Erie	120.9	B15-12	PEM	12.8	0.0	0.0
Erie	123.6	C15-80	PEM	0.0	0.0	0.0
Erie	123.6	C15-80	PEM	36.6	0.0	0.0
Erie	123.6	C15-80	PEM	36.6	0.0	0.0
Sandusky	133.4	B15-14	PEM	0.0	0.0	0.0
Sandusky	133.4	B15-14	PEM	7.3	0.0	0.0
Sandusky	133.4	B15-14	PEM	7.3	0.0	0.0
Sandusky	137.3	D15-105	AG-PEM	0.0	0.0	0.0
Sandusky	137.3	D15-105	AG-PEM	9.5	0.0	0.0
Sandusky	137.3	D15-105	AG-PEM	9.5	0.0	0.0
Sandusky	138.4	E14-163	PFO	0.0	0.1	0.0
Sandusky	138.4	E14-163	PFO	317.3	0.4	0.0
Sandusky	138.4	E14-163	PFO	317.3	0.4	0.4
Sandusky	138.6	D14-9	PSS	0.0	0.2	0.0
Sandusky	138.6	D14-9	PSS	254.8	0.3	0.0
Sandusky	138.6	D14-9	PSS	254.8	0.3	0.3
Sandusky	139.1	D14-10	PEM	0.0	0.0	0.0
Sandusky	139.1	D14-10	PEM	23.3	0.0	0.0
Sandusky	139.1	D14-10	PEM	23.3	0.0	0.0
Sandusky	139.3	D15-71	PEM	0.0	0.0	0.0
Sandusky	139.3	D15-71	PEM	11.1	0.0	0.0
Sandusky	139.3	D15-71	PEM	11.1	0.0	0.0
Sandusky	139.8	D15-69	PSS	0.0	0.0	0.0
Sandusky	139.8	D15-69	PSS	58.7	0.1	0.0
Sandusky	139.8	D15-69	PSS	58.7	0.1	0.1
Sandusky	139.9	D14-8	PFO	0.0	0.0	0.0
Sandusky	139.9	D14-8	PFO	0.0	0.1	0.0
Sandusky	139.9	D14-8	PFO	0.0	0.1	0.1
Sandusky	139.9	D14-8	PEM	0.0	0.0	0.0
Sandusky	141.6	D15-32	PEM	0.0	0.1	0.0
Sandusky	141.6	D15-32	PEM	206.4	0.2	0.0
Sandusky	141.6	D15-32	PEM	206.4	0.2	0.0
Sandusky	146.0	AWB-SA-700	PFO	70.0	0.1	0.1
Sandusky	146.0	AWB-SA-700	PSS	134.5	0.2	0.2
Sandusky	146.0	AWB-SA-700	PEM/PSS	28.6	0.0	0.0
Sandusky	146.1	AWB-SA-700	PFO	131.5	0.2	0.2
Sandusky	146.3	AWB-SA-701	PEM	0.0	0.1	0.0
Sandusky	146.3	AWB-SA-701	PEM	276.5	0.3	0.0
Sandusky	146.3	AWB-SA-701	PEM	276.5	0.3	0.0
Sandusky	146.4	AWB-SA-701	PEM	0.0	0.0	0.0
Sandusky	146.4	AWB-SA-701	PEM	57.6	0.1	0.0
Sandusky	146.4	AWB-SA-701	PEM	57.6	0.1	0.0
Sandusky	146.4	AWB-SA-702	PFO	0.0	0.0	0.0
Sandusky	146.4	AWB-SA-702	PFO	4.4	0.0	0.0
Sandusky	146.4	AWB-SA-702	PFO	4.4	0.0	0.0
Sandusky	146.4	AWB-SA-702	PFO	0.0	0.0	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Sandusky	146.4	AWB-SA-702	PFO	10.9	0.0	0.0
Sandusky	146.4	AWB-SA-702	PFO	10.9	0.0	0.0
Sandusky	147.2	AWB-SA-210	PEM	14.0	0.0	0.0
Sandusky	151.1	D14-37	PEM	0.0	0.0	0.0
Sandusky	151.1	D14-37	PEM	7.9	0.0	0.0
Sandusky	151.1	D14-37	PEM	7.9	0.0	0.0
Sandusky	151.2	D15-59	PSS	0.0	0.0	0.0
Sandusky	151.2	D15-59	PSS	45.7	0.0	0.0
Sandusky	151.2	D15-59	PSS	45.7	0.0	0.0
Sandusky	151.3	D15-58	PSS	0.0	0.0	0.0
Sandusky	151.3	D15-58	PSS	22.4	0.0	0.0
Sandusky	151.3	D15-58	PSS	22.4	0.0	0.0
Sandusky	152.2	E14-73	PEM	0.0	0.0	0.0
Sandusky	152.3	E14-73	PFO	0.0	0.0	0.0
Sandusky	152.3	E14-73	PFO	143.8	0.2	0.0
Sandusky	152.3	E14-73	PFO	143.8	0.2	0.2
Sandusky	153.4	E14-43	PFO	0.0	0.0	0.0
Sandusky	153.4	E14-43	PFO	34.5	0.0	0.0
Sandusky	153.4	E14-43	PFO	34.5	0.0	0.0
Sandusky	154.9	E14-110	PSS	0.0	0.0	0.0
Sandusky	154.9	E14-110	PSS	42.8	0.0	0.0
Sandusky	154.9	E14-110	PSS	42.8	0.0	0.0
Sandusky	155.6	D15-89	PSS	0.0	0.0	0.0
Sandusky	155.6	D15-89	PSS	0.0	0.0	0.0
Sandusky	155.6	D15-89	PSS	0.0	0.0	0.0
Sandusky	156.3	D15-70	PFO	0.0	0.1	0.0
Sandusky	156.3	D15-70	PFO	163.0	0.2	0.0
Sandusky	156.3	D15-70	PFO	163.0	0.2	0.2
Sandusky	157.4	D14-41	PFO	0.0	0.5	0.0
Sandusky	157.4	D14-41	PFO	878.6	1.0	0.0
Sandusky	157.4	D14-41	PFO	878.6	1.0	1.0
Sandusky	157.6	D14-41	PFO	0.0	0.0	0.0
Sandusky	157.6	D14-41	PFO	3.3	0.0	0.0
Sandusky	157.6	D14-41	PFO	3.3	0.0	0.0
Sandusky	157.9	E14-122	PEM	0.0	0.0	0.0
Sandusky	157.9	E14-122	PEM	0.0	0.0	0.0
Sandusky	158.0	E14-122	PFO	0.0	0.2	0.0
Sandusky	158.0	E14-122	PFO	259.5	0.3	0.0
Sandusky	158.0	E14-122	PFO	259.5	0.3	0.3
Sandusky	158.1	E14-123	PFO	0.0	0.1	0.0
Sandusky	158.1	E14-123	PFO	197.3	0.2	0.0
Sandusky	158.1	E14-123	PFO	197.3	0.2	0.2
Sandusky	158.1	E14-123	PEM	0.0	0.0	0.0
Sandusky	158.1	E14-123	PEM	0.0	0.0	0.0
Sandusky	158.2	D14-42	PEM	0.0	0.0	0.0
Sandusky	158.2	D14-42	PEM	0.0	0.0	0.0
Sandusky	158.2	D14-42	PSS	0.0	0.1	0.0
Sandusky	158.2	D14-42	PSS	221.7	0.2	0.0
Sandusky	158.2	D14-42	PSS	221.7	0.2	0.2
Sandusky	158.6	D14-25	PFO	0.0	0.0	0.0
Sandusky	158.6	D14-25	PFO	73.3	0.1	0.0
Sandusky	158.6	D14-25	PFO	73.3	0.1	0.1
Sandusky	158.6	D14-25	PEM	0.0	0.0	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Sandusky	158.6	D14-25	PEM	15.8	0.0	0.0
Sandusky	158.6	D14-25	PEM	15.8	0.0	0.0
Sandusky	159.9	D14-49	PFO	0.0	0.2	0.0
Sandusky	159.9	D14-49	PFO	319.3	0.3	0.0
Sandusky	159.9	D14-49	PFO	319.3	0.3	0.3
Sandusky	160.1	D14-48	PEM	0.0	0.2	0.0
Sandusky	160.1	D14-48	PEM	0.0	0.1	0.0
Sandusky	160.1	D14-48	PEM	0.0	0.1	0.0
Sandusky	163.0	E14-33	PFO	0.0	0.4	0.0
Sandusky	163.0	E14-33	PFO	703.6	0.8	0.0
Sandusky	163.0	E14-33	PFO	703.6	0.8	0.8
Sandusky	163.0	E14-33	PEM	0.0	0.0	0.0
Sandusky	163.0	E14-33	PEM	13.8	0.0	0.0
Sandusky	163.0	E14-33	PEM	13.8	0.0	0.0
Sandusky	163.0	D15-75	PEM	0.0	0.0	0.0
Sandusky	163.0	D15-75	PEM	0.0	0.0	0.0
Sandusky	163.0	D15-75	PEM	0.0	0.0	0.0
Sandusky	163.4	E14-34	PFO	0.0	0.3	0.0
Sandusky	163.4	E14-34	PFO	622.8	0.8	0.0
Sandusky	163.4	E14-34	PFO	622.8	0.8	0.8
Sandusky	163.7	D14-38	PEM	0.0	0.0	0.0
Sandusky	163.7	D14-38	PEM	5.3	0.0	0.0
Sandusky	163.7	D14-38	PEM	5.3	0.0	0.0
Wood	164.8	D14-31	PFO	0.0	0.2	0.0
Wood	164.8	D14-31	PFO	351.6	0.4	0.0
Wood	164.8	D14-31	PFO	351.6	0.4	0.4
Wood	165.0	D15-88	PEM	0.0	0.0	0.0
Wood	165.5	D15-73	PEM	0.0	0.0	0.0
Wood	165.5	D15-73	PEM	8.3	0.0	0.0
Wood	165.5	D15-73	PEM	8.3	0.0	0.0
Wood	165.7	E14-84	AG-PEM	0.0	0.0	0.0
Wood	165.7	E14-84	AG-PEM	0.0	0.0	0.0
Wood	165.7	E14-84	PFO	0.0	0.3	0.0
Wood	165.7	E14-84	PFO	349.6	0.3	0.0
Wood	165.7	E14-84	PFO	349.6	0.3	0.3
Wood	165.7	E14-84	PEM	33.2	0.0	0.0
Wood	165.7	E14-84	PEM	33.2	0.0	0.0
Wood	166.2	E14-154	PFO	0.0	0.4	0.0
Wood	166.2	E14-154	PFO	659.7	0.7	0.0
Wood	166.2	E14-154	PFO	659.7	0.7	0.7
Wood	166.6	E14-152	PEM	0.0	0.0	0.0
Wood	166.6	E14-152	PEM	10.7	0.0	0.0
Wood	166.6	E14-152	PEM	10.7	0.0	0.0
Wood	166.6	E14-152	PFO	0.0	0.5	0.0
Wood	166.6	E14-152	PFO	906.8	1.0	0.0
Wood	166.6	E14-152	PFO	906.8	1.0	1.0
Wood	166.7	E14-152	AG-PEM	0.0	0.2	0.0
Wood	166.7	E14-152	AG-PEM	230.6	0.3	0.0
Wood	166.7	E14-152	AG-PEM	230.6	0.3	0.0
Wood	166.8	D15-62A	PEM	14.9	0.0	0.0
Wood	168.7	D14-39	AG-PEM	0.0	0.0	0.0
Wood	168.7	D14-39	AG-PEM	0.0	0.0	0.0
Wood	168.7	D14-39	AG-PEM	0.0	0.0	0.0

APPENDIX I-1 (cont’d)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Wood	170.1	E14-52	PEM	0.0	0.3	0.0
Wood	170.1	E14-52	PEM	0.0	0.0	0.0
Wood	170.1	E14-52	PEM	0.0	0.0	0.0
Wood	170.1	E14-52	PFO	0.0	0.1	0.0
Wood	170.1	E14-52	PFO	490.6	0.6	0.0
Wood	170.1	E14-52	PFO	490.6	0.6	0.6
Wood	170.9	E14-41	AG-PEM	0.0	0.1	0.0
Wood	172.6	D15-72	PEM	0.0	0.0	0.0
Wood	172.6	D15-72	PEM	8.6	0.0	0.0
Wood	172.6	D15-72	PEM	8.6	0.0	0.0
Wood	173.8	E15-6	PFO	0.0	0.0	0.0
Wood	173.8	E15-6	PFO	133.8	0.2	0.0
Wood	173.8	E15-6	PFO	133.8	0.2	0.2
Wood	173.9	E15-6	PEM	0.0	0.1	0.0
Wood	173.9	E15-6	PEM	140.6	0.2	0.0
Wood	173.9	E15-6	PEM	140.6	0.2	0.0
Wood	180.7	E14-46	PFO	0.0	0.1	0.0
Wood	180.7	E14-46	PFO	123.1	0.1	0.0
Wood	180.7	E14-46	PFO	123.1	0.1	0.1
Wood	181.3	D15-107	AG-PEM	141.4	0.2	0.0
Wood	181.3	D15-107	AG-PEM	141.4	0.2	0.0
Wood	181.3	D15-107	AG-PEM	24.8	0.0	0.0
Wood	181.3	D15-107	AG-PEM	24.8	0.0	0.0
Lucas	181.8	D15-48	AG-PEM	29.4	0.0	0.0
Lucas	183.3	AWB-LU-14	PEM	16.4	0.0	0.0
Lucas	187.9	E15-10	AG-PEM	0.0	0.0	0.0
Lucas	188.5	D15-2	AG-PEM	0.0	0.0	0.0
Lucas	188.5	D15-2	AG-PEM	0.0	0.0	0.0
Lucas	188.5	D15-2	AG-PEM	0.0	0.0	0.0
Lucas	189.0	D15-3	AG-PEM	0.0	0.0	0.0
Lucas	189.1	D15-4	PFO	0.0	0.0	0.0
Lucas	189.1	D15-4	PFO	336.6	0.4	0.0
Lucas	189.1	D15-4	PFO	336.6	0.4	0.4
Lucas	189.1	D15-4	AG-PEM	27.2	0.0	0.0
Lucas	189.1	D15-4	AG-PEM	27.2	0.0	0.0
Lucas	189.2	D15-5	PEM	0.0	0.2	0.0
Lucas	189.2	D15-5	PEM	327.2	0.4	0.0
Lucas	189.2	D15-5	PEM	327.2	0.4	0.0
Henry	189.3	E15-27	PEM	0.0	0.0	0.0
Henry	189.3	E15-27	PEM	118.4	0.1	0.0
Henry	189.3	E15-27	PEM	118.4	0.1	0.0
Henry	189.4	E15-27	AG-PEM	0.0	0.1	0.0
Henry	189.4	E15-27	AG-PEM	129.7	0.2	0.0
Henry	189.4	E15-27	AG-PEM	129.7	0.2	0.0
Henry	189.4	E15-28	AG-PEM	0.0	0.0	0.0
Henry	189.4	E15-28	AG-PEM	78.1	0.1	0.0
Henry	189.4	E15-28	AG-PEM	78.1	0.1	0.0
Henry	189.5	E15-30	AG-PEM	0.0	0.0	0.0
Henry	189.5	E15-30	AG-PEM	0.0	0.0	0.0
Henry	189.5	E15-30	AG-PEM	0.0	0.0	0.0
Henry	189.6	D15-57	PFO	0.0	0.0	0.0
Henry	190.0	D15-7	PFO	0.0	0.0	0.0
Henry	190.0	D15-7	PFO	0.0	0.0	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Henry	190.0	D15-7	PFO	0.0	0.0	0.0
Henry	190.0	D15-7	PFO	68.3	0.1	0.0
Henry	190.0	D15-7	PFO	68.3	0.1	0.1
Henry	190.1	D15-7	AG-PEM	0.0	0.5	0.0
Henry	190.1	D15-7	AG-PEM	481.6	0.6	0.0
Henry	190.1	D15-7	AG-PEM	481.6	0.6	0.0
Henry	190.2	D15-7	AG-PEM	0.0	0.2	0.0
Henry	190.2	D15-7	AG-PEM	226.3	0.2	0.0
Henry	190.2	D15-7	AG-PEM	226.3	0.2	0.0
Henry	190.2	D15-7	PEM	0.0	0.0	0.0
Henry	190.2	D15-7	PEM	51.9	0.1	0.0
Henry	190.2	D15-7	PEM	51.9	0.1	0.0
Fulton	191.5	D15-14	AG-PEM	0.0	0.0	0.0
Fulton	191.5	D15-14	AG-PEM	86.7	0.1	0.0
Fulton	191.5	D15-14	AG-PEM	86.7	0.1	0.0
Fulton	191.6	D15-15	AG-PEM	0.0	0.1	0.0
Fulton	191.6	D15-15	AG-PEM	106.8	0.1	0.0
Fulton	191.6	D15-15	AG-PEM	106.8	0.1	0.0
Fulton	193.3	D15-94	PFO	0.0	0.1	0.0
Fulton	193.3	D15-94	PFO	132.4	0.1	0.0
Fulton	193.3	D15-94	PFO	132.4	0.1	0.1
Fulton	193.3	D15-94	PEM	0.0	0.0	0.0
Fulton	193.3	D15-94	PEM	0.0	0.0	0.0
Fulton	193.4	D15-95	PFO	0.0	0.1	0.0
Fulton	193.4	D15-95	PFO	131.3	0.1	0.0
Fulton	193.4	D15-95	PFO	131.3	0.1	0.1
Fulton	193.7	D15-96	PFO	0.0	0.0	0.0
Fulton	193.7	D15-96	PFO	0.0	0.0	0.0
Fulton	193.7	D15-96	PFO	0.0	0.0	0.0
Fulton	193.7	D15-97	PEM	0.0	0.1	0.0
Fulton	193.7	D15-97	PEM	0.0	0.0	0.0
Fulton	193.7	D15-97	PEM	0.0	0.0	0.0
Fulton	193.8	D15-97	PEM	0.0	0.0	0.0
Fulton	193.8	D15-97	PEM	3.7	0.0	0.0
Fulton	193.8	D15-97	PEM	3.7	0.0	0.0
Fulton	193.8	D15-97	PEM	0.0	0.1	0.0
Fulton	193.8	D15-97	PEM	1.9	0.0	0.0
Fulton	193.8	D15-97	PEM	1.9	0.0	0.0
Fulton	194.8	E15-38	AG-PEM	0.0	0.0	0.0
Fulton	194.8	E15-38	AG-PEM	0.0	0.0	0.0
Fulton	194.8	E15-38	AG-PEM	0.0	0.0	0.0
Fulton	196.6	D15-18	AG-PEM	0.0	0.2	0.0
Fulton	196.6	D15-18	AG-PEM	135.8	0.1	0.0
Fulton	196.6	D15-18	AG-PEM	135.8	0.1	0.0
Fulton	196.7	D15-19	PFO	0.0	0.0	0.0
Fulton	196.7	D15-19	AG-PEM	0.0	0.0	0.0
Fulton	196.7	D15-19	AG-PEM	0.0	0.0	0.0
Fulton	196.7	D15-19	AG-PEM	41.9	0.0	0.0
Fulton	196.7	D15-19	AG-PEM	41.9	0.0	0.0
Fulton	196.8	D15-19	AG-PEM	0.0	0.0	0.0
Fulton	196.8	D15-19	AG-PEM	0.0	0.0	0.0
Fulton	196.8	D15-19	AG-PEM	0.0	0.0	0.0
Fulton	197.8	D15-85	PFO	9.5	0.0	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Fulton	197.8	D15-85	PEM	0.0	0.0	0.0
Fulton	198.9	D15-11	AG-PEM	0.0	0.2	0.0
Fulton	198.9	D15-11	AG-PEM	149.5	0.1	0.0
Fulton	198.9	D15-11	AG-PEM	149.5	0.1	0.0
Fulton	199.0	D15-12	AG-PEM	0.0	0.1	0.0
Fulton	199.0	D15-12	AG-PEM	133.1	0.1	0.0
Fulton	199.0	D15-12	AG-PEM	133.1	0.1	0.0
Fulton	201.9	E15-16	AG-PEM	0.0	0.0	0.0
Fulton	201.9	E15-16	AG-PEM	0.0	0.1	0.0
Fulton	201.9	E15-16	AG-PEM	0.0	0.1	0.0
Fulton	202.0	E15-18	AG-PEM	0.0	0.1	0.0
Fulton	202.1	E15-17	AG-PEM	0.0	0.1	0.0
Fulton	202.1	E15-17	AG-PEM	69.1	0.1	0.0
Fulton	202.1	E15-17	AG-PEM	69.1	0.1	0.0
Fulton	207.4	E14-13	AG-PEM	0.0	0.0	0.0
Fulton	207.4	E14-13	AG-PEM	0.0	0.0	0.0
Fulton	207.4	E14-13	AG-PEM	0.0	0.0	0.0
Michigan						
Lenawee	215.2	D15-100	PFO	162.7	0.2	0.2
Lenawee	223.4	E14-170	PFO	0.0	0.1	0.0
Lenawee	223.4	E14-170	PFO	21.4	0.0	0.0
Lenawee	223.4	E14-170	PFO	21.4	0.0	0.0
Lenawee	224.9	D15-114	AG-PEM	0.0	0.1	0.0
Lenawee	224.9	D15-114	AG-PEM	143.6	0.2	0.0
Lenawee	224.9	D15-114	AG-PEM	143.6	0.2	0.0
Monroe	230.5	E14-62	PSS	0.0	0.0	0.0
Monroe	230.5	E14-62	PSS	24.5	0.0	0.0
Monroe	230.5	E14-62	PSS	24.5	0.0	0.0
Monroe	236.0	D15-128	PEM	0.0	0.0	0.0
Monroe	236.0	D15-128	PEM	21.7	0.0	0.0
Monroe	236.0	D15-128	PEM	21.7	0.0	0.0
Washtenaw	237.2	D15-121	AG-PEM	0.0	0.1	0.0
Washtenaw	237.2	D15-121	AG-PEM	149.3	0.1	0.0
Washtenaw	237.2	D15-121	AG-PEM	149.3	0.1	0.0
Washtenaw	238.0	E14-158	PFO	0.0	0.0	0.0
Washtenaw	239.6	AWB-WA-205	PEM	13.1	0.0	0.0
Washtenaw	244.2	E14-135	PFO	0.0	0.4	0.0
Washtenaw	244.2	E14-135	PFO	605.3	0.7	0.0
Washtenaw	244.2	E14-135	PFO	605.3	0.7	0.7
Washtenaw	244.4	E15-11	PFO	0.0	0.0	0.0
Washtenaw	244.5	E15-11	PFO	0.0	0.0	0.0
Washtenaw	244.5	E15-11	PFO	0.0	0.0	0.0
Washtenaw	244.5	E15-11	PFO	0.0	0.0	0.0
Washtenaw	244.5	E15-11	PFO	0.0	0.0	0.0
Washtenaw	244.5	E15-11	PFO	11.6	0.0	0.0
Washtenaw	244.5	E15-11	PFO	11.6	0.0	0.0
Washtenaw	244.6	E15-11	PFO	0.0	0.2	0.0
Washtenaw	244.6	E15-11	PFO	558.5	0.7	0.0
Washtenaw	244.6	E15-11	PFO	558.5	0.7	0.7
Washtenaw	244.6	E15-11	AG-PEM	0.0	0.1	0.0
Washtenaw	244.6	E15-11	AG-PEM	0.0	0.0	0.0
Washtenaw	244.6	E15-11	AG-PEM	0.0	0.0	0.0
Washtenaw	245.0	E15-12	AG-PEM	0.0	0.1	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Washtenaw	245.0	E15-12	AG-PEM	0.0	0.0	0.0
Washtenaw	245.0	E15-12	AG-PEM	0.0	0.0	0.0
Washtenaw	245.2	AWB-WA-4	PEM	0.0	0.0	0.0
Washtenaw	245.2	AWB-WA-4	PEM	13.5	0.0	0.0
Washtenaw	245.2	AWB-WA-4	PEM	13.5	0.0	0.0
Washtenaw	245.2	E14-167	PEM	0.0	0.0	0.0
Washtenaw	245.2	E14-167	PEM	14.9	0.0	0.0
Washtenaw	245.2	E14-167	PEM	14.9	0.0	0.0
Washtenaw	246.3	E14-164	PEM	0.0	0.1	0.0
Washtenaw	246.3	E14-164	PEM	98.0	0.1	0.0
Washtenaw	246.3	E14-164	PEM	98.0	0.1	0.0
Washtenaw	249.0	E14-180	PFO	0.0	0.0	0.0
Washtenaw	249.0	E14-180	PFO	19.8	0.0	0.0
Washtenaw	249.0	E14-180	PFO	19.8	0.0	0.0
Washtenaw	249.1	D15-39	PEM	0.0	0.1	0.0
Washtenaw	249.1	D15-39	PEM	100.3	0.1	0.0
Washtenaw	249.1	D15-39	PEM	100.3	0.1	0.0
Washtenaw	249.3	E14-155	PFO	0.0	0.3	0.0
Washtenaw	249.3	E14-155	PFO	631.5	0.7	0.0
Washtenaw	249.3	E14-155	PFO	631.5	0.7	0.7
Washtenaw	249.4	E14-156	PEM	0.0	0.1	0.0
Washtenaw	249.4	E14-156	PEM	237.9	0.3	0.0
Washtenaw	249.4	E14-156	PEM	237.9	0.3	0.0
Washtenaw	249.8	E14-168	PEM	0.0	0.4	0.0
Washtenaw	249.8	E14-168	PEM	696.5	0.8	0.0
Washtenaw	249.8	E14-168	PEM	696.5	0.8	0.0
Washtenaw	250.4	D15-78	PFO	0.0	0.1	0.0
Washtenaw	250.4	D15-78	PFO	195.4	0.2	0.0
Washtenaw	250.4	D15-78	PFO	195.4	0.2	0.2
Washtenaw	250.6	D15-79	PFO	0.0	0.0	0.0
Washtenaw	250.6	D15-79	PFO	0.0	0.0	0.0
Washtenaw	250.6	D15-79	PFO	0.0	0.0	0.0
Washtenaw	250.9	D15-80	PSS	20.2	0.1	0.1
Washtenaw	251.0	D15-20	PEM	115.6	0.1	0.0
Washtenaw	251.0	D15-22	PEM	198.2	0.2	0.0
Washtenaw	251.2	D15-23	PFO	0.0	0.1	0.0
Washtenaw	251.2	D15-23	PFO	176.8	0.2	0.0
Washtenaw	251.2	D15-23	PFO	176.8	0.2	0.2
Washtenaw	254.3	AWB-WA-764	PSS	58.0	0.0	0.0
Washtenaw	254.4	D15-77	PFO	0.0	0.4	0.0
Washtenaw	254.4	D15-77	PFO	698.7	0.8	0.0
Washtenaw	254.4	D15-77	PFO	698.7	0.8	0.8
Washtenaw	254.6	D15-77	PSS	0.0	0.4	0.0
Washtenaw	254.6	D15-77	PSS	738.9	0.9	0.0
Washtenaw	254.6	D15-77	PSS	738.9	0.9	0.9
Washtenaw	254.7	D15-77	PFO	0.0	0.0	0.0
Washtenaw	254.7	D15-77	PFO	57.8	0.1	0.0
Washtenaw	254.7	D15-77	PFO	57.8	0.1	0.1
Washtenaw	254.9	D15-44	PFO	0.0	0.1	0.0
Washtenaw	254.9	D15-44	PFO	132.0	0.1	0.0
Washtenaw	254.9	D15-44	PFO	132.0	0.1	0.1
				Ohio Total	**150.4**	**35.1**
				Michigan Total	**16.2**	**4.7**

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
				Mainline Total	**166.6**	**39.8**
ATWS						
Ohio						
Columbiana	2.1	A14-5	AG-PEM	N/A	0.0	0.0
Columbiana	2.1	A14-5	AG-PEM	N/A	0.0	0.0
Columbiana	2.1	A14-5	AG-PEM	N/A	0.3	0.0
Columbiana	2.1	A14-5	PEM	N/A	0.1	0.0
Columbiana	2.1	A14-5	PEM	N/A	0.1	0.0
Columbiana	2.2	A14-5	AG-PEM	N/A	0.1	0.0
Columbiana	2.2	A14-5	AG-PEM	N/A	0.2	0.0
Columbiana	2.2	A14-5	AG-PEM	N/A	0.2	0.0
Columbiana	2.2	A14-5	AG-PEM	N/A	0.0	0.0
Columbiana	2.2	A14-5	AG-PEM	N/A	0.0	0.0
Columbiana	2.2	A14-5	AG-PEM	N/A	0.1	0.0
Columbiana	4.8	A14-9	AG-PEM	N/A	0.0	0.0
Columbiana	4.9	A14-10	PFO	N/A	0.0	0.0
Columbiana	4.9	A14-10	PEM	N/A	0.1	0.0
Columbiana	4.9	A14-10	PEM	N/A	0.1	0.0
Columbiana	5.0	A14-10	PSS	N/A	0.1	0.0
Columbiana	5.0	A14-10	PSS	N/A	0.0	0.0
Columbiana	5.0	A14-10	PSS	N/A	0.3	0.0
Columbiana	6.4	C15-118	PEM	N/A	0.0	0.0
Columbiana	11.2	A15-34	PEM	N/A	0.3	0.0
Columbiana	11.2	A15-34	PEM	N/A	0.4	0.0
Columbiana	11.3	A15-31	PEM	N/A	0.1	0.0
Columbiana	11.3	A15-31	PEM	N/A	0.0	0.0
Columbiana	11.3	A15-31	PEM	N/A	0.0	0.0
Stark	13.3	B15-64	PEM	N/A	0.0	0.0
Stark	14.8	A14-20	AG-PEM	N/A	0.1	0.0
Stark	15.1	A14-21	AG-PEM	N/A	0.1	0.0
Stark	15.6	A15-64	AG-PEM	N/A	0.0	0.0
Stark	16.4	B15-119	AG-PEM	N/A	0.0	0.0
Stark	17.3	A14-107	AG-PEM	N/A	0.1	0.0
Stark	19.0	C15-85	AG-PEM	N/A	0.0	0.0
Stark	19.0	C15-85	AG-PEM	N/A	0.0	0.0
Stark	22.3	B15-40	PEM	N/A	0.2	0.0
Stark	27.9	A14-34	PEM	N/A	0.1	0.0
Stark	27.9	A14-34	PEM	N/A	0.4	0.0
Stark	27.9	A14-34	PEM	N/A	0.4	0.0
Stark	28.0	A14-34	PEM	N/A	0.0	0.0
Stark	28.0	A14-34	PEM	N/A	0.0	0.0
Stark	32.1	A14-164	AG-PEM	N/A	0.2	0.0
Stark	33.8	B15-73	PFO	N/A	0.1	0.0
Stark	34.1	C15-103	AG-PEM	N/A	0.1	0.0
Summit	34.3	A15-71	PSS	N/A	0.1	0.0
Summit	34.3	A15-71	PSS	N/A	0.0	0.0
Summit	34.3	A15-71	PEM	N/A	0.4	0.0
Summit	34.3	A15-71	PEM	N/A	0.3	0.0
Summit	34.3	A15-71	PSS	N/A	0.1	0.0
Summit	34.3	A15-71	PSS	N/A	0.1	0.0
Summit	34.4	A15-71	PSS	N/A	0.0	0.0
Summit	34.4	A15-71	PSS	N/A	0.0	0.0
Summit	34.4	A15-71	PSS	N/A	0.3	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Summit	34.4	A15-71	PSS	N/A	0.2	0.0
Summit	34.4	A15-71	PSS	N/A	0.6	0.0
Summit	34.5	AWB-SU-213	PFO	N/A	0.1	0.0
Summit	34.6	A15-71	PSS	N/A	0.3	0.0
Summit	34.6	A15-71	PEM	N/A	0.0	0.0
Summit	34.6	A15-71	PEM	N/A	0.0	0.0
Summit	34.6	A15-71	PEM	N/A	0.0	0.0
Summit	34.6	A15-71	PSS	N/A	0.0	0.0
Summit	34.7	A15-71	PEM	N/A	0.0	0.0
Summit	35.6	AWB-SU-4	PFO	N/A	0.1	0.0
Summit	36.7	C15-106	PSS	N/A	0.1	0.0
Summit	36.7	C15-106	PEM	N/A	0.1	0.0
Summit	39.8	A14-112	PSS	N/A	0.2	0.0
Summit	39.8	A14-112	PSS	N/A	0.2	0.0
Summit	39.8	A14-112	PSS	N/A	0.0	0.0
Summit	39.9	A14-112	PSS	N/A	0.1	0.0
Summit	45.4	B14-1	PEM	N/A	0.1	0.0
Summit	45.4	B14-1	PEM	N/A	0.0	0.0
Summit	45.4	B14-1	PEM	N/A	0.4	0.0
Summit	45.4	B14-1	PEM	N/A	0.0	0.0
Summit	49.3	AWB-SU-43	PSS	N/A	0.0	0.0
Summit	49.3	AWB-SU-43	PSS	N/A	0.0	0.0
Summit	49.3	AWB-SU-43	PEM	N/A	0.1	0.0
Summit	49.3	AWB-SU-43	PEM	N/A	0.2	0.0
Summit	49.3	AWB-SU-43	PEM	N/A	0.1	0.0
Wayne	51.2	A15-23	AG-PEM	N/A	0.0	0.0
Wayne	52.6	A14-124	PEM	N/A	0.1	0.0
Wayne	52.6	A14-124	PSS	N/A	0.0	0.0
Wayne	55.7	B15-48	PEM	N/A	0.1	0.0
Wayne	57.3	AWB-WA-400	PEM	N/A	0.5	0.0
Wayne	57.7	B15-52	AG-PEM	N/A	0.1	0.0
Wayne	57.7	B15-52	AG-PEM	N/A	0.0	0.0
Medina	58.9	C15-91	AG-PEM	N/A	0.0	0.0
Medina	62.7	B15-70	PEM	N/A	0.1	0.0
Medina	67.7	AWB-ME-31	PEM/PSS	N/A	0.1	0.0
Medina	70.5	B15-27	AG-PEM	N/A	0.0	0.0
Medina	70.6	C15-42	AG-PEM	N/A	0.0	0.0
Medina	70.6	C15-42	AG-PEM	N/A	0.1	0.0
Medina	70.6	C15-42	AG-PEM	N/A	0.0	0.0
Medina	70.6	C15-42	AG-PEM	N/A	0.0	0.0
Medina	70.6	C15-42	AG-PEM	N/A	0.3	0.0
Medina	70.6	C15-42	AG-PEM	N/A	0.2	0.0
Medina	72.5	A14-48	PFO	N/A	0.1	0.0
Medina	72.5	A14-48	PFO	N/A	0.0	0.0
Medina	72.5	A14-48	PFO	N/A	0.1	0.0
Medina	72.5	A14-48	PFO	N/A	0.2	0.0
Medina	72.5	A14-48	PEM	N/A	0.0	0.0
Medina	73.2	C15-24-W9	PEM	N/A	0.0	0.0
Medina	73.3	C15-24-W8	PSS	N/A	0.0	0.0
Medina	73.3	C15-24-W8	PSS	N/A	0.1	0.0
Medina	73.3	C15-24-W8	PSS	N/A	0.0	0.0
Medina	73.3	C15-24-W8	PFO	N/A	0.0	0.0
Medina	73.3	C15-24-W7	PFO	N/A	0.0	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Medina	76.3	B15-74	PEM	N/A	0.1	0.0
Medina	76.9	A15-76	PEM	N/A	0.0	0.0
Medina	77.7	A15-75	AG-PEM	N/A	0.0	0.0
Lorain	82.0	A14-59	AG-PEM	N/A	0.0	0.0
Lorain	82.8	A14-63	PFO	N/A	0.3	0.0
Lorain	83.5	A14-68	PFO	N/A	0.1	0.0
Lorain	83.7	A14-67	PEM	N/A	0.0	0.0
Lorain	84.8	B15-90	AG-PEM	N/A	0.1	0.0
Lorain	84.9	A15-51	AG-PEM	N/A	0.0	0.0
Lorain	87.0	A14-52	PFO	N/A	0.1	0.0
Lorain	87.7	B15-95	PFO	N/A	0.0	0.0
Lorain	87.8	B15-95	PEM	N/A	0.2	0.0
Lorain	87.8	B15-95	PEM	N/A	0.4	0.0
Lorain	95.7	A14-182	PEM	N/A	0.0	0.0
Lorain	95.7	A14-182	PEM	N/A	0.0	0.0
Lorain	96.3	C15-58	PFO	N/A	0.1	0.0
Lorain	96.3	C15-58	PFO	N/A	0.0	0.0
Lorain	96.3	C15-58	PEM	N/A	0.0	0.0
Lorain	96.3	C15-58	PEM	N/A	0.0	0.0
Lorain	96.8	A15-38	PEM	N/A	0.1	0.0
Lorain	96.8	A15-38	PSS	N/A	0.0	0.0
Lorain	96.8	A15-38	AG-PEM	N/A	0.2	0.0
Lorain	100.2	C15-63	AG-PEM	N/A	0.0	0.0
Lorain	100.3	C15-99	AG-PEM	N/A	0.0	0.0
Lorain	100.6	B15-105	PFO	N/A	0.1	0.0
Erie	105.9	C15-70	PEM	N/A	0.4	0.0
Erie	105.9	C15-70	PEM	N/A	0.2	0.0
Erie	111.4	B15-60	PEM	N/A	0.0	0.0
Erie	116.5	A14-156	PFO	N/A	0.0	0.0
Erie	116.5	A14-156	PFO	N/A	0.1	0.0
Erie	116.5	A14-156	PEM	N/A	0.0	0.0
Erie	120.4	C15-22-W2	PEM	N/A	0.0	0.0
Erie	120.4	C15-22-W2	PEM	N/A	0.0	0.0
Sandusky	137.3	D15-105	AG-PEM	N/A	0.0	0.0
Sandusky	137.5	D15-109	AG-PEM	N/A	0.0	0.0
Sandusky	138.6	D14-9	PSS	N/A	0.0	0.0
Sandusky	138.6	D14-9	PSS	N/A	0.3	0.0
Sandusky	139.3	D15-71	PEM	N/A	0.0	0.0
Sandusky	141.6	D15-32	PEM	N/A	0.0	0.0
Sandusky	141.6	D15-32	PEM	N/A	0.1	0.0
Sandusky	145.5	AWB-SA-706	PEM	N/A	0.2	0.0
Sandusky	146.3	AWB-SA-701	PEM	N/A	0.8	0.0
Sandusky	146.3	AWB-SA-701	PEM	N/A	0.7	0.0
Sandusky	146.4	AWB-SA-701	PEM	N/A	0.2	0.0
Sandusky	146.4	AWB-SA-701	PEM	N/A	0.0	0.0
Sandusky	146.4	D15-104	PEM	N/A	0.1	0.0
Sandusky	157.6	D14-41	PFO	N/A	0.1	0.0
Sandusky	158.1	E14-123	PFO	N/A	0.0	0.0
Sandusky	158.1	E14-123	PFO	N/A	0.3	0.0
Sandusky	158.1	E14-123	PEM	N/A	0.0	0.0
Sandusky	158.2	D14-42	PEM	N/A	0.1	0.0
Sandusky	158.2	D14-42	PSS	N/A	0.4	0.0
Sandusky	158.6	D14-25	PEM	N/A	0.1	0.0

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
Wood	166.6	E14-152	PEM	N/A	0.1	0.0
Wood	166.6	E14-152	PFO	N/A	0.1	0.0
Wood	166.7	E14-152	AG-PEM	N/A	0.2	0.0
Wood	170.9	E14-41	AG-PEM	N/A	0.1	0.0
Wood	181.3	D15-107	PEM	N/A	0.0	0.0
Wood	181.3	D15-107	AG-PEM	N/A	0.0	0.0
Wood	181.3	D15-107	AG-PEM	N/A	0.0	0.0
Lucas	187.9	E15-10	AG-PEM	N/A	0.2	0.0
Lucas	189.0	D15-3	AG-PEM	N/A	0.1	0.0
Henry	189.3	E15-27	PEM	N/A	0.1	0.0
Henry	189.4	E15-27	AG-PEM	N/A	0.0	0.0
Henry	189.4	E15-27	AG-PEM	N/A	0.0	0.0
Henry	189.4	E15-27	AG-PEM	N/A	0.0	0.0
Henry	189.5	E15-30	AG-PEM	N/A	0.0	0.0
Henry	190.1	D15-7	AG-PEM	N/A	0.1	0.0
Henry	190.1	D15-7	AG-PEM	N/A	0.4	0.0
Henry	190.2	D15-7	AG-PEM	N/A	0.4	0.0
Henry	190.2	D15-7	AG-PEM	N/A	0.1	0.0
Henry	190.2	D15-7	PEM	N/A	0.0	0.0
Henry	190.2	D15-7	PEM	N/A	0.1	0.0
Fulton	191.6	D15-15	AG-PEM	N/A	0.1	0.0
Fulton	194.8	E15-38	AG-PEM	N/A	0.0	0.0
Fulton	196.6	D15-18	AG-PEM	N/A	0.1	0.0
Fulton	198.9	D15-11	AG-PEM	N/A	0.0	0.0
Fulton	201.9	E15-16	AG-PEM	N/A	0.0	0.0
Fulton	202.1	E15-17	AG-PEM	N/A	0.1	0.0
Michigan						
Lenawee	215.68	D15-123	AG-PEM	N/A	0.0	0.0
Lenawee	224.9	D15-114	AG-PEM	N/A	0.1	0.0
Washtenaw	237.2	D15-121	AG-PEM	N/A	0.0	0.0
Washtenaw	244.6	E15-11	PFO	N/A	0.1	0.0
Washtenaw	244.6	E15-11	PFO	N/A	0.0	0.0
Washtenaw	244.6	E15-11	AG-PEM	N/A	0.1	0.0
Washtenaw	245.0	E15-12	AG-PEM	N/A	0.1	0.0
Washtenaw	245.2	E14-167	PEM	N/A	0.1	0.0
Washtenaw	254.4	D15-77	PFO	N/A	0.7	0.0
Washtenaw	254.4	D15-77	PFO	N/A	1.3	0.0
Washtenaw	254.4	D15-77	PFO	N/A	0.2	0.0
Washtenaw	254.6	D15-77	PSS	N/A	0.2	0.0
Washtenaw	254.6	D15-77	PSS	N/A	0.3	0.0
Washtenaw	254.6	D15-77	PSS	N/A	0.1	0.0
Washtenaw	254.7	D15-77	PFO	N/A	0.0	0.0
Washtenaw	254.9	D15-44	PFO	N/A	0.1	0.0
Washtenaw	255	D15-41	PEM	N/A	0.1	0.0
Washtenaw	255	D15-42	PEM	N/A	0.0	0.0
				Ohio Total	**19.9**	**0.0**
				Michigan Total	**3.7**	**0.0**
				ATWS Total	**23.6**	**0.0**

APPENDIX I-1 (cont'd)

NGT Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a]	Crossing Length (feet)	Construction (acres)	Operation (acres)
ACCESS ROADS						
Michigan						
Washtenaw	254.4	D15-77	PFO	0.0	<0.1	0.0
				Ohio Total	**0.0**	**0.0**
				Michigan Total	**<0.1**	**0.0**
				Access Road Total	**<0.1**	**0.0**
				NGT Project Total [c]	**190.2**	**39.8**

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a Wetland classification according to Cowardin et al., (1979): PEM = Palustrine Emergent Wetland; PSS = Palustrine Scrub-Shrub Wetland; PFO = Palustrine Forested Wetland.

b Total operational impacts on PSS acreage may be less than reflected in the table due to maintenance limit to a 10-foot-wide corridor centered over the pipeline.

c No wetland impacts will occur within access roads, contractor ware yards, or non-pipeline aboveground facilities.

Note: Sum of addends may not equal total due to rounding.

APPENDIX I-2

TEAL PROJECT WETLAND IMPACTS

APPENDIX I-2

TEAL Project Wetland Impacts

State/County/Facility	Milepost	Wetland ID	Type [a, b]	Crossing Length (feet)	Construction (acres)	Operation (acres)
LOOPLINE						
Monroe	0.7	A15-24	PEM	34.3	0.1	0.0
Monroe	0.7	A15-24	PEM	21.2	0.0	0.0
Monroe	0.7	A15-24	PEM	0.0	0.0	0.0
Monroe	1.2	A15-07	PSS	70.5	0.0	<0.1
Monroe	1.2	A15-07	PSS	0.0	0.0	0.0
Monroe	1.2	A15-07	PSS	0.0	0.0	0.0
Monroe	1.2	A15-07	PFO	0.5	0.0	<0.1
Monroe	1.2	A15-07	PFO	0.0	0.0	0.0
Monroe	1.6	A15-08	PEM	33.7	0.0	0.0
Monroe	1.6	A15-08	PEM	0.0	0.0	0.0
Monroe	1.6	A15-08	PEM	0.0	0.0	0.0
Monroe	1.7	A15-09	PEM	0.0	0.0	0.0
Monroe	1.9	A15-10	PEM	0.0	0.0	0.0
Monroe	2.2	A15-11	PEM	2.2	0.0	0.0
Monroe	2.2	A15-11	PEM	0.0	0.0	0.0
Monroe	2.4	A15-12	PEM	40.7	0.0	0.0
Monroe	2.4	A15-12	PEM	35.4	0.0	0.0
Monroe	2.4	A15-12	PEM	13.1	0.0	0.0
Monroe	2.4	A15-12	PEM	0.0	0.0	0.0
Monroe	2.4	A15-12	PEM	0.0	0.0	0.0
Monroe	3.0	A15-15	PEM	0.0	0.0	0.0
Monroe	4.1	B15-21	PEM	0.0	0.0	0.0
Monroe	4.1	B15-21	PEM	0.0	0.1	0.0
Monroe	4.2	A15-18	PEM	72.2	0.2	0.0
Monroe	4.2	A15-18	PEM	110.7	0.1	0.0
Monroe	4.2	A15-18	PEM	0.0	0.0	0.0
Monroe	4.3	A15-19	PEM	178.1	0.2	0.0
Monroe	4.3	A15-19	PEM	0.0	0.0	0.0
Monroe	4.3	A15-19	PEM	0.0	0.0	0.0
				Pipeline Loop Total	**1.0**	**0.1**
ATWS ON LOOPLINE						
Monroe	1.2	A15-07	PFO	0.0	<0.1	0.0
Monroe	1.2	A15-07	PFO	0.0	<0.1	0.0
Monroe	1.7	A15-09	PEM	0.0	<0.1	0.0
Monroe	4.0	B15-20	PEM	0.0	<0.1	0.0
Monroe	4.2	A15-18	PEM	0.0	<0.1	0.0
				ATWS Total	**<0.1**	**0.0**
CONNECTING PIPELINE						
Monroe	N/A	B15-17	PEM	0.0	0.1	0.0
Columbiana	N/A	B15-17	PEM	99.9	0.1	0.0
Columbiana	N/A	B15-17	PEM	0.0	0.1	0.0
				Connecting Pipeline Total	**0.3**	**0.0**
				TEAL Project Total [c]	**1.3**	**0.1**

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a Wetland classification according to Cowardin et al., (1979): PEM = Palustrine Emergent Wetland; PSS = Palustrine Scrub-Shrub Wetland; PFO = Palustrine Forested Wetland.

b Total operational impacts on PSS acreage may be less than reflected in the table due to maintenance limit to a 10-foot-wide corridor centered over the pipeline

c No wetland impacts will occur within access roads, contractor ware yards, or non-pipeline aboveground facilities

Note: Sum of addends may not equal total due to rounding

APPENDIX J

STATE-LISTED SPECIES POTENTIALLY OCCURRING WITHIN OR NEAR THE NGT AND TEAL PROJECTS

APPENDIX J

State-listed Species Potentially Occurring within or near the NGT and TEAL Projects

Species Name		Federal Status	State Status	County	Habitat	Impacts
Common Name	Scientific Name					
Amphibians						
Blanchard's cricket frog	*Acris crepitans blanchardi*	Not listed	MI – Threatened	Washtenaw	Open edges of permanent ponds, lakes, floodings, bogs, seeps and slow-moving streams and rivers	No impacts – HDD crossing methods selected to avoid potential habitat
Blue-spotted salamander	*Ambystoma laterale*	Not listed	OH – Endangered	Henry and Lucas	Occurs in damp forested areas with sandy soils. Typically found burrowing under rotting logs.	No impacts – lack of potential habitat
Eastern hellbender	*Cryptobranchus alleganiensis alleganiensis*	Not listed	OH – Endangered	Summit	Habitat is limited to cool and very clean, dissolved-oxygen rich waters with gravel and bedrock substrate. Often occurrences are associated with Ohio River drainages	No Impacts – based on habitat assessments, there is no suitable habitat within Project
Avian						
American bittern	*Botaurus lentiginosus*	Not listed	OH – Endangered	Lucas, Sandusky, and Summit	Occurs in large and undisturbed wetlands with thick vegetative cover and areas with small sections of open water	May impact – the Project avoids potential habitat where practicable
Barn owl	*Tyto alba*	Not listed	OH – Endangered	Columbiana and Wayne	Utilizes hallow trees or man-made sheds, etc. for nesting but are found in areas of large open grasslands.	No impact – NGT would avoid removal of abandoned buildings
Black tern	*Childonias niger*	Not listed	OH – Endangered	Lucas, Erie, and Sandusky	Large, undisturbed inland marshes with fairly dense vegetation and pockets of open water. They nest in various kinds of marsh vegetation, but cattail marshes are generally favored	May impact – the Project avoids potential habitat where practicable
Common tern	*Sterna hirundo*	Not listed	OH – Endangered	Erie, Lorain, and Lucas	Limited to the shores or islands of Lake Erie	No impacts – HDD crossing methods selected to avoid potential habitat
Grasshopper sparrow	*Ammodramus savannarum*	Not listed	MI – Special Concern	Lenawee, Monroe, and Washtenaw	Habitat includes grasslands, cultivated fields, hayfields and old fields	May impact – the Project avoids potential habitat where practicable
Kirtland's warbler	*Setophaga kirtlandii*	Endangered	OH – Endangered	Lorain, Erie, Sandusky, and Lucas	Kirtland's warblers are known to migrate along the Lake Erie shoreline through Ohio in late April-May and late August-early October	No impacts – the Project is situated more than 3 miles from Lake Erie
King rail	*Rallus elegans*	Not listed	OH – Endangered	Lucas and Sandusky	Occurs in freshwater wetland habitats with dense confines of cattails and other marsh vegetation	May impact – the Project avoids potential habitat where practicable
Lark sparrow	*Chondestes grammacus*	Not listed	OH – Endangered	Fulton, Henry, and Lucas	Occupy open grass and shrubby fields along sandy beach ridges	No impacts – avoidance of open natural areas within Oak Openings Region

State-listed Species Potentially Occurring within or near the NGT and TEAL Projects

Species Name		Federal Status	State Status	County	Habitat	Impacts
Common Name	Scientific Name					
Avian (cont'd)						
Northern harrier	*Circus cyaneus*	Not listed	OH – Endangered	Wood	Inhabits large marshes and grasslands	May impact – the Project avoids potential habitat where practicable
Piping plover	*Charadrius melodus*	Endangered	OH – Endangered	Lorain, Erie, Sandusky, Lucas	Beaches along the shorelines of the Great Lakes	No impacts – the Project is situated more than 3 miles for Lake Erie
Sandhill crane	*Grus canadensis*	Not listed	OH – Endangered	Lorain	Dependent on wetland habitats, including large tracts of wet meadow, shallow marsh or bogs for breeding	May impact – the Project avoids potential habitat where practicable
Trumpeter swan	*Cygnus buccinators*	Not listed	OH – Threatened	Sandusky	Occurs in large marshes and lakes (typically 40 to 150 acres). Utilize shallow wetlands with a diverse mix of plenty of emergent vegetation and open water	May impact – the Project avoids potential habitat where practicable
Upland sandpiper	*Bartramia longicauda*	Not listed	OH – Endangered	Erie, Fulton, Lorain, Sandusky, Summit, and Wood	Native prairie and other dry grasslands, including airports and some croplands	May impact – the Project avoids potential habitat where practicable
Fish						
Bigmouth shiner	*Notropis dorsalis*	Not listed	OH – Threatened	Medina and Lorain	Lake Erie drainages; found in pools with sandy substrates	No impacts – stream crossing methods selected to avoid impacts
Channel darter	*Percina copelandi*	Not listed	OH – Threatened	Columbiana, Erie, and Lorain	Occur in large, coarse sand or fine gravel bars in large rivers or along lake shores	No impacts – stream crossing methods selected to avoid impacts
Greater redhorse	*Moxostoma valenciennesi*	Not listed	OH – Threatened	Fulton, Lucas, and Sandusky	Found in clean sand or gravel substrate of medium to large rivers within the Lake Erie drainage	No impacts – stream crossing methods selected to avoid impacts
Iowa darter	*Etheostoma exile*	Not listed	OH – Endangered	Stark and Summit	Found in natural lakes and very sluggish streams or marshes with dense aquatic vegetation and clear waters	No impacts – stream crossing methods selected to avoid impacts
Lake chubsucker	*Erimyzon sucetta*	Not listed	OH – Threatened	Wayne and Summit	Found in natural lakes and very sluggish streams or marshes with dense aquatic vegetation and clear waters	No impacts – stream crossing methods selected to avoid impacts
Lake sturgeon	*Acipenser fluvescens*	Not listed	OH – Endangered	Erie, Lorain, and Lucas	Found in larger rivers and lakes with mud and sand substrates	No impacts – stream crossing methods selected to avoid impacts

APPENDIX J (cont'd)

State-listed Species Potentially Occurring within or near the NGT and TEAL Projects

Species Name		Federal Status	State Status	County	Habitat	Impacts
Common Name	Scientific Name					
Fish (cont'd)						
Orangethroat darter	*Etheostoma spectabile*	Not listed	MI – Special Concern	Monroe and Washtenaw	Occurs in small creeks to medium-sized streams with substrates of sand or gravel and slow to moderately swift currents, where it is most often found among riffles	No impacts – stream crossing methods selected to avoid impacts
Pugnose minnow	*Opsopoeodus emiliae*	Not listed	OH – Endangered	Summit	Lake Erie in bays and marshes with extremely clear waters and profuse amounts of submerged aquatic vegetation	No impacts – stream crossing methods selected to avoid impacts
Spotted gar	*Lepisosteus oculatus*	Not listed	OH – Endangered	Erie, Lorain, Sandusky, and Lucas	Found in Lake Erie	No impacts – the Project is situated more than 3 miles for Lake Erie
Western banded killfish	*Fundulus diaphanous menona*	Not listed	OH – Endangered	Sandusky and Wood	Occurs in areas with an abundance of rooted aquatic vegetation, clear waters, and substrates of clean sand or organic debris free of silt	No impacts – stream crossing methods selected to avoid impacts
Insects						
Canada darner	*Aeshna canadensis*	Not listed	OH – Threatened	Lucas	Inhabits both terrestrial and freshwater environments, including bogs, beaver ponds, lakes and other freshwater areas	No impacts - avoidance of impacts to potential habitat
Chalk-fronted corporal	*Ladona julia*	Not listed	OH – Threatened	Summit	Nutrient poor lakes, bogs and marshes	May impact – the Project avoids potential habitat where practicable
Elfin skimmer	*Nannothemis bella*	Not listed	OH – Endangered	Summit	Primarily inhabits stagnant pools and marshy places, such as bogs	May impact – the Project avoids potential habitat where practicable
Frosted elfin	*Incisalia irue*	Not listed	OH – Endangered	Lucas	Inhabits oak savannas with blue lupine	No impacts – avoidance of open natural areas within Oak Openings Region
Karner blue butterfly	*Lycaeides melissa samuelis*	Endangered	OH – Endangered MI – Threatened	OH – Lucas MI – Lenawee	Pine barrens and oak savannas on sandy soils and containing wild lupine (*Lupinus perennis*)	No impacts – botanical surveys were conducted and no lupine was identified
Laura's snaketail	*Stylurus laurae*	Not listed	MI – Special Concern	Washtenaw and Wayne	Occurs in shallow, well shaded rivers and streams with cobble, sand or mud substrate	No impacts – stream crossing methods selected to avoid impacts
Marsh bluet	*Enallagma erbium*	Not listed	OH – Threatened	Summit	Occurs at lowland lakes, ponds, and marshes, and has a definite preference for alkaline waters	May impact – the Project avoids potential habitat where practicable

APPENDIX J (cont'd)

State-listed Species Potentially Occurring within or near the NGT and TEAL Projects

Species Name		Federal Status	State Status	County	Habitat	Impacts
Common Name	Scientific Name					
Insects (cont'd)						
Mitchell's satyr butterfly	*Neonympha mitchelli mitchelli*	Endangered	MI – Endangered	Lenawee, Washtenaw, and Wayne	Fens; wetlands characterized by calcareous soils which are fed by carbonate-rich water from seeps and springs	No impacts – avoidance of impacts to potential habitat proposed
Persius duskywing	*Erynnis persius*	Not listed	OH – Endangered	Lucas	Inhabits oak savannas and blue lupine	No impacts – avoidance of open natural areas within Oak Openings Region
Pipevine swallowtail	*Battus philenor*	Not listed	MI – Special Concern	Lenawee and Washtenaw	Open fields and railroad embankments near oak-hickory woods or in open areas near deciduous woodlands	May impact – the Project avoids potential habitat where practicable
Plains clubtail	*Gomphus externus*	Not listed	OH – Endangered	Erie	Occurs along large, slow flowing and muddy streams and rivers	No impacts – stream crossing methods selected to avoid impacts
Powesheik skipperling	*Oarisma poweshiek*	Endangered	MI – Threatened	Lenawee and Washtenaw	Wet prairies and fens	No impacts – avoidance of impacts to potential habitat proposed
Purplish copper	*Lycaena helloides*	Not listed	OH – Endangered	Lucas	Inhabits a variety of disturbed moist areas, such as fallow fields with poor drainage, sedge meadows, wet prairies, wet ditches and low, damp areas in cultivated fields	May impact – the Project avoids potential habitat where practicable
Racket-tailed emerald	*Dorocordulia libera*	Not listed	OH – Endangered	Summit	Species confined to boggy ponds and lake edges	May impact – the Project avoids potential habitat where practicable
Regal fritiallary	*Speyeria idalia*	Not listed	MI – Endangered	Lenawee and Washtenaw	Prairie or open environments frequently in sandy regions. Meadows, old fields, and floodplain forest openings and edges	No impacts – avoidance of potential habitat proposed
Swamp metalmark	*Calephelis mutica*	Not listed	MI – Special Concern	Lenawee	Occurs in prairie fens and southern wet meadows that support its main host plant, swamp thistle (*Cirsium muticum*)	No impacts – avoidance of potential habitat proposed
Wild indigo dustwing	*Erynnis baptisiae*	Not listed	MI – Special Concern	Monroe, Washtenaw, and Wayne	Commonly occurs in open oak barrens, shrubby fields, prairies and roadsides or areas where its main food source, the wild indigo (*Baptisia australis*) grows	No impacts – avoidance of potential habitat proposed
Mammals						
Black bear	*Ursus americanus*	Not listed	OH – Endangered	All	Primarily inhabit heavily wooded forests, but can thrive in wetlands and swamps to dry coniferous or deciduous forests	No impacts anticipated

APPENDIX J (cont'd)

State-listed Species Potentially Occurring within or near the NGT and TEAL Projects

Species Name		Federal Status	State Status	County	Habitat	Impacts
Common Name	Scientific Name					
Mammals (cont'd)						
Evening bat	*Nycticeius humeralis*	Not listed	MI – Threatened	Lenawee	Inhabits old and mature forests, this species prefers to roost behind loose bark during the nonbreeding season	May impact – two evening bats captured during surveys.
Indiana bat	*Myotis sodalis*	Endangered	OH – Endangered MI – Endangered	All	Inhabits caves and abandoned mines which provide cool and stable temperatures during the winter and then inhabit under loose bark of exfoliating trees or in tree hollows in the summer	May impact – no Indiana bats captured during surveys and no hibernacula identified during portal searches. NGT would only conduct tree clearing during non-active season, October 1 – March 31
Least shrew	*Cryptotis humeralis*	Not listed	MI – Threatened	Washtenaw	Dry upland meadows with dense coverage of grasses and forbs. Nests are found tucked under rocks, logs, discarded lumber, metal sheeting, and hay bales left in fields over winter	No impacts anticipated
Northern long-eared bat	*Myotis septentrionalis*	Threatened	OH – Threatened MI – Threatened	All	Hibernation sites used during the winter (caves, mines) and roosting sites for reproduction (tree cavities) during the summer	May impact –
Mussels						
Black sandshell	*Ligumia recta*	Not listed	OH – Threatened MI – Endangered	OH – Erie, Lorain, Lucas MI- Lenawee, Monroe, Washtenaw	Occupies rivers with strong currents and lakes with a firm substrate of gravel	No impacts – surveys were conducted and one live individual was found in Ohio (Maumee River). This river would be crossed using HDD method
Creek heelsplitter	*Lasmigona compressa*	Not listed	OH – Special Concern	Columbiana, Wayne, Lorain, Huron, Wood, Lucas, and Henry	Most common in headwater streams with firm substrates, but can be found in larger rivers	No impacts – selection of crossing method or relocation efforts prior to construction
Deertoe	*Truncilla truncate*	Not listed	OH – Special Concern MI – Special Concern	OH – Erie, Sandusky, Wood, Lucas, and Henty MI – Lenawee and Monroe	Prefers habitats of firm sand or gravel substrates in rivers and lakes with a moderately swift current	No impacts – selection of crossing method or relocation efforts prior to construction

APPENDIX J (cont'd)

State-listed Species Potentially Occurring within or near the NGT and TEAL Projects

Species Name		Federal Status	State Status	County	Habitat	Impacts
Common Name	Scientific Name					
Mussels (cont'd)						
Eastern pondmussel	*Ligumia nasuta*	Not listed	OH – Endangered MI – Endangered	OH – Lorain, Erie, Sandusky, and Lucas MI – Monroe	Occurs in slow moving streams or ponds/lakes with sandy substrate. Limited to Lake Erie and Lake Erie tributaries	No impacts – species not identified during 2015 surveys
Elktoe	*Alasmidonta marginata*	Not listed	MI – Special Concern	All	Found in clean small to large sized streams and rivers and prefers swifter currents over packed sand and gravel substrates	No impacts – identified in the River Raisin, which would be crossed utilizing HDD method
Ellipse	*Venustaconcha ellipsiformis*	Not listed	MI – Special Concern	Washtenaw	The ellipse occurs in the swift currents of riffles or runs of clear, small to medium sized streams in gravel or sand and gravel substrates	No impacts – species not identified during 2015 surveys
Fawnsfoot	*Truncilla donaciformis*	Not listed	OH – Threatened MI – Threatened	OH – Eric, Lucas, and Sandusky MI – Monroe	Large rivers in compact sand and gravel substrates	No impacts – identified in the Sandusky River (Ohio), which would be crossed utilizing the HDD method
Hickorynut	*Obovaria olivaria*	Not listed	MI – Endangered	Monroe and Washtenaw	Occurs in medium to large streams with silt, sand and gravel substrates	No impacts – species not identified during 2015 surveys
Kidneyshell	*Ptychobranchus fasciolaris*	Not listed	OH – Special Concern MI – Special Concern	OH – None listed MI – Lenawee, Monroe, and Washtenaw	The kidneyshell occurs in high water quality creeks, rivers and lakes with moderate to swift currents and a sand or gravel substrate	No impacts – identified in the Vermillion River, which would be crossed utilizing the HDD method
Lilliput	*Toxolasma parvus*	Not listed	MI – Endangered	Lenawee, Monroe, and Wayne	Small streams with muddy or clay substrates. Occasionally found in large rivers, lakes and impoundments	No impacts – species not identified during 2015 surveys
Northern riffleshell mussel	*Epioblasma torulosa rangiana*	Endangered	MI – Endangered	Lenawee, Monroe, and Wayne	Large streams and small rivers in firm sand of riffle areas; also occurs in Lake Erie	No impacts – species not identified during 2015 surveys
Paper pondshell	*Utterbackia imbecillis*	Not listed	MI – Special Concern	Monroe, Washtenaw, and Wayne	Lakes, ponds, and impoundments with soft mud or sand substrates	No impacts – selection of crossing method or relocation efforts prior to construction
Purple Lilliput	*Toxolasma lvidus*	Not listed	MI – Endangered	Monroe	Small streams with compact sand or gravel substrates	No impacts – species not identified during 2015 surveys

APPENDIX J (cont'd)

State-listed Species Potentially Occurring within or near the NGT and TEAL Projects

Species Name		Federal Status	State Status	County	Habitat	Impacts
Common Name	Scientific Name					
Mussels (cont'd)						
Purple wartyback	*Cyclonaias tuberculate*	Not listed	OH – Special Concern MI – Threatened	OH – Erie and Lucas MI – Lenawee, Monroe, Washtenaw	Found in medium to large rivers with gravel or mixed sand and gravel substrates	No impacts – species not identified during 2015 surveys
Rainbow	*Vilosa iris*	Not listed	MI – Special Concern	All	The rainbow occurs in coarse sand or gravel in small to medium streams	No impacts – species not identified during 2015 surveys
Rayed bean	*Vilosa fabalis*	Endangered	OH – Endangered MI – Endangered	OH – Lucas MI – Lenawee, Monroe, and Wayne	Small headwater creeks, but they are sometimes found in large rivers	No impacts – identified in the River Raisin, which would be crossed utilizing HDD method
Round hickorynut	*Obovaria subrotunda*	Not listed	MI – Endangered	Lenawee	Found along the shores of medium to large rivers and lakes. The round hickorynut generally is found in sand and gravel substrates in areas with moderate flow	No impacts – species not identified during 2015 surveys
Round pigtoe	*Pleurobema sintoxia*	Not listed	OH – Special Concern MI – Special Concern	OH – Lucas MI – All	Occurs in mud, sand, or gravel substrates of medium to large rivers	No impacts – species not identified during 2015 surveys
Slippershell	*Alasmidonta biridis*	Not listed	MI – Threatened	Lenawee, Monroe, Washtenaw, and Wayne	Found in creeks and headwaters of rivers, but has also been reported in larger rivers and lakes. Typically, this mussel usually occurs in sand, mud or gravel substrates	No impacts – identified in the River Raisin, which would be crossed utilizing HDD method
Snuffbox	*Epioblasma triquetra*	Endangered	OH – Endangered MI – Endangered	Monroe, Washtenaw, and Wayne	Small to medium-sized creeks in areas with swift current and some larger rivers	No impacts – species not identified during 2015 surveys
Threehorn wartyback	*Obliquaria reflexa*	Not listed	OH – Threatened MI – Endangered	OH – Erie, Lucas, Lorain, and Sandusky MI – Monroe	Large rivers in sand or gravel; may be locally abundant in impoundments	No impacts – identified in the Sandusky and Maumee Rivers in Ohio, both of which would be crossed utilizing HDD method

APPENDIX J (cont'd)

State-listed Species Potentially Occurring within or near the NGT and TEAL Projects

Species Name		Federal Status	State Status	County	Habitat	Impacts
Common Name	Scientific Name					
Mussels (cont'd)						
Wavy-rayed lampmussel	*Lampsilis fasciola*	Not listed	OH – Special Concern MI – Threatened	OH – Lorain and Columbiana MI – Monroe, Lenawee, Washtenaw	Occurs in small to medium sized shallow streams, in and near riffles, with good current. The substrate preference is sand and/or gravel	No impacts – species not identified during 2015 surveys
Plants						
Canadian milk vetch	*Astragalus Canadensis*	Not listed	MI – Threatened	Lenawee, Monroe, and Washtenaw	Dry prairie, moist shores, river banks, marshy ground, and partly shaded ground	No impacts – species not identified during botanical surveys
Compass plant	*Silphium laciniatum*	Not listed	MI – Threatened	Washtenaw	Mostly in southwestern Michigan; adventive along railroads and depauperate prairies	No impacts – species not identified during botanical surveys
Cup plant	*Silphium perfoliatum*	Not listed	MI – Threatened	Washtenaw	Found in river floodplains in forest openings and edges	May impact – identified during botanical surveys in Ohio
David's sedge	*Carex davisii*	Not listed	MI – Special Concern	Lenawee, Monroe, and Washtenaw	First and second bottoms of floodplain forests in southern Lower Michigan, especially in canopy gaps and artificial clearings, including riparian thickets and fields	No impacts – species not identified during botanical surveys
Eastern prairie fringed orchid	*Plantanthera leucophaea*	Threatened	OH – Threatened MI – Endangered	OH – Wayne, Sandusky MI – Monroe, Washtenaw	Wet prairies, sedge meadows, and moist roadside ditches. Typically restricted to sandy or peaty lakeshores or bogs	No impacts – species not identified during botanical surveys
Ginseng	*Panax quinquefolius*	Not listed	MI – Threatened	Monroe and Washtenaw	Rich, swampy hardwoods, especially on slopes or ravines	May impact – identified during botanical surveys in Ohio
Green violet	*Hybanthus concolor*	Not listed	MI – Special Concern	Lenawee, Washtenaw, and Wayne	Found in floodplain forests, usually in lower bottoms, as well as mesic forests and rich hardwoods	No impacts – species not identified during botanical surveys
Hairy angelica	*Angelica venenosa*	Not listed	MI – Special Concern	All	Open, upland oak forests, savanna and prairie remnants and open, sandy woodlots	No impacts – species not identified during botanical surveys
Hairy wild petunia	*Ruellia humilis*	Not listed	MI – Threatened	Washtenaw	Dry to moist prairies and oak openings	No impacts – species not identified during botanical surveys
Lakeside Daisy	*Hymenoxys herbacea*	Threatened	OH – Endangered	Erie	Found in full sun, calcareous sites, and dry prairies	No impacts – species not identified during botanical surveys

APPENDIX J (cont'd)

State-listed Species Potentially Occurring within or near the NGT and TEAL Projects

Species Name		Federal Status	State Status	County	Habitat	Impacts
Common Name	Scientific Name					
Plants (cont'd)						
Northern monkshood	*Aconitum noveboracense*	Threatened	OH – Endangered	Summit	On sandstone in cool, shaded ravines in close proximity to running water, seeps, talus slopes, rock shelters, vertical cliff faces	No impacts – species not identified during botanical surveys
Pale avens	*Geum virginianum*	Not listed	MI – Special Concern	Lenawee, Washtenaw, and Wayne	Found in openings and banks in woods	No impacts – species not identified during botanical surveys
Purple milkweed	*Asclepias purpurascens*	Not listed	MI – Threatened	Lenawee, Monroe, and Washtenaw	Occurs in dry woodlands (especially oak), dry thickets, shores, and in prairies	No impacts – species not identified during botanical surveys
Twinleaf	*Jeffersonia diphylla*	Not listed	MI – Special Concern	Lenawee, Washtenaw, and Wayne	Found in mesic forests with rich, loamy soils and in floodplain forests	No impacts – species not identified during botanical surveys
Water willow	*Justicia americana*	Not listed	MI – Threatened	Monroe and Washtenaw	Local colonies along the banks of the Huron and Raisin Rivers and nearby lakes and streams	No impacts – species not identified during botanical surveys
Weak Stellate sedge	*Carex seorsa*	Not listed	MI – Threatened	Washtenaw	Found on hummocks in hardwood or hardwood-conifer swamps, margins of bogs, and buttonbush depressions	No impacts – species not identified during botanical surveys
White gentian	*Gentiana flavida*	Not listed	MI – Endangered	Washtenaw	Dry or moist prairies and open oak savanna; nearly extirpated in Michigan	No impacts – species not identified during botanical surveys
White or prairie false indigo	*Baptisia lacteal*	Not listed	MI – Special Concern	Lenawee, Monroe, and Washtenaw	Dry to mesic prairies and savannas, dry open roadsides, along railroads, and in fencerows	No impacts – species not identified during botanical surveys
Reptiles						
Blanding's turtle	*Emydoidea blandingii*	Not listed	OH – Threatened	Erie, Lorain, Henry, and Fulton	Typically found in clean, aquatically diverse areas with muddy substrates. Common systems include ponds, marshes, swamps, bogs, wet prairies, and river backwaters	May impact – Potential suitable habitat avoided where practicable. Habitat suitability is currently being evaluated; potential surveys in 2016
Eastern massasauga	*Sistrurus catenatus catenatus*	Proposed Threatened	OH – Endangered MI – Special Concern	OH – Wayne, Huron, and Sandusky MI – Lenawee, Monroe, Washtenaw, and Wayne	Wet prairies, sedge meadows, and early successional fields, preferred wetland habitats are marshes and fens	May impact – no suitable habitat in Ohio; surveys in Michigan. Fall presence/absence surveys were conducted with no individuals found. Spring emergence surveys will be conducted in 2016

APPENDIX J (cont'd)

State-listed Species Potentially Occurring within or near the NGT and TEAL Projects

Species Name		Federal Status	State Status	County	Habitat	Impacts
Common Name	Scientific Name					
Reptiles (cont'd)						
Spotted turtle	*Clemmys guttata*	Not listed	OH – Threatened MI – Threatened	OH – Summit, Erie, Lorain, and Fulton MI – Lenawee, Washtenaw, and Wayne	Slow-moving bodies of water with muddy or mucky bottoms and some aquatic and emergent vegetation, including shallow ponds, wet meadows, bogs, fends, sedge meadows, shallow cattail marshes, small woodland streams and roadside ditches	May impact – Potential suitable habitat avoided where practicable. Habitat suitability is currently being evaluated; potential surveys in 2016

APPENDIX K

LAND USE TABLES

APPENDIX K-1

SUMMARY OF EXISTING UTILITIES CROSSED BY THE NGT PROJECT

APPENDIX K-1

Summary of Existing Utilities Crossed by the NGT Project

State, Facility, County	Approximate MP	Utility Owner(s)/Operator(s)	Utility Type(s)
OHIO			
TGP Interconnecting Pipeline			
Columbiana	0.6	Access Midstream	Natural Gas
Columbiana	0.7	NiSource Midstream	Natural Gas
Mainline			
Columbiana	0.3	S&S Energy Corp, Access Midstream	Natural Gas
Columbiana	0.9	S&S Energy Corp	Natural Gas
Columbiana	0.9	Midstream	Natural Gas
Columbiana	0.9	Williams	Natural Gas
Columbiana	1.3	First Energy	Electric Transmission
Columbiana	1.4	First Energy	Electric Transmission
Columbiana	1.6	Unknown	Unknown
Columbiana	1.8	Access Midstream (49) M3 Midstream (30) Ev Energy (21)	Natural Gas Liquid (NGL)
Columbiana	1.8	Midstream Nisource Inc.	Natural Gas
Columbiana	2.2	Midstream Caiman Energy II Dominion	Natural Gas
Columbiana	3.1	Access Midstream Total E&P USA Enervest Energy	Natural Gas
Columbiana	3.2	Dominion East Ohio	Natural Gas
Columbiana	5.0	Atlas Energy	Natural Gas
Columbiana	5.6	Atlas Energy	Natural Gas
Columbiana	5.7	First Energy	Electric Transmission
Columbiana	6.1	Unknown	Electric Transmission
Columbiana	6.2	First Energy	Electric Transmission
Columbiana	6.3	Unknown	Electric Transmission
Columbiana	6.4	Atlas Energy	Natural Gas
Columbiana	6.6	First Energy	Electric Transmission
Columbiana	7.2	Atlas Energy	Natural Gas
Columbiana	7.3	Atlas Energy	Natural Gas
Columbiana	7.6	America Energy	Crude Oil
Columbiana	7.7	Atlas Energy	Natural Gas
Columbiana	7.8	Atlas Pipeline	Natural Gas
Columbiana	7.8	Atlas Pipeline	Natural Gas
Columbiana	8.0	Atlas Energy	Natural Gas
Columbiana	8.2	Atlas Pipeline	Natural Gas
Columbiana	8.5	Unknown	Natural Gas
Columbiana	8.6	First Energy	Electric Transmission
Columbiana	8.6	Unknown	Natural Gas
Columbiana	8.9	Unknown	Natural Gas
Columbiana	9.9	Atlas Gas Enervest Energy Partners	Natural Gas
Columbiana	10.0	Enervest Energy Partners	Natural Gas
Columbiana	10.2	First Energy	Electric Transmission
Columbiana	10.3	Enervest Energy Partners	Natural Gas
Columbiana	10.5	Enervest Energy Partners	Natural Gas
Columbiana	10.6	Enervest Energy Partners	Natural Gas
Columbiana	11.1	NiSource Inc.	Natural Gas
Columbiana	11.7	First Energy	Electric Transmission
Columbiana	12.3	Clinton Oil	Natural Gas

APPENDIX K-1 (cont'd)

Summary of Existing Utilities Crossed by the NGT Project

State, Facility, County	Approximate MP	Utility Owner(s)/Operator(s)	Utility Type(s)
Mainline (cont'd)			
Columbiana	12.4	Unknown	Electric Transmission
Stark	12.5	Unknown	Electric Transmission
Stark	13.1	First Energy	Electric Transmission
Stark	13.2	Unknown	Electric Transmission
Stark	14.0	Unknown	Electric Transmission
Stark	14.1	First Energy	Electric Transmission
Stark	14.1	Enervest Energy Partners	Natural Gas
Stark	14.2	Unknown	Unknown
Stark	14.3	First Energy	Electric Transmission
Stark	14.5	Belden & Blake Corp Enervest Energy Partners	Natural Gas
Stark	14.6	Dominion	Natural Gas
Stark	14.8	Unknown	Electric Transmission
Stark	14.8	Enervest Energy Partners	Natural Gas
Stark	15.0	East Ohio Gas Company Dominion	Natural Gas
Stark	15.2	East Ohio Gas Company	Natural Gas
Stark	15.8	First Energy	Electric Transmission
Stark	16.0	First Energy	Electric Transmission
Stark	16.0	Unknown	Natural Gas
Stark	16.0	Unknown	Natural Gas
Stark	16.2	Unknown	Electric Transmission
Stark	16.4	Unknown	Electric Transmission
Stark	16.6	Petrox Inc.	Natural Gas
Stark	16.7	Petrox Inc.	Natural Gas
Stark	16.7	Unknown	Natural Gas
Stark	16.7	Unknown	Electric Transmission
Stark	17.3	Atlas Energy	Natural Gas
Stark	17.6	Unknown	Natural Gas
Stark	17.7	Unknown	Natural Gas
Stark	17.8	Atlas Energy	Natural Gas
Stark	18.3	Unknown	Electric Transmission
Stark	18.3	Unknown	Unknown
Stark	19.6	Enervest Energy Partners	Natural Gas
Stark	20.4	Enervest Energy Partners	Natural Gas
Stark	20.6	First Energy	Electric Transmission
Stark	21.7	Unknown	Electric Transmission
Stark	21.7	Enervest Energy Partners	Natural Gas
Stark	22.2	Enervest Energy Partners	Natural Gas
Stark	23.1	Enervest Energy Partners	Natural Gas
Stark	23.2	Enervest Energy Partners	Natural Gas
Stark	23.3	Old Dominion/Caiman Energy II	Natural Gas
Stark	23.5	Enervest Energy Partners	Natural Gas
Stark	24.2	Enervest Energy Partners	Natural Gas
Stark	25.0	Enervest Energy Partners	Natural Gas
Stark	25.5	Enervest Energy Partners	Natural Gas
Stark	26.0	Belden & Blake Corp	Unknown
Stark	26.4	Enervest Energy Partners	Natural Gas
Stark	26.5	Enervest Energy Partners	Natural Gas
Stark	26.7	Enervest Energy Partners	Natural Gas
Stark	27.2	Enervest Energy Partners	Natural Gas
Stark	27.3	Enervest Energy Partners	Natural Gas

APPENDIX K-1 (cont'd)

Summary of Existing Utilities Crossed by the NGT Project

State, Facility, County	Approximate MP	Utility Owner(s)/Operator(s)	Utility Type(s)
Mainline (cont'd)			
Stark	28.0	MB Operating Company	Natural Gas
Stark	28.1	MB Operating	Natural Gas
Stark	28.2	Dominion	Natural Gas
Stark	28.2	Enervest Energy Partners	Natural Gas
Stark	29.3	Enervest Energy Partners	Natural Gas
Stark	29.4	BP	Product
Stark	29.7	Dominion	Natural Gas
Stark	29.8	First Energy	Electric Transmission
Stark	30.3	Enervest Energy Partners	Natural Gas
Stark	30.8	Enervest Energy Partners	Natural Gas
Stark	30.9	Dominion	Natural Gas
Stark	31.8	First Energy	Electric Transmission
Stark	31.9	Enervest Energy Partners	Natural Gas
Stark	32.1	Dominion	Natural Gas
Stark	32.1	Enervest Energy Partners	Natural Gas
Stark	32.6	First Energy	Electric Transmission
Stark	32.8	First Energy	Power
Stark	32.8	First Energy	Electric Transmission
Stark	32.8	Dominion	Natural Gas
Stark	33.0	Unknown	Electric Transmission
Stark	33.0	Dominion	Natural Gas
Stark	33.1	Unknown	Electric Transmission
Stark	34.0	Unknown	Electric Transmission
Summit	34.4	Enervest Energy Partners	Natural Gas
Summit	35.0	Enervest Energy Partners	Natural Gas
Summit	35.0	Unknown	Electric Transmission
Summit	35.2	Enervest Energy Partners	Natural Gas
Summit	35.9	First Energy	Electric Transmission
Summit	36.4	Unknown	Natural Gas
Summit	36.7	Dominion	Natural Gas
Summit	36.8	Enervest Energy Partners	Natural Gas
Summit	37.4	Unknown	Electric Transmission
Summit	38.0	Dominion	Natural Gas
Summit	39.8	Unknown	Electric Transmission
Summit	40.9	Dominion	Natural Gas
Summit	41.1	First Energy	Electric Transmission
Summit	41.5	East Ohio Gas Company/Dominion	Natural Gas
Summit	41.9	Dominion	Natural Gas
Summit	42.2	Dominion	Natural Gas
Summit	42.6	Dominion	Natural Gas
Summit	42.8	Dominion East	Natural Gas
Summit	43.2	Dominion	Natural Gas
Summit	43.3	Dominion	Natural Gas
Summit	43.5	Dominion	Natural Gas
Summit	43.5	East Ohio Gas Company	Natural Gas
Summit	43.8	Dominion	Natural Gas
Summit	44.2	Dominion	Natural Gas
Summit	44.3	Dominion	Natural Gas
Summit	44.5	Dominion	Natural Gas
Summit	44.5	Dominion	Natural Gas
Summit	44.7	Dominion	Natural Gas
Summit	44.8	Dominion	Natural Gas

APPENDIX K-1 (cont'd)

Summary of Existing Utilities Crossed by the NGT Project

State, Facility, County	Approximate MP	Utility Owner(s)/Operator(s)	Utility Type(s)
Mainline (cont'd)			
Summit	44.9	Dominion	Natural Gas
Summit	45.1	Dominion	Natural Gas
Summit	45.2	Dominion	Natural Gas
Summit	45.3	Dominion	Natural Gas
Summit	45.4	Dominion	Natural Gas
Summit	45.4	East Ohio Gas Company/Dominion	Natural Gas
Summit	45.5	Dominion	Natural Gas
Summit	46.2	Dominion	Natural Gas
Summit	46.2	Dominion	Natural Gas
Summit	46.8	Sunoco/BP	Natural Gas
Summit	47.4	Marathon Petroleum Company, LLC	Product
Summit	47.7	First Energy	Electric Transmission
Summit	48.0	Dominion	Natural Gas
Summit	48.6	Dominion	Natural Gas
Summit	48.8	Unknown	Unknown
Summit	48.9	Dominion	Natural Gas
Summit	48.9	First Energy	Electric Transmission
Summit	49.0	Marathon Petroleum Company, LLC	Product
Summit	49.5	Unknown	Electric Transmission
Summit	49.7	First Energy	Electric Transmission
Summit	49.9	Unknown	Electric Transmission
Summit	50.0	North Coast Gas	Natural Gas
Wayne	50.4	Unknown	Electric Transmission
Wayne	50.4	Dominion	Natural Gas
Wayne	50.7	Unknown	Electric Transmission
Wayne	51.3	First Energy	Electric Transmission
Wayne	51.3	First Energy	Electric Transmission
Wayne	51.8	Dominion	Natural Gas
Wayne	51.8	Somerset Gas Transmission Company, LLC	Natural Gas
Wayne	52.0	Somerset Gas Transmission Company, LLC	Natural Gas
Wayne	52.0	First Energy	Electric Transmission
Wayne	52.4	Dominion	Natural Gas
Wayne	52.6	First Energy	Electric Transmission
Wayne	52.6	Somerset Gas Transmission Company, LLC	Natural Gas
Wayne	52.7	Unknown	Unknown
Wayne	52.9	Dominion	Natural Gas
Wayne	53.5	Dominion	Natural Gas
Wayne	54.5	Dominion	Natural Gas
Wayne	54.7	Dominion	Natural Gas
Wayne	54.8	Unknown	Unknown
Wayne	55.2	Unknown	Unknown
Wayne	55.8	First Energy	Electric Transmission
Medina	56.8	Northeast Ohio Natural Gas Corporation	Natural Gas
Medina	57.2	Dominion	Natural Gas
Medina	57.3	Dominion	Natural Gas
Medina	57.6	First Energy	Electric Transmission
Medina	57.7	First Energy	Electric Transmission
Medina	57.7	Dominion	Natural Gas
Medina	59.7	Dominion	Natural Gas
Medina	60.1	Bass Energy	Natural Gas
Medina	60.1	Dominion	Natural Gas
Medina	60.2	S&S Energy Corp	Crude Oil

APPENDIX K-1 (cont'd)

Summary of Existing Utilities Crossed by the NGT Project

State, Facility, County	Approximate MP	Utility Owner(s)/Operator(s)	Utility Type(s)
Mainline (cont'd)			
Medina	60.3	Unknown	Electric Transmission
Medina	60.8	Mb Operation Company	Natural Gas
Medina	60.8	Bass Energy Company	Natural Gas
Medina	60.8	Bass Energy Company	Natural Gas
Medina	63.0	Mb Operating	Natural Gas
Medina	63.0	Mb Operating	Natural Gas
Medina	63.5	King Energy	Natural Gas
Medina	63.8	Unknown	Crude Oil
Medina	66.0	Unknown	Unknown
Medina	66.0	Unknown	Unknown
Medina	66.7	Gatherco Inc.	Natural Gas
Medina	68.8	First Energy	Electric Transmission
Medina	69.3	NiSource Inc.	Natural Gas
Medina	69.3	Unknown	Electric Transmission
Medina	69.7	Columbia Gas	Natural Gas
Medina	69.8	NiSource Inc.	Natural Gas
Medina	70.5	Medina Fuel Company	Unknown
Medina	70.6	Columbia Gas NiSource Inc.	Natural Gas
Medina	70.6	Columbia Gas NiSource Inc.	Natural Gas
Medina	70.9	Unknown	Electric Transmission
Medina	71.5	Unknown	Unknown
Medina	73.1	Aspire Energy	Natural Gas
Medina	73.4	Columbia Gas NiSource Inc.	Natural Gas
Medina	73.6	Columbia Gas NiSource Inc.	Natural Gas
Medina	73.8	NiSource Inc.	Natural Gas
Medina	75.0	Columbia Gas	Natural Gas
Medina	75.3	Columbia Gas	Natural Gas
Medina	75.4	NiSource Inc. Columbia	Natural Gas
Medina	75.9	NiSource Inc.	Natural Gas
Medina	75.9	Columbia Gas	Natural Gas
Medina	76.0	NiSource Inc.	Natural Gas
Medina	76.6	NiSource Inc.	Natural Gas
Medina	77.0	Unknown	Electric Transmission
Medina	77.4	NiSource Inc.	Natural Gas
Medina	77.5	First Energy	Electric Transmission
Medina	77.8	Sunoco, Inc. (Energy Transfer Partners, LP)	Natural Gas
Medina	78.6	NiSource Inc.	Natural Gas
Medina	79.4	NiSource Inc.	Natural Gas
Lorain	81.2	Unknown	Electric Transmission
Lorain	82.8	NiSource Inc.	Natural Gas
Lorain	82.9	NiSource Inc.	Natural Gas
Lorain	83.3	Magellan Midstream Partners Poet	Product
Lorain	83.7	First Energy	Electric Transmission
Lorain	83.9	NiSource Inc.	Natural Gas
Lorain	85.1	First Energy	Electric Transmission
Lorain	85.9	Unknown	Electric Transmission
Lorain	86.1	Unknown	Unknown

APPENDIX K-1 (cont'd)

Summary of Existing Utilities Crossed by the NGT Project

State, Facility, County	Approximate MP	Utility Owner(s)/Operator(s)	Utility Type(s)
Mainline (cont'd)			
Lorain	87.0	Unknown	Electric Transmission
Lorain	87.8	First Energy	Electric Transmission
Lorain	88.5	Dominion	Natural Gas
Lorain	88.5	Dominion	Natural Gas
Lorain	89.1	NiSource Inc.	Natural Gas
Lorain	89.5	NiSource Inc.	Natural Gas
Lorain	91.4	Dominion	Natural Gas
Lorain	92.7	Dominion	Natural Gas
Lorain	93.4	Unknown	Electric Transmission
Lorain	93.6	Dominion	Natural Gas
Lorain	94.3	Buckeye Partners, LP	Crude Oil
Lorain	94.6	Unknown	Electric Transmission
Lorain	96.4	Buckeye Partners NiSource Inc.	Natural Gas
Lorain	96.4	Columbia Gas NiSource Inc.	Natural Gas
Lorain	96.4	Buckeye Partners, LP	Crude Oil
Lorain	97.5	First Energy	Electric Transmission
Lorain	98.1	Buckeye Partners	Natural Gas
Lorain	98.2	Somerset Gas Transmission Company, LLC	Natural Gas
Lorain	98.3	Buckeye	Natural Gas
Lorain	98.3	North Coast Gas	Natural Gas
Lorain	98.6	Unknown	Natural Gas
Lorain	99.2	Unknown	Unknown
Lorain	99.6	NiSource Inc.	Natural Gas
Lorain	99.9	Unknown	Electric Transmission
Huron	104.2	NiSource Inc.	Natural Gas
Erie	107.1	Dominion	Natural Gas
Erie	108.3	NiSource Inc.	Natural Gas
Erie	112.1	Unknown	Electric Transmission
Erie	112.6	First Energy	Electric Transmission
Erie	112.6	AEP Ohio	Electric Transmission
Erie	113.0	AEP Ohio	Electric Transmission
Erie	113.1	First Energy	Electric Transmission
Erie	113.5	First Energy	Electric Transmission
Erie	113.6	AEP Ohio	Electric Transmission
Erie	116.2	NiSource Inc.	Natural Gas
Erie	116.7	Unknown	Electric Transmission
Erie	117.4	AEP Ohio	Electric Transmission
Erie	117.5	First Energy	Electric Transmission
Erie	118.1	Columbia Gas	Natural Gas
Erie	119.2	First Energy	Electric Transmission
Erie	119.2	AEP Ohio	Electric Transmission
Erie	122.6	AEP Ohio	Electric Transmission
Erie	122.6	First Energy	Electric Transmission
Erie	130.4	Dominion	Natural Gas
Sandusky	137.4	Unknown	Electric Transmission
Sandusky	139.6	Buckeye PL Co	Crude Oil
Sandusky	139.8	Unknown	Electric Transmission
Sandusky	140.7	Dominion	Natural Gas
Sandusky	140.7	East Ohio Gas Company	Natural Gas
Sandusky	147.0	Unknown	Electric Transmission

APPENDIX K-1 (cont'd)

Summary of Existing Utilities Crossed by the NGT Project

State, Facility, County	Approximate MP	Utility Owner(s)/Operator(s)	Utility Type(s)
Mainline (cont'd)			
Sandusky	147.5	Columbia Gas	Natural Gas
Sandusky	148.1	Columbia Gas NiSource Inc.	Natural Gas
Sandusky	149.3	Unknown	Electric Transmission
Sandusky	153.9	East Ohio Gas Company	Natural Gas
Sandusky	153.9	Dominion	Natural Gas
Sandusky	156.1	Dominion	Natural Gas
Sandusky	156.1	East Ohio Gas Company	Natural Gas
Sandusky	157.6	Kinder Morgan	NGL
Sandusky	157.7	East Ohio Gas Company	Natural Gas
Sandusky	157.7	Dominion	Natural Gas
Sandusky	158.2	Unknown	Electric Transmission
Sandusky	159.4	Columbia Gas NiSource Inc.	Natural Gas
Sandusky	160.3	Unknown	Electric Transmission
Sandusky	161.4	Unknown	Electric Transmission
Sandusky	163.0	Dominion	Natural Gas
Sandusky	163.2	North Coast Gas Somerset Gas Transmission Company, LLC	Natural Gas
Sandusky	163.7	Dominion	Natural Gas
Wood	164.5	Unknown	Electric Transmission
Wood	165.5	BP	Highly volatile liquid
Wood	165.5	Sunoco	Liquefied gas
Wood	165.5	Unknown	Electric Transmission
Wood	165.5	American Electric Power Company, Inc.	Electric Transmission
Wood	165.5	Unknown	Electric Transmission
Wood	165.5	BP	Product
Wood	168.4	Unknown	Electric Transmission
Wood	168.5	First Energy	Electric Transmission
Wood	169.4	Buckeye Partners, LP	NGL
Wood	170.5	Mid Valley Pipeline Sunoco, Inc. (Energy Transfer Partners, LP)	Crude Oil
Wood	170.5	Buckeye PL Co	Crude Oil
Wood	170.6	Columbia Gas NiSource Inc.	Natural Gas
Wood	174.2	Kinder Morgan	Natural Gas
Wood	175.2	First Energy	Electric Transmission
Wood	175.3	First Energy	Electric Transmission
Wood	175.6	Columbia Gas NiSource Inc.	Natural Gas
Wood	176.6	First Energy	Electric Transmission
Wood	177.1	First Energy	Electric Transmission
Wood	177.1	First Energy	Electric Transmission
Wood	181.0	Waterville Gas Company	Natural Gas
Lucas	182.1	Waterville Gas Company	Natural Gas
Lucas	185.1	First Energy	Electric Transmission
Henry	190.0	ANR Pipeline Transcanada	Natural Gas
Henry	190.0	First Energy	Electric Transmission
Fulton	192.5	First Energy	Electric Transmission
Fulton	193.7	NORCO Pipeline Buckeye Partners, LP	Natural Gas
Fulton	197.9	First Energy	Electric Transmission

APPENDIX K-1 (cont'd)

Summary of Existing Utilities Crossed by the NGT Project

State, Facility, County	Approximate MP	Utility Owner(s)/Operator(s)	Utility Type(s)
Ohio (cont'd)			
Fulton	199.1	First Energy	Electric Transmission
Fulton	200.7	First Energy	Electric Transmission
Fulton	201.5	First Energy	Electric Transmission
Fulton	201.8	First Energy	Electric Transmission
Fulton	202.2	Transcanada	Natural Gas
Fulton	204.9	First Energy	Electric Transmission
Fulton	205.3	First Energy	Electric Transmission
Fulton	207.2	Panhandle Eastern Southern Union Company (Energy Transfer Partners, LP)	Natural Gas
Fulton	207.3	Kinder Morgan	NGL
Fulton	207.8	First Energy	Electric Transmission
Michigan			
Lenawee	210.0	Kinder Morgan	NGL
Lenawee	212.8	Michigan Gas Integrys Energy Group, Inc.	Natural Gas
Lenawee	217.4	Hanover Marathon Petroleum Company, LLC	Crude Oil
Lenawee	218.8	Transcanada	Natural Gas
Lenawee	218.8	Transcanada	Natural Gas
Lenawee	218.9	CMS Energy	Electric Transmission
Lenawee	222.6	Panhandle Eastern Southern Union Company (Energy Transfer Partners, LP)	Natural Gas
Lenawee	229.0	ITC Holdings Corporation	Electric Transmission
Lenawee	229.8	Enbridge	Crude Oil
Monroe	236.3	MichCon	Natural Gas
Washtenaw	240.0	Ameritech	Unknown
Washtenaw	240.1	ITC Holdings Corporation	Electric Transmission
Washtenaw	241.4	ITC Holdings Corporation	Electric Transmission
Washtenaw	241.5	Transcanada	Crude Oil
Washtenaw	241.8	MichCon	Natural Gas
Washtenaw	242.8	Buckeye Partners, LP	NGL
Washtenaw	248.5	BP Pipeline	Crude Oil
Washtenaw	248.6	ITC Holdings Corporation	Electric Transmission
Washtenaw	248.7	BP Pipeline	Crude Oil
Washtenaw	248.9	BP Pipeline	Crude Oil
Washtenaw	249.2	Enbridge Wolverine Pipeline Company	Crude Oil
Washtenaw	250.2	MichCon	Natural Gas
Washtenaw	250.2	MichCon	Natural Gas
Washtenaw	251.0	MichCon	Natural Gas
Washtenaw	251.1	YCUA	Water
Washtenaw	251.1	DTE	Natural Gas
Washtenaw	251.1	Unknown	Electric Transmission
Washtenaw	251.4	DTE Energy	Natural Gas
Washtenaw	251.4	Unknown	Electric Transmission
Washtenaw	251.4	MichCon	Natural Gas
Washtenaw	252.0	MichCon (DTE)	Natural Gas
Washtenaw	252.0	Unknown	Electric Transmission
Washtenaw	252.4	Transcanada	Natural Gas
Washtenaw	252.5	Transcanada	Natural Gas
Washtenaw	252.8	DTE Energy (MichCon)	Natural Gas

APPENDIX K-1 (cont’d)

Summary of Existing Utilities Crossed by the NGT Project

State, Facility, County	Approximate MP	Utility Owner(s)/Operator(s)	Utility Type(s)
Michigan (cont’d)			
Washtenaw	253.7	MichCon	Natural Gas
Washtenaw	253.7	Unknown	Electric Transmission
Washtenaw	253.8	MichCon	Natural Gas
Washtenaw	254.0	DTE Energy	Natural Gas
Washtenaw	254.3	Transcanada	Natural Gas
Washtenaw	254.7	DTE Energy	Natural Gas
Washtenaw	255.0	MichCon	Natural Gas
Washtenaw	255.0	MichCon	Natural Gas

APPENDIX K-2

BUILDINGS WITHIN 50 FEET OF THE NGT PROJECT

APPENDIX K-2

Buildings within 50 Feet of the NGT Project

State, Facility, County	Parcel ID	Building Type	Approximate Milepost	Distance from [a]		Direction (Right or Left) [b]	Occupied (Yes/No) [c]	Proposed Mitigation Measures [d]	Residential Construction Plan Number
				Pipeline Centerline (feet)	Edge of Workspace (feet)				
OHIO									
TGP Interconnecting Pipeline									
Columbiana	OH-COL-003.0000	Shed	0.5	53	Inside	Right	No	Safety Fence	TGPI-P-8001_1D
Columbiana	OH-COL-003.0000	Shed	0.5	63	3	Right	No	Safety Fence	TGPI-P-8001_1D
Mainline									
Columbiana	OH-CO-013.0000	Garage	1.9	94	8	Right	No	Safety Fence	HANO-P-8001_1A
Columbiana	OH-CO-016.0010	Barn	2.1	173	48	Right	No	Safety Fence	HANO-P-8002_1A
Columbiana	OH-CO-031.0000	Shed	4.1	103	38	Left	No	Safety Fence	HANO-P-8003_1A
Columbiana	OH-CO-031.0000	Shed	4.1	107	42	Left	No	Safety Fence	HANO-P-8003_1A
Columbiana	OH-CO-055.0100/ OH-CO-055.0102	Dwelling	6.3	88	28	Right	Yes	Safety Fence	HANO-P-8004_1B
Columbiana	OH-CO-055.0100	Barn	6.3	97	37	Right	No	Safety Fence	HANO-P-8004_1B
Columbiana	OH-CO-055.0100	Pool	6.3	68	8	Right		Safety Fence	HANO-P-8004_1B
Columbiana	OH-CO-055.0001	Garage	6.4	94	29	Left	No	Safety Fence	HANO-P-8005_1B
Columbiana	OH-CO-055.0210	Garage	6.4	81	41	Left	No	Safety Fence	HANO-P-8005_1B
Columbiana	OH-CO-055.0210	Shed	6.4	88	48	Left	No	Safety Fence	HANO-P-8005_1B
Columbiana	OH-CO-055.0210	Dwelling	6.4	75	35	Left	Yes	Safety Fence	HANO-P-8005_1B
Columbiana	OH-CO-102.0000	Barn	11.4	59	11	Left	No	Safety Fence	HANO-P-8006_1A
Columbiana	OH-CO-106.0000	Barn	11.7	101	36	Left	No	Safety Fence	HANO-P-8007_1A
Stark	OH-ST-046.0000	Barn	18.4	97	32	Left	No	Safety Fence	HANO-P-8010_1A
Stark	OH-ST-046.0000	Garage	18.4	120	30	Left	No	Safety Fence	HANO-P-8010_1A
Stark	OH-ST-046.0000	Shed	18.4	86	21	Left	No	Safety Fence	HANO-P-8010_1A
Stark	OH-ST-046.0000	Shed	18.4	89	24	Left	No	Safety Fence	HANO-P-8010_1A
Stark	OH-ST-046.0000	Shed	18.4	91	26	Left	No	Safety Fence	HANO-P-8010_1A
Stark	OH-ST-069.0000	Barn	21.5	124	39	Right	No	Safety Fence	HANO-P-8011_1A
Stark	OH-ST-093.0000	Barn	26.3	42	7	Right	No	Safety Fence	HANO-P-8012_1A
Stark	OH-ST-093.0000	Animal Pen	26.3	69	16	Right	No	Safety Fence	HANO-P-8012_1A
Stark	OH-ST-093.0000	Dwelling	26.3	77	42	Right	Yes	Safety Fence	HANO-P-8012_1A
Stark	OH-ST-107.0000	Shed	27.9	62	Inside	Left	No	Safety Fence	HANO-P-8082_1A
Stark	OH-ST-110.0000	Barn	28.1	110	50	Right	No	Safety Fence	HANO-P-8013_1A
Stark	OH-ST-110.0000	Barn	28.1	89	18	Right	No	Safety Fence	HANO-P-8013_1A
Stark	OH-ST-110.0000	Dwelling	28.2	132	27	Right	Yes	Safety Fence	HANO-P-8013_1A
Stark	OH-ST-123.0000	Barn	29.9	53	Inside	Left	No	Safety Fence	HANO-P-8014_1A
Stark	OH-ST-123.0002	Barn	30.3	107	44	Left	No	Safety Fence	HANO-P-8015_1B
Stark	OH-ST-123.0002	Dwelling	30.3	129	36	Left	Yes	Safety Fence	HANO-P-8015_1B

APPENDIX K-2 (cont'd)

Buildings within 50 Feet of the NGT Project

State, Facility, County	Parcel ID	Building Type	Approximate Milepost	Distance from [a] Pipeline Centerline (feet)	Distance from [a] Edge of Workspace (feet)	Direction (Right or Left) [b]	Occupied (Yes/No) [c]	Proposed Mitigation Measures [d]	Residential Construction Plan Number
Mainline (cont'd)									
Stark	OH-ST-136.0005	Barn	32.3	87	47	Left	No	Safety Fence	HANO-P-8016_1A
Stark	OH-ST-136.0007/ OH-ST-136.0000	Barn	32.3	81	41	Left	No	Safety Fence	HANO-P-8016_1A
Stark	OH-ST-138.0000	Dwelling	32.6	95	35	Right	Yes	Safety Fence	HANO-P-8017_1A
Stark	OH-ST-138.0000	Barn	32.7	88	28	Right	No	Safety Fence	HANO-P-8017_1A
Stark	OH-ST-148.0000	Commercial Building	32.7	70	30	Left	Yes	Safety Fence	HANO-P-8018_1A
Stark	OH-ST-149.0001	Shed	32.8	114	29	Right	No	Safety Fence	HANO-P-8019_1A
Stark	OH-ST-149.0001	Shed	32.8	101	16	Right	No	Safety Fence	HANO-P-8019_1A
Stark	OH-ST-151.0001	Shed	32.8	128	43	Right	No	Safety Fence	HANO-P-8019_1A
Stark	OH-ST-153.0001	Garage	32.9	87	27	Right	No	Safety Fence	HANO-P-8019_1A
Stark	OH-ST-153.0001	Shed	32.9	103	43	Right	No	Safety Fence	HANO-P-8019_1A
Stark	OH-ST-153.0001	Shed	32.9	105	45	Right	No	Safety Fence	HANO-P-8019_1A
Stark	OH-ST-154.0000	Dwelling	32.9	69	29	Left	Yes	Safety Fence	HANO-P-8020_1A
Stark	OH-ST-155.0000	Dwelling	32.9	84	39	Left	Yes	Safety Fence	HANO-P-8020_1A
Stark	OH-ST-169.0000	Commercial Building	33.1	40	10	Left	Yes	Safety Fence	HANO-P-8021_1A
Stark	OH-ST-166.0000	Dwelling	33.2	84	24	Right	Yes	Safety Fence	HANO-P-8021_1A
Stark	OH-ST-172.0000	Commercial Building	33.2	41	12	Left	Yes	Safety Fence	HANO-P-8022_1A
Stark	OH-ST-174.0000	Dwelling	33.5 R	72	37	Right	Yes	Safety Fence	HANO-P-8023_1A
Summit	OH-SU-001.0000	Shed	34.3	169	34	Right	No	Safety Fence	HANO-P-8024_1A
Summit	OH-SU-006.0000/ OH-SU-007.0000	Shed	34.6	131	32	Left	No	Safety Fence	HANO-P-8025_1A
Summit	OH-SU-006.0000/ OH-SU-007.0000	Shed	34.6	136	43	Left	No	Safety Fence	HANO-P-8025_1A
Summit	OH-SU-013.0000	Dwelling	35	73	8	Left	Yes	Safety Fence	HANO-P-8026_1A
Summit	OH-SU-030.0000	Garage	36.7 R	54	11	Left	No	Safety Fence	HANO-P-8028_1A
Summit	OH-SU-029.0010	Dwelling	36.8 R	45	10	Right	Yes	Safety Fence	HANO-P-8028_1A
Summit	OH-SU-029.0010	Garage	36.8 R	55	12	Right	No	Safety Fence	HANO-P-8028_1A
Summit	OH-SU-030.0000	Dwelling	36.8 R	45	110	Left	Yes	Safety Fence	HANO-P-8028_1A
Summit	OH-SU-037.0000/ OH-SU-034.0000/ OH-SU-034.0001	Tanks	37.3	77	37	Left	No	Safety Fence	HANO-P-8029_1A
Summit	OH-SU-035.0000	Dwelling	37.3	95	35	Right	Yes	Safety Fence	HANO-P-8029_1A

APPENDIX K-2 (cont'd)

Buildings within 50 Feet of the NGT Project

State, Facility, County	Parcel ID	Building Type	Approximate Milepost	Distance from [a]		Direction (Right or Left) [b]	Occupied (Yes/No) [c]	Proposed Mitigation Measures [d]	Residential Construction Plan Number
				Pipeline Centerline (feet)	Edge of Workspace (feet)				
Mainline (cont'd)									
Summit	OH-SU-037.0000	Dwelling	37.3	82	37	Left	Yes	Safety Fence	HANO-P-8029_1A
Summit	OH-SU-041.0000	Dwelling	37.8	69	9	Right	Yes	Safety Fence	HANO-P-8030_1A
Summit	OH-SU-042.0000	Garage	37.8	81	30	Left	No	Safety Fence	HANO-P-8031_1A
Summit	OH-SU-042.0000	Dwelling	37.8	125	35	Left	Yes	Safety Fence	HANO-P-8031_1A
Summit	OH-SU-045.0000	Garage	37.9	67	Inside	Right	No	Safety Fence	HANO-P-8030_1A
Summit	OH-SU-044.0001	Dwelling	37.9	86	10	Left	Yes	Safety Fence	HANO-P-8031_1A
Summit	OH-SU-061.0000	Dwelling	39	158	48	Right	Yes	Safety Fence	HANO-P-8032_1B
Summit	OH-SU-061.0000	Garage	39	97	37	Right	No	Safety Fence	HANO-P-8032_1B
Summit	OH-SU-066.0000	Dwelling	39.6	101	41	Right	Yes	Safety Fence	HANO-P-8033_1A
Summit	OH-SU-069.0001	Dwelling	39.8 R	139	49	Left	Yes	Safety Fence	HANO-P-8034_1A
Summit	OH-SU-072.0510	Shed	40.1 R	68	18	Right	No	Safety Fence	HANO-P-8070_1A
Summit	OH-SU-072.0510	Shed	40.2 R	62	3	Right	No	Safety Fence	HANO-P-8070_1A
Summit	OH-SU-072.0510	Dwelling	40.2 R	83	23	Right	Yes	Safety Fence	HANO-P-8070_1A
Summit	OH-SU-078.0200	Dwelling	40.2 R	59	On Edge	Right	Yes	Safety Fence	HANO-P-8070_1A
Summit	OH-SU-078.0100	Garage	40.2 R	88	18	Left	No	Safety Fence	HANO-P-8071_1A
Summit	OH-SU-078.0100	Dwelling	40.2 R	61	21	Left	Yes	Safety Fence	HANO-P-8071_1A
Summit	OH-SU-081.0000	Shed	40.8 R	123	38	Right	No	Safety Fence	HANO-P-8072_1A
Summit	OH-SU-081.0000	Shed	40.8 R	119	34	Right	No	Safety Fence	HANO-P-8072_1A
Summit	OH-SU-083.0100	Dwelling	41.2 R	34	19	Left	Yes	Safety Fence	HANO-P-8036_1A
Summit	OH-SU-097.0000	Barn	42	128	43	Right	No	Safety Fence	HANO-P-8037_1A
Summit	OH-SU-097.0000	Barn	42.1	97	12	Right	No	Safety Fence	HANO-P-8037_1A
Summit	OH-SU-097.0000	Dwelling	42.1	107	34	Right	Yes	Safety Fence	HANO-P-8037_1A
Summit	OH-SU-099.0010	Dwelling	42.1	137	47	Left	Yes	Safety Fence	HANO-P-8038_1A
Summit	OH-SU-099.0010	Barn	42.1	136	46	Left	No	Safety Fence	HANO-P-8038_1A
Summit	OH-SU-110.0000	Dwelling	42.7	118	42	Right	Yes	Safety Fence	HANO-P-8039_1A
Summit	OH-SU-111.0000	Barn	42.8	123	38	Right	No	Safety Fence	HANO-P-8039_1A
Summit	OH-SU-132.0001	Garage	43.6 R	78	25	Right	No	Safety Fence	HANO-P-8074_1B
Summit	OH-SU-132.0001	Dwelling	43.6 R	73	20	Right	Yes	Safety Fence	HANO-P-8074_1B
Summit	OH-SU-135.0400	Barn	43.6 R	55	15	Left	No	Safety Fence	HANO-P-8073_1B
Summit	OH-SU-135.0400	Shed	43.6 R	65	25	Left	No	Safety Fence	HANO-P-8073_1B
Summit	OH-SU-132.0001	Barn	43.7 R	124	14	Right	No	Safety Fence	HANO-P-8074_1B
Summit	OH-SU-135.0300	Dwelling	43.7 R	63	23	Left	Yes	Safety Fence	HANO-P-8073_1B
Summit	OH-SU-133.0003	Garage	43.7 R	81	21	Right	No	Safety Fence	HANO-P-8074_1B
Summit	OH-SU-133.0003	Dwelling	43.7 R	65	30	Right	Yes	Safety Fence	HANO-P-8074_1B

APPENDIX K-2 (cont'd)

Buildings within 50 Feet of the NGT Project

				Distance from [a]					
State, Facility, County	Parcel ID	Building Type	Approximate Milepost	Pipeline Centerline (feet)	Edge of Workspace (feet)	Direction (Right or Left) [b]	Occupied (Yes/No) [c]	Proposed Mitigation Measures [d]	Residential Construction Plan Number
Mainline (cont'd)									
Summit	OH-SU-137.0010	Dwelling	44.4	106	46	Right	Yes	Safety Fence	HANO-P-8042_1B
Summit	OH-SU-137.0010	Barn	44.4	99	39	Right	No	Safety Fence	HANO-P-8042_1B
Summit	OH-SU-137.0010	Barn	44.4	83	23	Right	No	Safety Fence	HANO-P-8042_1B
Summit	OH-SU-145.0000	Dwelling	44.9	90	30	Right	Yes	Safety Fence	HANO-P-8043_1A
Summit	OH-SU-145.0000	Garage	45	102	42	Right	No	Safety Fence	HANO-P-8043_1A
Summit	OH-SU-149.0001	Barn	45.4	104	46	Right	No	Safety Fence	HANO-P-8045_1A
Summit	OH-SU-153.0000	Barn	45.6	83	48	Right	No	Safety Fence	HANO-P-8046_1A
Summit	OH-SU-157.0000	Dwelling	46.2	84	43	Left	Yes	Safety Fence	HANO-P-8047_1A
Summit	OH-SU-161.0000	Barn	46.4	76	16	Right	No	Safety Fence	HANO-P-8048_1A
Summit	OH-SU-189.0001	Barn	48.8	85	25	Right	No	Safety Fence	HANO-P-8049_1B
Summit	OH-SU-189.0001	Barn	48.8	101	17	Right	No	Safety Fence	HANO-P-8049_1B
Summit	OH-SU-191.0010	Dwelling	48.8	156	21	Right	Yes	Safety Fence	HANO-P-8049_1B
Summit	OH-SU-193.0010	Shed	49.3	76	14	Right	No	Safety Fence	HANO-P-8050_1A
Summit	OH-SU-193.0010	Dwelling	49.4	80	20	Right	Yes	Safety Fence	HANO-P-8050_1A
Summit	OH-SU-195.0000	Dwelling	49.4	79	44	Right	Yes	Safety Fence	HANO-P-8051_1A
Summit	OH-SU-195.0000	Garage	49.4	59	24	Right	No	Safety Fence	HANO-P-8051_1A
Summit	OH-SU-195.0000	Shed	49.4	59	24	Right	No	Safety Fence	HANO-P-8051_1A
Summit	OH-SU-195.0000	Barn	49.5	116	6	Right	No	Safety Fence	HANO-P-8051_1A
Summit	OH-SU-198.0006	Garage	49.8 R	83	23	Right	No	Safety Fence	HANO-P-8075_1A
Summit	OH-SU-198.0006	Barn	49.8 R	71	11	Right	No	Safety Fence	HANO-P-8075_1A
Summit	OH-SU-198.0009	Shed	49.8 R	82	22	Right	No	Safety Fence	HANO-P-8075_1A
Summit	OH-SU-199.0002	Dwelling	49.8 R	89	29	Right	Yes	Safety Fence	HANO-P-8075_1A
Summit	OH-SU-200.0001	Dwelling	49.9 R	80	20	Right	Yes	Safety Fence	HANO-P-8076_1A
Summit	OH-SU-203.0000	Barn	50.2	107	47	Right	No	Safety Fence	HANO-P-8052_1A
Summit	OH-SU-206.0001	Barn	50.3	80	20	Right	No	Safety Fence	HANO-P-8053_1B
Summit	OH-SU-206.0010	Shed	50.3	76	16	Right	No	Safety Fence	HANO-P-8053_1B
Summit	OH-SU-206.0000	Dwelling	50.3	92	43	Left	Yes	Safety Fence	HANO-P-8053_1B
Wayne	OH-WA-008.0000	Barn	51.4 R	91	26	Left	No	Safety Fence	HANO-P-8054_1A
Wayne	OH-WA-014.0001	Dwelling	52.0 R	88	23	Left	Yes	Safety Fence	HANO-P-8055_1B
Wayne	OH-WA-020.0000	Dwelling	52.9 R	114	24	Left	Yes	Safety Fence	HANO-P-8077_1A
Wayne	OH-WA-020.0000	Pool	52.9 R	81	Inside	Left	No	Safety Fence	HANO-P-8077_1A
Wayne	OH-WA-024.0010	Dwelling	53	139	49	Left	Yes	Safety Fence	HANO-P-8056_1A
Wayne	OH-WA-026.0002	Dwelling	53.3	74	34	Left	Yes	Safety Fence	HANO-P-8057_1A
Wayne	OH-WA-026.0006	Dwelling	53.3	84	44	Left	Yes	Safety Fence	HANO-P-8057_1A

APPENDIX K-2 (cont’d)

Buildings within 50 Feet of the NGT Project

State, Facility, County	Parcel ID	Building Type	Approximate Milepost	Distance from [a]		Direction (Right or Left) [b]	Occupied (Yes/No) [c]	Proposed Mitigation Measures [d]	Residential Construction Plan Number
				Pipeline Centerline (feet)	Edge of Workspace (feet)				
Mainline (cont’d)									
Wayne	OH-WA-026.0020	Garage	53.5	129	39	Left	No	Safety Fence	HANO-P-8058_1A
Wayne	OH-WA-030.0101	Barn	54	91	23	Left	No	Safety Fence	HANO-P-8059_1A
Wayne	OH-WA-030.0101	Dwelling	54	37	22	Left	Yes	Safety Fence	HANO-P-8059_1A
Wayne	OH-WA-030.0103	Dwelling	54	68	33	Right	Yes	Safety Fence	HANO-P-8059_1A
Wayne	OH-WA-033.0400	Barn	54.3 R	79	19	Right	No	Safety Fence	HANO-P-8078_1A
Wayne	OH-WA-046.0000	Commercial Building	55.7	85	25	Right	Yes	Safety Fence	HANO-P-8062_1A
Wayne	OH-WA-044.0000	Dwelling	55.7	55	15	Left	Yes	Safety Fence	HANO-P-8062_1A
Wayne	OH-WA-053.0000	Dwelling	56.5	87	27	Right	Yes	Safety Fence	HANO-P-8063_1A
Wayne	OH-WA-054.0000	Barn	56.5	106	41	Left	No	Safety Fence	HANO-P-8063_1A
Wayne	OH-WA-057.0004	Garage	57.2 R	42	27	Left	No	Safety Fence	HANO-P-8079_1A
Wayne	OH-WA-057.0200	Trailer	57.2 R	25	10	Left	No	Safety Fence	HANO-P-8079_1A
Wayne	OH-WA-057.0400	Dwelling	57.2 R	92	10	Right	Yes	Safety Fence	HANO-P-8079_1A
Wayne	OH-WA-057.0001	Commercial Building	57.4	113	33	Right	Yes	Safety Fence	HANO-P-8080_1A
Medina	OH-ME-018.0000	Dwelling	59.3	89	29	Right	Yes	Safety Fence	HANO-P-8081_1A
Medina	OH-ME-071.0000	Animal Pen	65.4	102	17	Right	No	Safety Fence	WADS-P-8001_1A
Medina	OH-ME-071.0000	Barn	65.4	125	40	Right	No	Safety Fence	WADS-P-8001_1A
Medina	OH-ME-100.0000	Barn	68	61	21	Left	No	Safety Fence	WADS-P-8002_1A
Medina	OH-ME-107.0000	Dwelling	68.3	37	2	Right	Yes	Safety Fence	WADS-P-8004_1A
Medina	OH-ME-107.0000	Garage	68.3	75	40	Right	No	Safety Fence	WADS-P-8004_1A
Medina	OH-ME-108.0000	Shed	68.3	80	45	Right	No	Safety Fence	WADS-P-8004_1A
Medina	OH-ME-111.0002	Shed	68.3	36	21	Left	No	Safety Fence	WADS-P-8003_1A
Medina	OH-ME-112.0001	Shed	68.4	119	25	Left	No	Safety Fence	WADS-P-8003_1A
Medina	OH-ME-116.0000	Barn	68.8	43	3	Left	No	Safety Fence	WADS-P-8005_1A
Medina	OH-ME-116.0000	Commercial Building	68.8	140	44	Left	Yes	Safety Fence	WADS-P-8005_1A
Medina	OH-ME-122.0400	Dwelling	69.3 R	105	40	Left	Yes	Safety Fence	WADS-P-8050_1A
Medina	OH-ME-130.0060	Shed	69.4 R	42	7	Right	No	Safety Fence	WADS-P-8050_1A
Medina	OH-ME-144.0010	Dwelling	71.9	153	18	Right	Yes	Safety Fence	WADS-P-8007_1A
Medina	OH-ME-147.0000	Barn	71.9	91	6	Right	No	Safety Fence	WADS-P-8007_1A
Medina	OH-ME-147.0000	Barn	72	90	5	Right	No	Safety Fence	WADS-P-8007_1A
Medina	OH-ME-150.0000	Barn	72.6	78	18	Right	No	Safety Fence	WADS-P-8008_1A
Medina	OH-ME-149.0000	Dwelling	72.6	102	33	Left	Yes	Safety Fence	WADS-P-8009_1A

APPENDIX K-2 (cont'd)

Buildings within 50 Feet of the NGT Project

State, Facility, County	Parcel ID	Building Type	Approximate Milepost	Distance from [a] Pipeline Centerline (feet)	Distance from [a] Edge of Workspace (feet)	Direction (Right or Left) [b]	Occupied (Yes/No) [c]	Proposed Mitigation Measures [d]	Residential Construction Plan Number
Mainline (cont'd)									
Medina	OH-ME-150.0000	Garage	72.6	70	10	Right	No	Safety Fence	WADS-P-8008_1A
Medina	OH-ME-149.0000	Barn	72.6	86	46	Left	No	Safety Fence	WADS-P-8009_1A
Medina	OH-ME-151.0000	Barn	72.6	43	8	Right	No	Safety Fence	WADS-P-8008_1A
Medina	OH-ME-153.0000	Garage	72.7	90	50	Left	No	Safety Fence	WADS-P-8009_1A
Medina	OH-ME-153.0000	Barn	72.7	88	50	Left	No	Safety Fence	WADS-P-8009_1A
Medina	OH-ME-153.0000	Barn	72.7	50	10	Left	No	Safety Fence	WADS-P-8009_1A
Medina	OH-ME-153.0000	Barn	72.7	74	48	Left	No	Safety Fence	WADS-P-8009_1A
Medina	OH-ME-153.0000	Shed	72.7	60	20	Left	No	Safety Fence	WADS-P-8009_1A
Medina	OH-ME-161.0000	Shed	73.6	153	18	Right	No	Safety Fence	WADS-P-8010_1A
Medina	OH-ME-165.0000	Garage	73.9	84	24	Right	No	Safety Fence	WADS-P-8011_1A
Medina	OH-ME-165.0000	Shed	73.9	29	Inside	Right	No	Safety Fence	WADS-P-8011_1A
Medina	OH-ME-165.0000	Barn	73.9	46	Inside	Right	No	Safety Fence	WADS-P-8011_1A
Medina	OH-ME-181.0010	Dwelling	76.4	148	38	Right	Yes	Safety Fence	WADS-P-8012_1A
Lorain	OH-LO-002.0000	Grain Bin	81	109	49	Right	No	Safety Fence	WADS-P-8013_1A
Lorain	OH-LO-002.0000	Shed	81	93	33	Right	No	Safety Fence	WADS-P-8013_1A
Lorain	OH-LO-015.0000	Dwelling	82.6	90	30	Right	Yes	Safety Fence	WADS-P-8014_1A
Lorain	OH-LO-023.0000	Wood Deck	83.9	60	20	Left	No	Safety Fence	WADS-P-8015_1A
Lorain	OH-LO-027.0000	Barn	84.6	132	50	Right	No	Safety Fence	WADS-P-8016_1A
Lorain	OH-LO-031.0001	Barn	84.8	129	44	Right	No	Safety Fence	WADS-P-8017_1A
Lorain	OH-LO-031.0001	Barn	84.8	122	37	Right	No	Safety Fence	WADS-P-8017_1A
Lorain	OH-LO-050.0000	Shed	88	65	25	Left	No	Safety Fence	WADS-P-8018_1A
Lorain	OH-LO-060.0000	Dwelling	89.2	152	42	Right	Yes	Safety Fence	WADS-P-8019_1B
Lorain	OH-LO-065.0110	Shed	90.4 R	83	23	Right	No	Safety Fence	WADS-P-8047_1A
Lorain	OH-LO-083.0000	Shed	93.4	59	Inside	Right	No	Safety Fence	WADS-P-8020_1A
Lorain	OH-LO-083.0000	Shed	93.4	78	Inside	Right	No	Safety Fence	WADS-P-8020_1A
Lorain	OH-LO-083.0000	Shed	93.5	48	Inside	Right	No	Safety Fence	WADS-P-8020_1A
Lorain	OH-LO-086.000/ OH-LO-087.0000	Barn	94.5	75	35	Left	No	Safety Fence	WADS-P-8021_1A
Lorain	OH-LO-086.000/ OH-LO-087.0000	Commercial Building	94.6	79	39	Left	Yes	Safety Fence	WADS-P-8021_1A
Lorain	OH-LO-086.000/ OH-LO-087.0000	Dwelling	94.6	62	22	Left	Yes	Safety Fence	WADS-P-8021_1A
Lorain	OH-LO-090.0000	Dwelling	94.6	84	24	Right	Yes	Safety Fence	WADS-P-8022_1A
Lorain	OH-LO-090.0000	Gazebo	94.6	71	11	Right	No	Safety Fence	WADS-P-8022_1A

APPENDIX K-2 (cont'd)

Buildings within 50 Feet of the NGT Project

State, Facility, County	Parcel ID	Building Type	Approximate Milepost	Distance from [a] Pipeline Centerline (feet)	Distance from [a] Edge of Workspace (feet)	Direction (Right or Left) [b]	Occupied (Yes/No) [c]	Proposed Mitigation Measures [d]	Residential Construction Plan Number
Mainline (cont'd)									
Lorain	OH-LO-090.0000	Shed	94.7	102	43	Right	No	Safety Fence	WADS-P-8022_1A
Lorain	OH-LO-092.0002	Shed	94.8	67	27	Left	No	Safety Fence	WADS-P-8023_1A
Lorain	OH-LO-092.0003	Shed	94.9	65	25	Left	No	Safety Fence	WADS-P-8023_1A
Lorain	OH-LO-092.0004	Shed	94.9	62	22	Left	No	Safety Fence	WADS-P-8023_1A
Lorain	OH-LO-092.0007	Shed	94.9	68	28	Left	No	Safety Fence	WADS-P-8023_1A
Lorain	OH-LO-092.0008	Shed	94.9	73	33	Left	No	Safety Fence	WADS-P-8023_1A
Lorain	OH-LO-093.0006	Shed	95.1	78	38	Left	No	Safety Fence	WADS-P-8024_1A
Lorain	OH-LO-093.0007	Shed	95.1	79	39	Left	No	Safety Fence	WADS-P-8024_1A
Lorain	OH-LO-093.0009	Shed	95.1	69	29	Left	No	Safety Fence	WADS-P-8024_1A
Lorain	OH-LO-096.0000/ OH-LO-096.0001	Shed	95.7	45	5	Left	No	Safety Fence	WADS-P-8025_1A
Lorain	OH-LO-107.0002	Garage	96.8	106	46	Right	No	Safety Fence	WADS-P-8026_1A
Lorain	OH-LO-115.0100	Dwelling	98.5 R	98	38	Right	Yes	Safety Fence	WADS-P-8049_1A
Lorain	OH-LO-115.0100	Garage	98.5 R	76	16	Right	No	Safety Fence	WADS-P-8049_1A
Lorain	OH-LO-122.0000	Barn	99.2 R	88	11	Right	No	Safety Fence	WADS-P-8029_1A
Lorain	OH-LO-128.0000	Barn	100.5	87	47	Left	No	Safety Fence	WADS-P-8030_1A
Erie	OH-ER-059.0100	Dwelling	112.1 R	131	41	Left	Yes	Safety Fence	WADS-P-8048_1A
Erie	OH-ER-059.0100	Dwelling	112.1 R	65	19	Left	Yes	Safety Fence	WADS-P-8048_1A
Erie	OH-ER-063.0000	Barn	113.1	143	28	Left	No	Safety Fence	WADS-P-8032_1A
Erie	OH-ER-063.0000	Barn	113.1 R	164	49	Left	No	Safety Fence	WADS-P-8032_1A
Erie	OH-ER-078.0000	Shed	115.9 R	94	9	Right	No	Safety Fence	WADS-P-8033_1B
Erie	OH-ER-078.0000	Barn	115.9 R	179	44	Right	No	Safety Fence	WADS-P-8033_1B
Erie	OH-ER-078.0000	Barn	116.0 R	34	Inside	Right	No	Safety Fence	WADS-P-8033_1B
Erie	OH-ER-078.0000	Barn	116.0 R	66	Inside	Right	No	Safety Fence	WADS-P-8033_1A
Erie	OH-ER-094.0000	Commercial Building	118.1	140	30	Right	Yes	Safety Fence	WADS-P-8034_1B
Erie	OH-ER-097.0000	Barn	118.5	34	Inside	Right	No	Safety Fence	WADS-P-8035_1A
Erie	OH-ER-099.0000	Garage	119.2	157	42	Left	No	Safety Fence	WADS-P-8036_1A
Erie	OH-ER-135.0000	Shed	125.8	77	17	Right	No	Safety Fence	WADS-P-8037_1A
Erie	OH-ER-135.0001	Dwelling	125.8	131	32	Right	Yes	Safety Fence	WADS-P-8037_1A
Erie	OH-ER-136.0000	Dwelling	125.8	74	34	Left	Yes	Safety Fence	WADS-P-8038_1A
Erie	OH-ER-139.0000	Barn	125.8	62	2	Right	No	Safety Fence	WADS-P-8039_1A
Erie	OH-ER-139.0000	Barn	125.9	99	5	Right	No	Safety Fence	WADS-P-8039_1A
Erie	OH-ER-152.0001	Dwelling	127.7	107	22	Right	Yes	Safety Fence	WADS-P-8040_1A

APPENDIX K-2 (cont'd)

Buildings within 50 Feet of the NGT Project

State, Facility, County	Parcel ID	Building Type	Approximate Milepost	Distance from [a] Pipeline Centerline (feet)	Distance from [a] Edge of Workspace (feet)	Direction (Right or Left) [b]	Occupied (Yes/No) [c]	Proposed Mitigation Measures [d]	Residential Construction Plan Number
Mainline (cont'd)									
Erie	OH-ER-152.0010	Dwelling	127.7	160	48	Left	Yes	Safety Fence	WADS-P-8041_1A
Erie	OH-ER-152.0001	Pool	127.7	126	41	Right	No	Safety Fence	WADS-P-8040_1A
Erie	OH-ER-152.0000	Shed	127.7	103	18	Right	No	Safety Fence	WADS-P-8040_1A
Erie	OH-ER-160.0010	Barn	128.9	175	30	Right	No	Safety Fence	WADS-P-8042_1A
Erie	OH-ER-160.0010	Silo	128.9	383	24	Right	No	Safety Fence	WADS-P-8042_1A
Sandusky	OH-SA-014.0000	Dwelling	133.5	73	33	Left	Yes	Safety Fence	WADS-P-8043_1A
Sandusky	OH-SA-085.0000	Barn	145.2	109	29	Left	No	Safety Fence	CLYD-P-8001_1B
Sandusky	OH-SA-120.0010	Barn	150.2	110	25	Right	No	Safety Fence	CLYD-P-8003_1B
Sandusky	OH-SA-120.0010	Shed	150.2	86	On Edge	Right	No	Safety Fence	CLYD-P-8003_1B
Sandusky	OH-SA-120-0010	Dwelling	150.2	132	47	Right	Yes	Safety Fence	CLYD-P-8003_1B
Sandusky	OH-SA-120.0010	Shed	150.2	127	42	Right	No	Safety Fence	CLYD-P-8003_1B
Sandusky	OH-SA-156.0002	Shed	155.1	113	20	Right	No	Safety Fence	CLYD-P-8004_1B
Sandusky	OH-SA-159.0030	Barn	155.9	98	12	Right	No	Safety Fence	CLYD-P-8006_1B
Sandusky	OH-SA-159.0020	Dwelling	155.9	134	44	Left	No	Safety Fence	CLYD-P-8005_1B
Sandusky	OH-SA-159.0020	Dwelling	155.9	107	17	Left	Yes	Safety Fence	CLYD-P-8005_1B
Sandusky	OH-SA-159.0020	Shed	155.9	116	26	Left	No	Safety Fence	CLYD-P-8005_1B
Sandusky	OH-SA-170.0000	Dwelling	157.7	169	34	Right	Yes	Safety Fence	CLYD-P-8008_1B
Sandusky	OH-SA-217.0010	Dwelling	163.7	101	15	Right	Yes	Safety Fence	CLYD-P-8009_1A
Wood	OH-WO-028.0001	Garage	167.2	153	43	Right	No	Safety Fence	CLYD-P-8010_1B
Wood	OH-WO-048.0000	Barn	170.7	118	37	Right	No	Safety Fence	CLYD-P-8011_1A
Wood	OH-WO-048.0000	Shed	170.7	111	49	Right	No	Safety Fence	CLYD-P-8011_1A
Lucas	OH-LC-055.0003	Shed	187.9	84	24	Right	No	Safety Fence	WATE-P-8001_1A
Henry	OH-HY-001.0000	Barn	189.3	97	29	Left	No	Safety Fence	WATE-P-8002_1A
Fulton	OH-FU-014.0030	Shed	193.5	36	Inside	Right	No	Safety Fence	WATE-P-8003_1A
Fulton	OH-FU-014.0030	Shed	193.5	42	Inside	Right	No	Safety Fence	WATE-P-8003_1A
Fulton	OH-FU-014.0030	Shed	193.5	39	Inside	Right	No	Safety Fence	WATE-P-8003_1A
Fulton	OH-FU-015.0001	Garage	193.8	159	45	Left	No	Safety Fence	WATE-P-8005_1B
Fulton	OH-FU-015.0001	Dwelling	193.8	144	17	Left	Yes	Safety Fence	WATE-P-8005_1B
Fulton	OH-FU-015.0000	Barn	193.8	162	27	Right	No	Safety Fence	WATE-P-8004_1B
Fulton	OH-FU-019.0000	Barn	194.8	117	32	Left	No	Safety Fence	WATE-P-8006_1A
MICHIGAN									
Monroe	MI-MR-019.0000	Barn	232.4	65	25	Left	No	Safety Fence	WATE-P-8007_1A
Monroe	MI-MR-019.0001	Dwelling	232.4	165	50	Left	Yes	Safety Fence	WATE-P-8007_1A
Monroe	MI-MR-028.0000	Shed	233.1	105	45	Right	No	Safety Fence	WATE-P-8008_1B

APPENDIX K-2 (cont'd)

Buildings within 50 Feet of the NGT Project

State, Facility, County	Parcel ID	Building Type	Approximate Milepost	Distance from [a]		Direction (Right or Left) [b]	Occupied (Yes/No) [c]	Proposed Mitigation Measures [d]	Residential Construction Plan Number
				Pipeline Centerline (feet)	Edge of Workspace (feet)				
MICHIGAN (cont'd)									
Washtenaw	MI-WA-027.0000	Barn	241.1	55	14	Left	No	Safety Fence	WATE-P-8010_1B
Washtenaw	MI-WA-030.0001	Shed	241.6	77	37	Left	No	Safety Fence	WATE-P-8011_1A
Washtenaw	MI-WA-035.0000	Barn	242.4	93	8	Right	No	Safety Fence	WATE-P-8012_1A
Washtenaw	MI-WA-069.0001	Shed	247.5	134	49	Right	No	Safety Fence	WATE-P-8013_1A
Washtenaw	MI-WA-074.0000	Shed	247.9	100	15	Right	No	Safety Fence	WATE-P-8014_1A
Washtenaw	MI-WA-075.0010	Dwelling	247.9	123	44	Left	Yes	Safety Fence	WATE-P-8015_1A
Washtenaw	MI-WA-106.0000	Commercial Building	250.2	62	1	Right	Yes	Safety Fence	WATE-P-8016_1B
Washtenaw	MI-WA-118.0000	Dwelling	252	77	37	Left	Yes	Safety Fence	WATE-P-8017_1B
Washtenaw	MI-WA-118.0000	Shed	252	41	On Edge	Left	No	Safety Fence	WATE-P-8017_1B
Washtenaw	MI-WA-119.0010	Dwelling	252	66	26	Left	Yes	Safety Fence	WATE-P-8017_1B
Washtenaw	MI-WA-119.0010	Shed	252.1	29	Inside	Left	No	Safety Fence	WATE-P-8017_1B
Washtenaw	MI-WA-119.0020	Shed	252.1	39	On Edge	Left	No	Safety Fence	WATE-P-8017_1B
Washtenaw	MI-WA-119.0020	Shed	252.1	90	50	Left	No	Safety Fence	WATE-P-8017_1B
Washtenaw	MI-WA-120.0000	Commercial Building	252.2	66	31	Right	Yes	Safety Fence	WATE-P-8018_1A
Washtenaw	MI-WA-123.0001	Commercial Building	252.2	172	45	Right	No	Safety Fence	WATE-P-8018_1A
Washtenaw	MI-WA-141.1300	Commercial Building	254.9 R	40	6	Left	No	Safety Fence	WATE-P-8027_1A
Washtenaw	MI-WA-141.1300	Commercial Building	254.9 R	Crossed	Inside	Left	No	Safety Fence	WATE-P-8027_1A

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[a] Distances are approximate and derived from aerial photography and LIDAR data (where survey is not available).

[b] Direction "right" and "left" are from the perspective of an observer starting at milepost 0.0 of the proposed pipeline centerline.

[c] See site-specific residential construction plans for workspace configuration and mitigation (e.g., placement of safety fencing).

[d] Occupancy status determined based on DOT/Non-DOT structure classification.

APPENDIX K-3

PLANNED DEVELOPMENTS NEAR THE NGT PROJECT

APPENDIX K-3

Planned Developments Near the NGT Project

State, Name of Planned Development	Description	Approximate Milepost	Location and Proximity to NGT Project	Status
OHIO				
Private Residential	Pond recently installed on property.	1.0 to 1.3	The pond is within the study corridor and approximately 89 feet NW of the 100-foot temporary right-of-way corridor and will be approximately 1 acre in size. The project borders Railroad Street/Hwy 644 to the north. The exact location of the proposed pond is unknown, but from the southern property boundary bordering Railroad Street/Hwy 644 to pipeline centerline is approximately 1,883.9 feet and from the northern property boundary line it is approximately 723.5 feet.	Plans have not been filed.
Dehoff Agency Inc.	Residential development.	32.7	Multiple properties bordering Dotwood Street to the south.	Plans have not been filed.
Whitetail Properties, Inc.	Residential development.	33.0	Multiple properties bordering Wright Road.	Plans have not been filed.
Dutch Heritage Homes, Inc.	Residential development.	33.0	Multiple properties bordering Wright Road.	Plans have not been filed.
Private Residential	Plans have been approved for construction of a pole barn, pond, and bridge. Landowner has future plans to construct a residence; these plans have not been approved.	34.0	Parcel borders Cain Street to the northwest; centerline crosses through this property.	Plan approved by Stark County for pole barn, pond, and bridge. Construction schedule unknown.
Brienza Park	Commercial development.	34.4	Parcel is located approximately 3,080 feet south of the construction workspace.	Status unknown
Ariss Park Master Plan	Public park	35.4	Undetermined	Status unknown
Wise's Mayfair Allotment	Residential development.	35.4	Parcel is located approximately 1,100 feet southeast of the construction workspace.	Status unknown
Park Place	Commercial development.	35.6 to 36.0	Undetermined	Status unknown
Portage Lakes Career Center	Commercial development.	36.0	Parcel is approximately 1.2 mile northwest of MP 36.0 R.	Status unknown
Green Vertical Properties LLC	Commercial development. According to Green Vertical Properties LLC, future development plans are confidential.	36.0	Parcel is approximately 0.3 mile southwest of MP 36.0R.	Will not provide copies of plans; unknown if plans have been filed.
Greensburg Heights Allotment	Residential development.	36.3	Parcel is approximately 710 feet west of construction workspace.	Status unknown

APPENDIX K-3 (cont'd)

Planned Developments Near the NGT Project

State, Name of Planned Development	Description	Approximate Milepost	Location and Proximity to NGT Project	Status
OHIO (cont'd)				
NCT Development Corporation	Commercial development. NCT Development Corporation plans to expand its facility by the end of 2017.	36.4	Parcel is approximately 0.4 mile southwest of MP 36.4 R.	Status unknown
Green Meadows Estates	Residential development.	37.0	Parcel is approximately 2,775 feet west of construction workspace.	Status unknown
Akron-Canton Airport Runway Protection Zone	Commercial development.	37.0	Parcel is approximately 1,070 feet east of construction workspace.	Status unknown
Summit County sheriff training facility	Summit County Sheriff plans to construct a training facility (including a firing range) at this location.	37.0	Parcel is adjacent to and east of construction workspace.	Status unknown
Greensburg Woodlands	Residential development.	37.8	Parcel is approximately 3,225 feet northwest of construction workspace.	Status unknown
Hidden Trail Estates	Residential development.	39.3	Undetermined	Status unknown
Sanctuary At Stoney Creek	Residential development.	39.4	Parcel is approximately 760 feet east of construction workspace.	Status unknown
High Tower Estates	Residential development.	39.5	Parcel is approximately 4,200 feet north of construction workspace.	Status unknown
Mirror Lake Allotment	Residential development.	39.5	Parcel is approximately 4,150 feet north of construction workspace.	Status unknown
Rabl Subdivision	Residential development.	39.5	Parcel is approximately 1,300 feet north of construction workspace.	Status unknown
Springview Estates	Residential development.	39.5	Parcel is approximately 1,750 feet northeast of construction workspace.	Status unknown
Stoney Creek Estates (and future phases)	Residential development.	39.5	Parcel is approximately 760 feet east of construction workspace.	Status unknown
Lake Breeze Allotment	Residential development.	39.5	Parcel is approximately 1,050 feet north of construction workspace.	Status unknown
Forest Lake Estates	Residential development.	39.8	Parcel is approximately 357 feet south of construction workspace.	Status unknown
Commercial	Loyola of the Lakes Jesuit Retreat House	41.0	Parcel is approximately 1,998 feet northwest of construction workspace.	Status unknown
Comet Lake Club	Residential development.	41.5	Parcel is approximately 1,749 feet north of construction workspace.	Status unknown

APPENDIX K-3 (cont'd)

Planned Developments Near the NGT Project

State, Name of Planned Development	Description	Approximate Milepost	Location and Proximity to NGT Project	Status
OHIO (cont'd)				
Woods at Silver Creek Ltd.	Residential development. Township has approved 65 allotments for future development.	53.3	Parcel is northwest of MP 53.3 on Akron Road and Gates Street.	Allotments approved since 2003. A map has been filed with Wayne County. Construction schedule unknown.
AR Lockhart Development	Shopping center, apartment complex, and residential development. Plans contingent upon developer installing sewage line. Plans have been filed with county but zoning is pending.	54.0	Undetermined	Plans filed. Construction schedule unknown.
Private Residential	Plans to build residence.	54.2	Undetermined	Plans have not been filed.
Private Residential	Plans to develop land.	54.9	Undetermined	Plans have not been filed.
City of Wadsworth Airport Expansion	Airport expansion plans are from 2008.	57.5	Parcel is approximately 500 feet north of the proposed permanent easement.	Status unknown
Private	Mining of peat moss on property.	59.0	Undetermined	Current.
Damar Valley LLC	Residential subdivision development.	59.0	Undetermined	Plans have not been filed.
Private Residential	Plans to build residence and barn on property.	59.3	Undetermined	Plans have not been filed.
Private Residential	Operating orchard on property. Plans to further develop with additional trees.	59.5	Undetermined	Plans have not been filed.
Gatliff Building Company	Plans to build residential home on lot.	61.3	Undetermined	Plans have not been filed.
Private Residential	Potential plans to build residences on properties.	62.8	Undetermined	Plans have not been filed.
Private Residential	Plans to subdivide property along road frontage on Blake and Guilford Roads.	64.0	Undetermined	Plans have not been filed.
Private Residential	Plans to subdivide lot (MP 65).	65.8	Undetermined	Plans have not been filed.
Private Residential	Plans to build sewage line and associated pump.	68.3	Undetermined	Plans have not been filed.
VGL Properties LLC	Development related to outdoor public attractions. Plans involve construction of driveways, trails, dirt moving/excavating, and construction of small structures, paintball course, and hay ride trails.	68.8	Undetermined	In process of obtaining permits. Construction schedule unknown.

APPENDIX K-3 (cont'd)

Planned Developments Near the NGT Project

State, Name of Planned Development	Description	Approximate Milepost	Location and Proximity to NGT Project	Status
OHIO (cont'd)				
Medina County Parks	Plans to develop an extension to an existing biking/running trail.	68.9	Undetermined	Plans have not been filed.
Board of County Commissioners of Medina County	No details provided.	70.0	Undetermined	Plans have not been filed.
Medina County Park District	Medina County Parks Department is planning on developing mitigated wetland on tract. Parks Department owns additional tracts near this location that have been developed into mitigated wetlands. Subsequent to development of mitigated wetlands on a tract, the Parks Department historically enters into an environmental covenant with the ODNR.	70.5	Undetermined	Plans have not been filed.
Western Land Conservancy	Conservancy recently purchased this parcel to protect land from development.	95.4	Undetermined	Plans have not been filed.
Western Land Conservancy	Conservancy recently purchased this parcel to protect land from development.	95.4 to 95.5	Undetermined	Plans have not been filed.
Private Residential	Plans to subplot properties for additional residential structures.	111.5 to 111.7	Undetermined	Plans have not been filed.
Private Residential	Plans to build residential structure directly behind existing residence.	112.1	Undetermined	Plans have not been filed.
Private Residential	Plans to build residence.	112.3	NEXUS has not been able to connect with landowner. Distance and direction from Project unknown	Plans have not been filed.
Board of County Commissioners of Erie County	Future plans to use property for land mining. Dirt will be removed and used to cover county landfills.	119.0	Parcel is approximately 290 feet north of construction workspace.	Plans have not been filed.
Avery Commerce Park, LLC	Plans for commercial park to be updated and/or renovated.	119.7	Undetermined	Plans have not been filed.
State of Ohio and Sandusky County	State and county have plans to build a new intersection from 53, about 800 feet south of proposed pipeline route. New intersection at turnpike would intersect the proposed pipeline route.	146.2	Located at the intersection of County Road 53 and the turnpike, just south of the proposed pipeline route.	Possibly start construction in 2016.
Gun range	Plans to sell property to the City of Bowling Green; not currently in negotiations. Pipeline route intersects gun range on this property.	178.5	Undetermined	Plans have not been filed. Gun range is operational.

APPENDIX K-3 (cont'd)

Planned Developments Near the NGT Project

State, Name of Planned Development	Description	Approximate Milepost	Location and Proximity to NGT Project	Status
OHIO (cont'd)				
Commercial	City of Bowling Green has purchased this property with initial plan to lease as farm land. Future plans may include building a substation or water reservoir.	178.6	Undetermined	Plans have not been filed.
Browning Masonic Community Inc.	Masonic lodge plans to build a retirement community with housing and other facilities on the property	182.0	West of County Road 53.	Pre-filing stage.
Noward Road Rebuild; Waterville Township and Lucas County	Planning to rebuild this stretch of road.	183.1	Located in Lucas County, Waterville Township; Township Rd 137 (Noward) between Highway 64 and Neopolis Waterville Rd.	Plans are firm. Rebuild to start in spring 2017.
MICHIGAN				
Crescent Hills Associates, LLC	Residential development. Subdivision expansion; planned subdivision would take up the entire parcel. There are currently two existing utility lines on this parcel.	236.7	Undetermined	Plans have not been filed.
Undetermined	An easterly expansion of the subdivision on the property to the west across this parcel of land.	244.6	Undetermined	Plans were filed around 2004 but have not been approved to date. Tentatively breaking ground on road construction in spring 2016.
Undetermined	Current: Disc golf course. Future plans to build an apartment complex and restaurant along the lake, service station near north east side of property with restaurants.	251.2	The new apartments and restaurant will be along the lake where temporary workspace is located (west of centerline). New gas station will be built at the intersection of Bridge Road and Southgrove Street.	Plans filed with Ypsilanti Township.
Racer Properties, LLC	Remediation site with ground contamination; communications with different interested parties regarding future developmental plans but no firm commitments have been shared. Future development is scheduled for entire tract; type of development will determine how much space is used. Could be several simultaneous projects on this property.	253.4R	Undetermined	Plans have not been filed.

APPENDIX K-4

KNOWN FSA-ENROLLED LANDS CROSSED BY THE NGT PROJECT

APPENDIX K-4

Known FSA-Enrolled Lands Crossed by the NGT Project Mainline

State, Tract Number	Milepost Start	Milepost End	Acres Affected	
			Construction [a]	Operation [b]
OHIO				
OH-CO-059.0000 OH-CO-059.0000-AB.05	6.4	6.9	9.2	2.7
OH-CO-059.0100-AB.05	6.4	6.9	1.0	0.5
OH-CO-073.0000 OH-CO-073.0000-TAR-7	8.1	8.2	0.2	1.0
OH-CO-080.0000	9.5	9.9	8.0	3.0
OH-CO-082.0000	10.0	10.0	1.5	0.5
OH-CO-108.0000	11.8	11.9	0.9	0.4
OH-SU-150.0000	45.3	45.5	1.9	0.7
OH-SU-177.0000	48.0	48.1	0.0	1.0
OH-ME-097.0000	67.9	67.9	0.1	0.0
OH-ME-173.0000	75.4	75.5	2.7	0.7
OH-LO-026.0000	83.9	84.4	7.4	2.8
OH-LO-039.0000	86.4	86.5	2.5	0.9
OH-LO-040.0000	86.5	86.7	1.7	1.2
OH-LO-071.0010	90.6	90.6	0.0	0.0
OH-LO-076.0000 OH-LO-076.0000-TAR-7-92.5	92.4	92.7	5.9	1.9
OH-LO-077.0000	92.7	92.8	1.8	0.7
OH-ER-005.0000	105.5	105.9	6.8	2.4
OH-ER-007.0000	105.9	105.9	0.9	0.2
OH-ER-008.0000	105.9	106.1	2.6	0.9
OH-ER-008.0000	116.9	117.1	0.1	1.3
OH-ER-089.0000	117.1	117.2	0.0	0.5
OH-ER-091.0000 OH-ER-091.0000-TAR-7-117.6 c	117.1	117.7	11.0	2.7
OH-ER-097.0000	118.4	118.7	4.2	1.8
OH-ER-098.0000	118.7	118.8	2.0	0.6
OH-ER-111.0000	120.4	120.8	8.0	2.7
OH-ER-114.0000	121.3	121.6	5.1	2.0
OH-ER-142.0000	126.1	126.1	1.7	0.4
OH-SA-012.0000 OH-SA-012.0000-TAR-1	133.1	133.4	7.8	1.5
OH-SA-032.0000	137.9	138.0	2.4	0.9
OH-SA-045.0000	139.6	139.8	2.9	0.9
OH-SA-056.0000	141.3	141.6	5.7	2.0
OH-SA-081.0000 OH-SA-081.0000-AB-1	144.9	145.2	10.4	3.0
OH-SA-092.0000	146.0	146.2	2.6	1.0
OH-SA-109.0000	148.1	148.2	1.7	0.4
OH-SA-110.0000 OH-SA-110.0000-PAR	148.2	148.3	1.0	0.4
OH-SA-116.0000	149.4	149.6	4.8	1.6
OH-SA-120.0000	150.0	150.3	4.0	1.5
OH-SA-132.0000	151.7	151.8	1.6	0.6
OH-SA-134.0000	151.9	152.2	6.0	2.3
OH-SA-135.0000	152.2	152.5	2.8	1.3
OH-SA-151.0000	154.6	154.7	2.7	0.9

APPENDIX K-4 (cont'd)

Known FSA-Enrolled Lands Crossed by the NGT Project Mainline

			Acres Affected	
State, Tract Number	Milepost Start	Milepost End	Construction [a]	Operation [b]
OHIO (cont'd)				
OH-SA-164.0000	156.6	156.9	5.2	1.9
OH-SA-168.0000	157.4	157.6	3.1	1.6
OH-SA-170.0000	157.6	157.7	1.0	0.3
OH-SA-171.0000	157.7	157.9	4.3	1.2
OH-SA-177.0000	158.9	159.0	1.2	0.4
OH-SA-179.0000	159.0	159.2	1.8	1.1
OH-SA-180.0000	159.2	159.4	4.3	1.5
OH-SA-181.0000	159.4	159.4	0.5	0.1
OH-SA-184.0000	159.6	159.7	1.9	0.8
OH-SA-192.0000	160.8	161.1	4.4	1.6
OH-SA-194.0000	161.1	161.4	4.6	1.7
OH-SA-207.0000	162.6	162.8	6.1	2.0
OH-WO-011.0000	165.0	165.1	1.1	0.5
OH-WO-015.0000 OH-WO-015.0000-TAR-2	165.4	165.6	5.2	1.2
OH-WO-016.0000	165.6	165.7	2.2	0.6
OH-WO-017.0000	165.7	165.8	1.7	0.8
OH-WO-026.0000	166.8	167.2	6.8	2.2
OH-WO-029.0010	167.4	167.4	0.1	0.0
OH-WO-037.0000	168.3	168.4	2.1	0.6
OH-WO-039.0000	168.4	168.4	1.5	0.4
OH-WO-047.0000	170.4	170.7	4.4	1.6
OH-WO-049.0000 OH-WO-049.0000-MLV	170.7	170.8	1.8	0.7
OH-WO-051.0000	170.8	170.9	1.2	0.4
OH-WO-057.0000	171.4	171.7	1.9	1.1
OH-WO-059.0000	171.7	171.8	1.1	0.4
OH-WO-060.0000	171.8	171.8	0.6	0.2
OH-WO-062.0000	171.9	172.0	1.1	0.4
OH-WO-063.0000	172.0	172.2	2.3	0.9
OH-WO-064.0000	172.2	172.2	1.1	0.5
OH-WO-065.0000	172.2	172.3	1.2	0.5
OH-WO-071.0000	172.8	172.9	1.2	0.5
OH-WO-072.0000	172.9	173.0	1.2	0.5
OH-WO-081.0000	173.9	173.9	1.7	0.5
OH-WO-088.0000 OH-WO-088.0000-TAR-6-174.5 OH-WO-088.0000-AB-3 OH-WO-088.0100-AB-3	174.5	174.6	2.3	0.9
OH-WO-089.0000	174.6	174.7	1.6	0.6
OH-WO-090.0000	174.7	174.7	0.5	0.2
OH-WO-091.0000	174.7	174.9	1.9	0.8
OH-WO-092.0000	174.9	175.0	1.9	0.7
OH-WO-093.0000 OH-WO-093.0000-TAR-7-175.1	175.0	175.1	3.8	0.8
OH-WO-095.0000	175.2	175.2	2.1	0.4
OH-WO-096.0000	175.2	175.4	3.1	0.9

APPENDIX K-4 (cont'd)

Known FSA-Enrolled Lands Crossed by the NGT Project Mainline

State, Tract Number	Milepost Start	Milepost End	Acres Affected Construction [a]	Operation [b]
OHIO (cont'd)				
OH-WO-101.0000	175.6	176.1	8.4	3.1
OH-WO-102.0000	176.1	176.2	0.9	0.4
OH-WO-115.0000 c	177.8	178.1	3.9	1.5
OH-WO-117.0000 c	178.1	178.3	3.9	1.5
OH-WO-118.0000 c	178.3	178.4	0.9	0.4
OH-WO-129.0000	179.5	179.5	1.2	0.4
OH-LC-035.0000	184.5	184.8	4.0	1.5
OH-FU-004.0000	190.9	191.5	10.0	3.5
OH-FU-018.0000	194.1	194.3	4.0	1.5
OH-FU-019.0000	194.3	194.8	8.1	3.1
OH-FU-027.0000	195.9	196.2	6.4	2.1
		Ohio Total	**292.4**	**104.8**
MICHIGAN				
MI-LE-001.0000-SC MI-LE-001.0000-TAR-1	208.3	208.5	8.6	0.9
MI-LE-002.0000	208.5	208.7	4.0	1.5
MI-LE-005.0000	209.0	209.5	7.8	3.0
MI-LE-006.0000	209.5	209.7	4.0	1.5
MI-LE-007.0000	209.7	210.0	5.6	1.6
MI-LE-012.0000	210.5	211.0	7.6	2.9
MI-LE-014.0000	211.0	211.5	8.1	3.1
MI-LE-015.0000	211.5	212.0	8.1	3.1
MI-LE-017.0000	212.0	212.5	7.6	2.9
MI-LE-018.0000	212.5	213.0	7.7	2.9
MI-LE-020.0000	213.0	213.5	8.5	3.1
MI-LE-021.0000	213.5	214.0	8.2	3.1
MI-LE-023.0000	214.0	214.3	3.7	1.4
MI-LE-024.0000	214.3	214.5	3.5	1.4
MI-LE-025.0000	214.5	214.8	4.7	1.8
MI-LE-026.0000	215.1	215.2	7.3	2.4
MI-LE-030.0000	215.9	216.0	2.6	1.0
MI-LE-035.0000	216.8	217.1	6.8	1.9
MI-LE-038.0000	217.1	217.4	7.1	1.5
MI-LE-040.0000	217.9	218.4	8.6	3.0
MI-LE-042.0000	218.4	218.9	9.3	3.0
MI-LE-052.0000	220.1	220.2	1.7	0.0
MI-LE-053.0000	220.2	220.4	2.8	0.0
MI-LE-073.0000	222.8	223.1	3.6	1.6
MI-LE-074.0000	223.1	223.2	2.6	1.0
MI-LE-077.0000	223.5	223.8	4.6	1.8
MI-LE-078.0000	223.8	224.1	3.8	1.4
MI-LE-079.0000	224.1	224.1	0.7	0.3
MI-LE-084.0000	224.9	225.0	1.8	0.4
MI-LE-086.0000	225.0	225.1	1.7	0.4
MI-LE-093.0000 MI-LE-093.0000-TAR-3	226.3	226.6	7.1	2.3
MI-LE-095.0000	226.7	227.0	6.2	2.1

APPENDIX K-4 (cont'd)

Known FSA-Enrolled Lands Crossed by the NGT Project Mainline

State, Tract Number	Milepost Start	Milepost End	Acres Affected Construction [a]	Operation [b]
MICHGIAN (cont'd)				
MI-LE-116.0000	230.3	230.4	0.7	0.2
MI-MR-007.0000	230.8	231.1	3.3	1.4
MI-MR-008.0000	231.1	231.2	3.3	1.1
MI-MR-010.0000	231.3	231.3	0.6	0.2
MI-MR-013.0000	231.8	231.9	1.8	0.0
MI-MR-015.0000	231.9	232.2	4.5	1.7
MI-MR-019.0000	232.3	232.5	2.2	0.8
MI-MR-027.0000	233.3	233.4	5.2	1.6
MI-MR-029.0000	233.4	233.7	4.6	1.7
MI-MR-031.0000	233.8	234.0	1.7	3.5
MI-MR-039.0000	234.7	235.0	5.7	2.0
MI-MR-040.0000	235.0	235.2	3.3	1.2
MI-MR-042.0000	235.3	235.6	4.4	1.7
MI-MR-043.0000	235.6	235.7	1.2	0.4
MI-MR-044.0000	235.7	235.9	4.0	1.4
MI-MR-048.0000	236.3	236.6	5.6	2.0
MI-WA-023.0000	240.5	240.7	4.0	1.6
		Michigan Total	**232.1**	**80.8**
		NGT Project Total	**524.5**	**185.6**

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a Land affected during construction includes temporary workspace, permanent easement, and additional temporary workspace.

b Land affected during operation of the pipeline includes only the permanent right-of-way.

c Tract also produces specialty crops.

APPENDIX K-5

AGRICULTURAL DRAIN TILES AND IRRIGATION SYSTEMS CROSSED BY THE NGT PROJECT

APPENDIX K-5

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
OHIO				
TGP Interconnecting Pipeline				
Columbiana	OH-COL-008.0000 OH-COL-008.0000-MR OH-COL-008.0000-PAR-1	0.0	0.1	Drain tiles; size and type unknown
Columbiana	OH-COL-006.0000	0.1	0.1	Drain tiles; size and type unknown
Mainline				
Columbiana	OH-CO-003.0000	0.3	0.6	Drain tiles; size and type unknown
Columbiana	OH-CO-004.0000	0.6	0.9	Drain tiles; size and type unknown
Columbiana	OH-CO-005.0000	0.9	1.0	Drain tiles; 4" plastic
Columbiana	OH-CO-006.0000	1.0	1.1	Drain tiles; 4" plastic
Columbiana	OH-CO-010.0000 OH-CO-010.0000-CS OH-CO-010-0000-PAR-2-1.4	1.3	1.5	Drain tiles; 6” clay
Columbiana	OH-CO-013.0000	1.9	2.0	Drain tiles; 4” and 12” plastic
Columbiana	OH-CO-016.0000	2.0	2.2	Drain tiles; 4" plastic
Columbiana	OH-CO-019.0000	2.2	2.5	Drain tiles; 4" plastic and clay
Columbiana	OH-CO-020.0000 OH-CO-020.0000-TAR-2-2.6 OH-CO-000.0001-SA-3-SPRD1	2.5	2.8	Drain tiles; size and type unknown
Columbiana	OH-CO-021.0000	2.8	2.9	Drain tiles; size and type unknown
Columbiana	OH-CO-022.0000	2.9	3.1	Drain tiles; size and type unknown
Columbiana	OH-CO-035.0000 OH-CO-035.0000-TAR-4-4.3	4.3	4.7	Drain tiles; 4” and 6” clay
Columbiana	OH-CO-035.0010-TAR-4-4.3	4.3	4.3	Drain tiles; size and type unknown
Columbiana	OH-CO-036.0000	4.7	4.8	Drain tiles; 4” and 6” clay
Columbiana	OH-CO-037.0000 OH-CO-037.0000-TAR-5	4.8	4.9	Drain tiles; 4” and 6” clay
Columbiana	OH-CO-039.0000	4.9	5.0	Drain tiles; size and type unknown
Columbiana	OH-CO-042.0000	5.0	5.1	Drain tiles; 4" plastic
Columbiana	OH-CO-043.0000	5.1	5.3	Drain tiles; 4" plastic
Columbiana	OH-CO-046.0000	5.5	5.6	Drain tiles; 4" plastic
Columbiana	OH-CO-053.0000	5.9	6.1	Drain tiles; size and type unknown
Columbiana	OH-CO-054.0000	6.1	6.3	Drain tiles; size and type unknown
Columbiana	OH-CO-054.0100	6.3	6.3	Drain tiles; size and type unknown
Columbiana	OH-CO-055.0100	6.3	6.4	Drain tiles; size and type unknown
Columbiana	OH-CO-055.0200	6.4	6.4	Drain tiles; 4" plastic
Columbiana	OH-CO-059.0000 OH-CO-059.0000-AB-1 OH-CO-000.0001-SA-6-SPRD1	6.4	6.9	Drain tiles; 6" plastic
Columbiana	OH-CO-061.0000	6.9	7.2	Drain tiles; size unknown; clay and plastic
Columbiana	OH-CO-062.0000 OH-CO-062.0000-TAR-6-7.3	7.2	7.5	Drain tiles; size and type unknown
Columbiana	OH-CO-063.0000	7.5	7.5	Drain tiles; size unknown; clay and plastic
Columbiana	OH-CO-064.0000	7.5	7.6	Drain tiles; size unknown; clay and plastic
Columbiana	OH-CO-065.0000	7.6	7.7	Drain tiles; size unknown; clay
Columbiana	OH-CO-074.0000 OH-CO-074.0000-TAR-8-8.2 OH-CO-000.0001-SA-8-SPRD1 OH-CO-000.0001-SA-9-SPRD1	8.2	8.3	Drain tiles; size and type unknown

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Columbiana	OH-CO-075.0000	8.3	8.5	Drain tiles; size and type unknown
Columbiana	OH-CO-076.0000	8.5	8.6	Drain tiles; size unknown; clay and plastic
Columbiana	OH-CO-077.0000	8.6	8.7	Drain tiles; size unknown; clay and plastic
Columbiana	OH-CO-078.0000	8.7	8.9	Drain tiles; size unknown; clay and plastic
Columbiana	OH-CO-079.0000	8.9	9.5	Drain tiles; 4" and 6" clay and plastic
Columbiana	OH-CO-080.0000	9.5	9.9	Drain tiles; 4" and 6" clay and plastic
Columbiana	OH-CO-082.0000	10.0	10.0	Drain tiles; 4" and 6" clay and plastic
Columbiana	OH-CO-086.0000	10.1	10.4	Drain tiles; size and type unknown
Columbiana	OH-CO-087.0000	10.4	10.5	Drain tiles; size and type unknown
Columbiana	OH-CO-089.0000 OH-CO-089.0000-TAR-9-10.8 OH-CO-000.0001-SA-10-SPRD1	10.5	10.8	Drain tiles; 3" and 4"; clay and plastic
Columbiana	OH-CO-091.0000	11.0	11.0	Drain tiles; size and type unknown
Columbiana	OH-CO-093.0000	11.0	11.1	Drain tiles; size and type unknown
Columbiana	OH-CO-094.0000	11.1	11.1	Drain tiles; size and type unknown
Columbiana	OH-CO-099.0010	11.2	11.3	Drain tiles; size and type unknown
Columbiana	OH-CO-098.0010	11.3	11.3	Drain tiles; size and type unknown
Columbiana	OH-CO-102.0000	11.4	11.4	Drain tiles; 3" and 4"; clay and plastic
Columbiana	OH-CO-103.0000	11.4	11.4	Drain tiles; 3" and 4"; clay and plastic
Columbiana	OH-CO-106.0000	11.4	11.7	Drain tiles; 4" and 6"; clay and plastic
Columbiana	OH-CO-107.0000	11.7	11.8	Drain tiles; size and type unknown
Columbiana	OH-CO-109.0000	11.9	12.1	Drain tiles; 4" and 6"; clay and plastic
Columbiana	OH-CO-110.0000	12.1	12.5	Drain tiles; 4" and 6"; clay and plastic
Columbiana	OH-CO-112.0000	12.5	12.5	Drain tiles; 4" and 6"; clay and plastic
Stark	OH-ST-001.0000	12.5	13.1	Drain tiles; 4" and 6"; clay and plastic
Stark	OH-ST-005.0100 OH-ST-005.0100-HTAR-0.5	13.2	13.5	Drain tiles; size unknown; clay
Stark	OH-ST-008.0000 OH-ST-008.0000-TAR-1-13.5	13.5	13.8	Drain tiles; size and type unknown
Stark	OH-ST-013.0000	14.0	14.1	Drain tiles; size and type unknown
Stark	OH-ST-015.0000	14.1	14.2	Drain tiles; 4" clay and plastic
Stark	OH-ST-016.0000	14.2	14.3	Drain tiles; 4" and 6"; type unknown
Stark	OH-ST-017.0000	14.3	14.4	Drain tiles; 4" clay and plastic
Stark	OH-ST-018.0000	14.4	14.5	Drain tiles; 4"; type unknown
Stark	OH-ST-020.0000	14.5	14.5	Drain tiles; size and type unknown
Stark	OH-ST-021.0000	14.5	14.8	Drain tiles; 4" and 6"; clay and plastic
Stark	OH-ST-023.0000	14.8	15.0	Drain tiles; 4" and 6"; clay and plastic
Stark	OH-ST-024.0000	15.0	15.1	Drain tiles; size and type unknown
Stark	OH-ST-025.0000	15.1	15.2	Drain tiles; size and type unknown
Stark	OH-ST-026.0000	15.2	15.4	Drain tiles; 4" and 6"; clay and plastic
Stark	OH-ST-028.0000 OH-ST-028.0000-TAR-2-15.4 OH-ST-000.0001-SA-2-SPRD1	15.4	15.7	Drain tiles; 6" and 8"; clay
Stark	OH-ST-029.0000	15.7	16.0	Drain tiles; 4" clay and plastic
Stark	OH-ST-030.0000	16.0	16.2	Drain tiles; 4" and 12"; clay
Stark	OH-ST-032.0000	16.2	16.3	Drain tiles; size unknown; clay
Stark	OH-ST-032.0100	16.3	16.4	Drain tiles; 4" clay and plastic
Stark	OH-ST-032.0200	16.4	16.5	Drain tiles; size unknown; clay

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Stark	OH-ST-032.0300	16.5	16.6	Drain tiles; size unknown; clay
Stark	OH-ST-033.0000 OH-ST-033.0000-PAR-1-16.8 OH-ST-033.0000-MLV-1	16.6	16.7	Drain tiles; size unknown; clay
Stark	OH-ST-035.0000	16.7	17.0	Drain tiles; 6" clay
Stark	OH-ST-036.0000	17.0	17.0	Drain tiles; size and type unknown
Stark	OH-ST-037.0000	17.0	17.1	Drain tiles; 4" clay
Stark	OH-ST-039.0000	17.2	17.6	Drain tiles; 4", 6" and 8"; clay and plastic
Stark	OH-ST-040.0000	17.6	17.7	Drain tiles; 4" clay
Stark	OH-ST-041.0000	17.8	17.9	Drain tiles; 4" plastic
Stark	OH-ST-042.0000	17.9	18.3	Drain tiles; 4" clay and plastic
Stark	OH-ST-045.0000	18.3	18.4	Drain tiles; 4" clay and plastic
Stark	OH-ST-047.0000	18.4	18.6	Drain tiles; 4" and 6"; clay and plastic
Stark	OH-ST-051.0000 OH-ST-051.0000-TAR-3-18.6	18.6	19.0	Drain tiles; 4" and 8" clay
Stark	OH-ST-052.0000	19.0	19.2	Drain tiles; 4" clay and plastic
Stark	OH-ST-053.0000	19.2	19.3	Drain tiles; 4" clay and plastic
Stark	OH-ST-055.0000	19.5	19.6	Drain tiles; 8" clay
Stark	OH-ST-057.0000	19.6	19.9	Drain tiles; 4", 6" and 8"; clay and plastic
Stark	OH-ST-057.0010	19.7	19.9	Drain tiles; size and type unknown
Stark	OH-ST-058.0000	19.9	20.0	Drain tiles; 4", 6" and 8"; clay and plastic
Stark	OH-ST-059.0000	20.0	20.0	Drain tiles; size and type unknown
Stark	OH-ST-062.0000	20.1	20.2	Drain tiles; 4", 6", 8" and 12"; clay and plastic
Stark	OH-ST-063.0000 OH-ST-063.0000-TAR-4-20.4	20.2	20.4	Drain tiles; 4" and 6" clay
Stark	OH-ST-066.0000	20.5	20.5	Drain tiles; size and type unknown
Stark	OH-ST-067.0000	20.5	20.8	Drain tiles; size and type unknown
Stark	OH-ST-068.0000	20.8	21.2	Drain tiles; size and type unknown
Stark	OH-ST-069.0000	21.2	21.7	Drain tiles; 4" clay
Stark	OH-ST-070.0000 OH-ST-070.0000-AB-1	21.7	22.0	Drain tiles; size and type unknown
Stark	OH-ST-072.0000	22.0	22.2	Drain tiles; size and type unknown
Stark	OH-ST-073.0010	22.2	22.2	Drain tiles; size and type unknown
Stark	OH-ST-073.0000	22.2	22.2	Drain tiles; size and type unknown
Stark	OH-ST-075.0000	22.2	22.5	Drain tiles; size unknown; clay and plastic
Stark	OH-ST-077.0000	22.7	23.2	Drain tiles; size unknown; clay and plastic
Stark	OH-ST-079.0000	23.2	23.5	Drain tiles; size unknown; clay and plastic
Stark	OH-ST-082.0000	23.7	24.2	Drain tiles; 4" and 6"; clay and plastic
Stark	OH-ST-082.0010	24.1	24.2	Drain tiles; size and type unknown
Stark	OH-ST-084.0000	24.2	24.7	Drain tiles; size unknown; clay
Stark	OH-ST-085.0000	24.7	25.0	Drain tiles; size and type unknown
Stark	OH-ST-087.0000	25.0	25.3	Drain tiles; size and type unknown
Stark	OH-ST-088.0000	25.3	25.5	Drain tiles; 4" and 6" clay
Stark	OH-ST-089.0000	25.6	25.7	Drain tiles; 4" and 6" clay
Stark	OH-ST-090.0000	25.7	25.8	Drain tiles; size and type unknown
Stark	OH-ST-091.0000	25.8	25.9	Drain tiles; size and type unknown
Stark	OH-ST-093.0000	25.9	26.4	Drain tiles; size and type unknown

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Stark	OH-ST-098.0000	26.7	26.7	Drain tiles; size and type unknown
Stark	OH-ST-099.0000	26.7	26.8	Drain tiles; size and type unknown
Stark	OH-ST-104.0000	27.3	27.4	Drain tiles; 4" clay and plastic
Stark	OH-ST-105.0000	27.4	27.7	Drain tiles; size unknown; clay and plastic
Stark	OH-ST-107.0000	27.8	28.0	Drain tiles; 4" clay
Stark	OH-ST-112.0000	28.2	28.7	Drain tiles; size and type unknown
Stark	OH-ST-113.0000	28.7	28.7	Drain tiles; size and type unknown
Stark	OH-ST-114.0000	28.7	28.9	Drain tiles; size and type unknown
Stark	OH-ST-116.0000 OH-ST-116.0000-TAR-5-29.1 OH-ST-000.0001-SA-6.1-SPRD1	29.0	29.1	Drain tiles; size and type unknown
Stark	OH-ST-121.0000	29.3	29.7	Drain tiles; size and type unknown
Stark	OH-ST-122.0000	29.7	29.9	Drain tiles; size and type unknown
Stark	OH-ST-123.0000	29.9	30.2	Drain tiles; size and type unknown
Stark	OH-ST-124.0000	30.2	30.3	Drain tiles; size and type unknown
Stark	OH-ST-126.0000	30.3	30.7	Drain tiles; size and type unknown
Stark	OH-ST-127.0000	30.7	30.8	Drain tiles; size and type unknown
Stark	OH-ST-129.0000	30.9	31.1	Drain tiles; size and type unknown
Stark	OH-ST-130.0000	31.1	31.4	Drain tiles; size and type unknown
Stark	OH-ST-131.0000	31.4	31.9	Drain tiles; size and type unknown
Stark	OH-ST-133.0000 OH-ST-133.0000-AB-2	31.9	32.1	Drain tiles; size and type unknown
Stark	OH-ST-135.0000	32.1	32.2	Drain tiles; size and type unknown
Stark	OH-ST-136.0000 OH-ST-136.0000-PAR-2-32.6 OH-ST-136.0000-MLV-2 OH-ST-000.0001-SA-7-SPRD1	32.2	32.6	Drain tiles; size and type unknown
Stark	OH-ST-180.0000	34.0	34.1	Drain tiles; size and type unknown
Stark	OH-ST-181.0000	34.1	34.2	Drain tiles; size and type unknown
Summit	OH-SU-005.0000	34.5	34.5	Drain tiles; size and type unknown
Summit	OH-SU-006.0000	34.5	34.5	Drain tiles; size and type unknown
Summit	OH-SU-007.0000	34.5	34.7	Drain tiles; size and type unknown
Summit	OH-SU-008.0000	34.7	34.8	Drain tiles; size and type unknown
Summit	OH-SU-009.0000	34.8	35.0	Drain tiles; size and type unknown
Summit	OH-SU-016.0000	35.0	35.0	Drain tiles; size and type unknown
Summit	OH-SU-034.0000	37.1	37.3	Drain tiles; 4" clay and plastic
Summit	OH-SU-041.0000	37.6	37.8	Drain tiles; size and type unknown
Summit	OH-SU-044.0000	37.8	37.9	Drain tiles; size and type unknown
Summit	OH-SU-045.0000	37.9	37.9	Drain tiles; size and type unknown
Summit	OH-SU-058.0000	38.8	38.9	Drain tiles; size and type unknown
Summit	OH-SU-059.0000	38.9	39.0	Drain tiles; size and type unknown
Summit	OH-SU-064.0000	39.3	39.3	Drain tiles; size and type unknown
Summit	OH-SU-065.0000	39.3	39.5	Drain tiles; size and type unknown
Summit	OH-SU-067.0000	39.6	39.7	Drain tiles; size and type unknown
Summit	OH-SU-081.0000 OH-SU-081.0000-TAR-2-40.8	40.7	41.0	Drain tiles; size and type unknown
Summit	OH-SU-085.0000	41.2	41.4	Drain tiles; size and type unknown
Summit	OH-SU-086.0000	41.3	41.4	Drain tiles; size and type unknown

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Summit	OH-SU-090.0000 OH-SU-000.0001-SA-2-SPRD-1	41.5	41.5	Drain tiles; size and type unknown
Summit	OH-SU-091.0000	41.5	41.5	Drain tiles; size and type unknown
Summit	OH-SU-097.0000	41.9	42.1	Drain tiles; size and type unknown
Summit	OH-SU-101.0000	42.2	42.2	Drain tiles; size and type unknown
Summit	OH-SU-103.0000	42.3	42.3	Drain tiles; size and type unknown
Summit	OH-SU-107.0010	42.5	42.6	Drain tiles; size and type unknown
Summit	OH-SU-108.0000	42.6	42.7	Drain tiles; size and type unknown
Summit	OH-SU-123.0000	43.1	43.1	Drain tiles; size and type unknown
Summit	OH-SU-124.0000	43.1	43.2	Drain tiles; size and type unknown
Summit	OH-SU-126.0000	43.2	43.3	Drain tiles; size and type unknown
Summit	OH-SU-127.0000	43.3	43.5	Drain tiles; size and type unknown
Summit	OH-SU-135.0000 OH-SU-135.0000-TAR-2.2-44.1	44.0	44.3	Drain tiles; size and type unknown
Summit	OH-SU-138.0000 OH-SU-138.0000-TAR-3-44.3	44.4	44.7	Drain tiles; size and type unknown
Summit	OH-SU-141.0000	44.7	44.8	Drain tiles; size and type unknown
Summit	OH-SU-142.0000	44.8	44.8	Drain tiles; size and type unknown
Summit	OH-SU-150.0000	45.3	45.5	Drain tiles; size and type unknown
Summit	OH-SU-152.0000	45.5	45.5	Drain tiles; size and type unknown
Summit	OH-SU-155.0000	45.8	46.2	Drain tiles; size and type unknown
Summit	OH-SU-155.0010	46.0	46.2	Drain tiles; size and type unknown
Summit	OH-SU-164.0000	46.5	46.8	Drain tiles; size and type unknown
Summit	OH-SU-166.0000	46.8	47.0	Drain tiles; size and type unknown
Summit	OH-SU-167.0000	47.0	47.0	Drain tiles; size and type unknown
Summit	OH-SU-171.0000 OH-SU-171.0000-TAR-4-47.4	47.4	47.5	Drain tiles; size and type unknown
Summit	OH-SU-172.0000	47.5	47.8	Drain tiles; size and type unknown
Summit	OH-SU-173.0000	47.8	47.8	Drain tiles; size and type unknown
Summit	OH-SU-185.0000 OH-SU-185.0000-TAR-5-48.5	48.2	48.5	Drain tiles; size and type unknown
Summit	OH-SU-186.0000	48.5	48.5	Drain tiles; size and type unknown
Summit	OH-SU-187.0000 OH-SU-187.0000-TAR-5-48.5	48.5	48.6	Drain tiles; size and type unknown
Summit	OH-SU-188.0000	48.6	48.7	Drain tiles; size and type unknown
Summit	OH-SU-189.0000	48.7	48.8	Drain tiles; size and type unknown
Summit	OH-SU-191.0000	48.8	48.9	Drain tiles; 6" clay and plastic
Summit	OH-SU-193.0000	48.9	49.4	Drain tiles; size and type unknown
Wayne	OH-WA-001.0000 OH-WA-001.0000-MLV-4 OH-WA-001.0000-PAR-1-50.5	50.4	50.6	Drain tiles; size and type unknown
Wayne	OH-WA-002.0000	50.6	50.9	Drain tiles; 6" clay and plastic
Wayne	OH-WA-003.0000	50.9	51.1	Drain tiles; 6" clay and plastic
Wayne	OH-WA-005.0000	51.1	51.1	Drain tiles; size and type unknown
Wayne	OH-WA-006.0000	51.1	51.3	Drain tiles; 6" clay
Wayne	OH-WA-007.0000	51.3	51.3	Drain tiles; 6" clay
Wayne	OH-WA-008.0000	51.3	51.4	Drain tiles; 6" clay
Wayne	OH-WA-010.0000	51.4	51.6	Drain tiles; size and type unknown
Wayne	OH-WA-011.000	51.6	51.7	Drain tiles; 4" and 6"; clay and plastic

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Wayne	OH-WA-012.0000	51.7	52.0	Drain tiles; size and type unknown
Wayne	OH-WA-014.0000	52.0	52.0	Drain tiles; size and type unknown
Wayne	OH-WA-013.0000	52.0	52.0	Drain tiles; size and type unknown
Wayne	OH-WA-011.0000	52.0	52.3	Drain tiles; size and type unknown
Wayne	OH-WA-011.0010	52.3	52.3	Drain tiles; size and type unknown
Wayne	OH-WA-016.0000	52.2	52.3	Drain tiles; size and type unknown
Wayne	OH-WA-018.0000 OH-WA-018.0000-TAR-1-52.6 OH-WA-018.0000-VS	52.3	52.9	Drain tiles; size and type unknown
Wayne	OH-WA-024.0000 OH-WA-001-SA-1-SPRD1	53.0	53.2	Drain tiles; size and type unknown
Wayne	OH-WA-030.0300 OH-WA-030.0300-AB-1	54.2	54.3	Drain tiles; size and type unknown
Wayne	OH-WA-037.0000	54.5	54.6	Drain tiles; size and type unknown
Wayne	OH-WA-039.0000	54.6	54.8	Drain tiles; 4" to 6" plastic; 4' to 6' depth
Wayne	OH-WA-040.0000	54.8	55.1	Drain tiles; 4" to 6" plastic; 4' to 6' depth
Wayne	OH-WA-041.0000	55.1	55.6	Drain tiles; 4" to 6" plastic; 4' to 6' depth
Wayne	OH-WA-042.0000	55.6	55.7	Drain tiles; size and type unknown
Wayne	OH-WA-048.0000	55.7	55.8	Drain tiles; size and type unknown
Wayne	OH-WA-049.0000	55.8	56.1	Drain tiles; size and type unknown
Wayne	OH-WA-050.0000 OH-WA-050.0000-TAR-4-56.2	56.1	56.3	Drain tiles; 4" to 8" plastic and clay; 4' to 5' depth
Medina	OH-ME-001.0000 OH-ME-001.0000-VS	56.6	56.8	Drain tiles; 4" to 8" clay, plastic and wood; 4' to 6' depth
Medina	OH-ME-004.0000	56.8	57.1	Drain tiles; 4" to 8" clay, plastic and wood; 4' to 6' depth
Medina	OH-ME-005.0000	57.1	57.2	Drain tiles; 4" to 8" clay, plastic and wood; 4' to 6' depth
Wayne	OH-WA-058.0000 OH-WA-058.0000-TAR-5-57.5 OH-WA-058.0000-PAR-1-57.5	57.4	57.6	Drain tiles; 4" to 8" unknown tile; 4' to 6' depth
Wayne	OH-WA-059.0000 OH-WA-059.0000-PAR-1-57.5 OH-WA-059.0000-AB-1.5	57.6	57.7	Drain tiles; size and type unknown
Medina	OH-ME-009.0000	57.7	57.9	Drain tiles; 4" to 10" plastic and clay; 4' to 7' depth
Medina	OH-ME-010.0000	57.9	58.0	Drain tiles; 4" to 10" plastic and clay; 4' to 7' depth
Medina	OH-ME-012.0000 OH-ME-012.0000-PAR-1-58.1 OH-ME-012.0000-MLV-5	58.0	58.3	Drain tiles; 4" to 10" plastic and clay; 4' to 7' depth
Medina	OH-ME-014.0000	58.4	58.4	Drain tiles; 4" to 10" plastic and clay; 4' to 6' depth
Medina	OH-ME-015.0000	58.4	58.9	Drain tiles; 4" to 10" plastic and clay; 4' to 6' depth
Medina	OH-ME-016.0000 OH-ME-016.0000-HTAR-1	58.9	59.2	Drain tiles; size and type unknown
Medina	OH-ME-018.0000	59.3	59.4	Drain tiles; size and type unknown
Medina	OH-ME-021.0000	59.5	59.7	Drain tiles; size and type unknown
Medina	OH-ME-023.0000	59.7	59.8	Drain tiles; size and type unknown
Medina	OH-ME-024.0000	59.8	59.8	Drain tiles; size and type unknown
Medina	OH-ME-025.0000	59.8	59.9	Drain tiles; size and type unknown

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Medina	OH-ME-026.0000	59.9	59.9	Drain tiles; size and type unknown
Medina	OH-ME-027.0000	59.9	60.0	Drain tiles; size and type unknown
Medina	OH-ME-028.0000	60.0	60.1	Drain tiles; size and type unknown
Medina	OH-ME-029.0000	60.1	60.3	Drain tiles; size and type unknown
Medina	OH-ME-031.0000	60.3	60.4	Drain tiles; size and type unknown
Medina	OH-ME-032.0000	60.4	60.8	Drain tiles; size and type unknown
Medina	OH-ME-033.0000	60.8	60.8	Drain tiles; size and type unknown
Medina	OH-ME-034.0000	60.8	61.3	Drain tiles; type unknown; 2' to 8' depth
Medina	OH-ME-035.0000	61.3	61.3	Drain tiles; type unknown; 2' to 8' depth
Medina	OH-ME-036.0010	61.3	61.4	Drain tiles; size and type unknown
Medina	OH-ME-037.0000	61.4	61.4	Drain tiles; size and type unknown
Medina	OH-ME-039.0000	61.4	61.4	Drain tiles; size and type unknown
Medina	OH-ME-040.0000	61.4	61.5	Drain tiles; size and type unknown
Medina	OH-ME-041.0000	61.5	61.5	Drain tiles; size and type unknown
Medina	OH-ME-042.0000	61.5	61.5	Drain tiles; size and type unknown
Medina	OH-ME-043.0000	61.5	61.7	Drain tiles; size and type unknown
Medina	OH-ME-044.0000	61.7	62.0	Drain tiles; size and type unknown
Medina	OH-ME-045.0000	62.0	62.1	Drain tiles; 4" clay; 3' depth
Medina	OH-ME-046.0000	62.1	62.6	Drain tiles; size and type unknown
Medina	OH-ME-048.0000	62.6	62.7	Drain tiles; 12" clay
Medina	OH-ME-049.0000	62.7	62.8	Drain tiles; 12" clay
Medina	OH-ME-050.0000	62.8	62.9	Drain tiles; size and type unknown
Medina	OH-ME-051.0000	62.9	62.9	Drain tiles; 12" clay
Medina	OH-ME-053.0000	62.9	63.0	Drain tiles; size and type unknown
Medina	OH-ME-054.0000 OH-ME-054.0000-TAR-2-63.1	63.0	63.2	Drain tiles; 3' plastic; 3' to 6' depth
Medina	OH-ME-056.0000	63.2	63.3	Drain tiles; size and type unknown
Medina	OH-ME-057.0000 OH-ME-057.0000-CS OH-ME-057.0000-PAR-2-63.4	63.3	63.6	Drain tiles; 4" to 6" clay and plastic; 2' to 4' depth
Medina	OH-ME-058.0000	63.6	63.8	Drain tiles; size and type unknown
Medina	OH-ME-059.0000 OH-ME-059.0000-TAR-3-63.8 OH-ME-000.0001-SA-2-SPRD2	63.8	63.8	Drain tiles; size and type unknown
Medina	OH-ME-060.0000	63.8	64.2	Drain tiles; 6" to 12" plastic and clay
Medina	OH-ME-062.0000	64.2	64.3	Drain tiles; 6" to 12" plastic and clay
Medina	OH-ME-063.0000	64.3	64.4	Drain tiles; 6" to 12" plastic and clay
Medina	OH-ME-065.0000	64.4	65.0	Drain tiles; size and type unknown
Medina	OH-ME-066.0000 OH-ME-066.0000-TAR-4-64.9	65.0	65.2	Drain tiles; size unknown, clay; 3' depth
Medina	OH-ME-068.0000	65.2	65.3	Drain tiles; size unknown, clay
Medina	OH-ME-069.0000	65.3	65.3	Drain tiles; size unknown, clay
Medina	OH-ME-070.0000	65.3	65.4	Drain tiles; size unknown, clay
Medina	OH-ME-071.0000	65.4	65.5	Drain tiles; size unknown, clay and plastic; 2' to 4' depth
Medina	OH-ME-072.0000	65.5	65.5	Drain tiles; size and type unknown
Medina	OH-ME-073.0000	65.5	65.6	Drain tiles; size and type unknown
Medina	OH-ME-074.0000	65.6	65.6	Drain tiles; size and type unknown

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Medina	OH-ME-075.0000 OH-ME-075.0000-VS	65.6	65.8	Drain tiles; size and type unknown
Medina	OH-ME-077.0000	65.8	65.9	Drain tiles; size and type unknown
Medina	OH-ME-079.0000	65.9	66.0	Drain tiles; size and type unknown
Medina	OH-ME-081.0000	66.0	66.2	Drain tiles; 4" clay and plastic
Medina	OH-ME-082.0000 OH-ME-082.0000-TAR-4-5-66.4	66.2	66.7	Drain tiles; 4" clay and plastic
Medina	OH-ME-084.0000	66.7	66.9	Drain tiles; size and type unknown
Medina	OH-ME-085.0000	66.9	67.0	Drain tiles; size and type unknown
Medina	OH-ME-086.0000	67.0	67.1	Drain tiles; size and type unknown
Medina	OH-ME-086.0010	67.0	67.1	Drain tiles; size and type unknown
Medina	OH-ME-088.0000	67.1	67.2	Drain tiles; size and type unknown
Medina	OH-ME-089.0000	67.2	67.4	Drain tiles; size and type unknown
Medina	OH-ME-093.0000	67.5	67.6	Drain tiles; size and type unknown
Medina	OH-ME-112.0000 OH-ME-112.0000-TAR-6-68.3 OH-ME-112.0000-TAR-7-68.6	68.6	68.7	Drain tiles; size and type unknown
Medina	OH-ME-114.0000	68.7	68.7	Drain tiles; size unknown, clay
Medina	OH-ME-116.0000	68.8	68.8	Drain tiles; size and type unknown
Medina	OH-ME-123.0000	68.9	68.9	Drain tiles; size and type unknown
Medina	OH-ME-122.0000	68.9	69.0	Drain tiles; size and type unknown
Medina	OH-ME-124.0102-TAR-9-69.5 OH-ME-000.0001-SA-8-SPRD2	69.4	69.4	Drain tiles; size and type unknown
Medina	OH-ME-133.0000	69.9	70.0	Storm drain; equal to or greater than 12"
Medina	OH-ME-135.0000 OH-ME-135.0000-TAR-10-70.1	70.0	70.3	Storm drain; equal to or greater than 12"
Medina	OH-ME-136.0000 OH-ME-000.0001-SA-9-SPRD2 OH-ME-136.0000-TAR-11-70.8a	70.3	70.8	Drain tiles; size and type unknown
Medina	OH-ME-138.0000 OH-ME-138.0000-TAR-12-70.8B	70.8	70.9	Drain tiles; 4" plastic
Medina	OH-ME-140.0000 OH-ME-140.0000-TAR-13-70.9 OH-ME-000.0001-SA-11-SPRD2	70.9	71.1	Drain tiles; 4" plastic
Medina	OH-ME-143.0000	71.3	71.4	Drain tiles; 10" clay and 4' plastic, up to 6' depth; 40' center in crop fields
Medina	OH-ME-144.0000 OH-ME-144.0000-HTAR-2 OH-ME-144.0000-PAR-3-71.8	71.4	71.8	Drain tiles; 10" clay and 4' plastic, up to 6' depth; 40' center in crop fields
Medina	OH-ME-145.0000 OH-ME-145.0000-MLV-6 OH-ME-145.0000-PAR-3-71.8	71.8	71.9	Drain tiles; 10" clay and 4' plastic, up to 6' depth; 40' center in crop fields
Medina	OH-ME-147.0000	71.9	72.5	Drain tiles; 4" plastic
Medina	OH-ME-147.0000-AB-2	71.9	72.5	Drain tiles; 4" plastic
Medina	OH-ME-156.0000 OH-ME-156.0000-TAR-14-72.8 OH-ME-000.0001-SA-12-SPRD2	72.8	72.9	Drain tiles; 4" plastic
Medina	OH-ME-159.0000 OH-ME-159.0000-TAR-15-73.1 OH-ME-000.0001-SA-13-SPRD2 OH-ME-000.0001-SA-14-SPRD2	73.1	73.3	Drain tiles; 4" plastic

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Medina	OH-ME-160.0000 OH-ME-160.0000-TAR-16-73.6	73.3	73.6	Sprinkler system; 4 to 5 drain culverts under; approximately 8' to 10' diameter
Medina	OH-ME-164.0000	73.7	73.9	Drain tiles; size and type unknown
Medina	OH-ME-167.0000	74.0	74.1	Drain tiles; size and type unknown
Medina	OH-ME-169.0000	74.1	74.6	Drain tiles; size and type unknown
Medina	OH-ME-172.0000 OH-ME-172.0000-VS	75.0	75.4	Drain tiles; 10" type unknown; 3' depth
Medina	OH-ME-173.0000	75.4	75.5	Drain tiles; 10" type unknown; 3' depth
Medina	OH-ME-175.0000	75.5	75.6	Drain tiles; size and type unknown
Medina	OH-ME-176.0000	75.6	75.6	Drain tiles; 4" clay
Medina	OH-ME-177.0000 OH-ME-177.0000-TAR-17-75.8 OH-ME-000.0001-SA-15-SPRD2	75.6	76.0	Drain tiles; 4" clay
Medina	OH-ME-178.0000 OH-ME-178.0000-TAR-18-76.1	76.0	76.3	Drain tiles; size and type unknown
Medina	OH-ME-179.0000	76.3	76.3	Drain tiles; size and type unknown
Medina	OH-ME-182.0000	76.5	76.7	Drain tiles; size and type unknown
Medina	OH-ME-183.0000 OH-ME-183.0000-TAR-19-76.8A OH-ME-183.0000-TAR-20-76.8B OH-ME-000.0010-CERT-Y-1-SPRD-2	76.7	77.0	Drain tiles; size unknown, clay; 3' depth
Medina	OH-ME-185.0000	77.0	77.4	Drain tiles; size and type unknown
Medina	OH-ME-186.0000	77.4	77.4	Drain tiles; size and type unknown
Medina	OH-ME-187.0000	77.4	77.7	Drain tiles; size and type unknown
Medina	OH-ME-188.0000	77.7	77.9	Drain tiles; size unknown; clay
Medina	OH-ME-189.0000	77.9	78.0	Drain tiles; size and type unknown
Medina	OH-ME-191.0000	78.0	78.2	Drain tiles; size and type unknown
Medina	OH-ME-192.0000	78.2	78.6	Drain tiles; size and type unknown
Medina	OH-ME-193.0000	78.6	78.6	Drain tiles; size and type unknown
Medina	OH-ME-194.0000	78.6	78.7	Drain tiles; size and type unknown
Medina	OH-ME-195.0000	78.7	79.0	Drain tiles; size and type unknown
Medina	OH-ME-197.0000	79.1	79.2	Drain tiles; size and type unknown
Medina	OH-ME-198.0000	79.1	79.2	Drain tiles; size and type unknown
Medina	OH-ME-199.0000	79.2	79.5	Drain tiles; size and type unknown
Medina	OH-ME-200.0000	79.5	79.6	Drain tiles; size and type unknown
Medina	OH-ME-202.0000	79.6	79.9	Drain tiles; size and type unknown
Medina	OH-ME-203.0000	79.9	80.1	Drain tiles; size and type unknown
Medina	OH-ME-204.0000	80.1	80.2	Drain tiles; size and type unknown
Medina	OH-ME-205.0000	80.2	80.4	Drain tiles; size and type unknown
Medina	OH-ME-206.0000	80.4	80.5	Drain tiles; size and type unknown
Lorain	OH-LO-001.0000	80.5	81.0	Drain tiles; size unknown, plastic
Lorain	OH-LO-002.0000	81.0	81.2	Drain tiles; size and type unknown
Lorain	OH-LO-004.0000	81.2	81.5	Drain tiles; size and type unknown
Lorain	OH-LO-007.0000	81.5	81.7	Drain tiles; size and type unknown
Lorain	OH-LO-008.0000	81.7	81.8	Drain tiles; size and type unknown
Lorain	OH-LO-009.0000	81.8	82.0	Drain tiles; size and type unknown
Lorain	OH-LO-010.0000	82.0	82.2	Drain tiles; size and type unknown
Lorain	OH-LO-011.0000	82.2	82.2	Drain tiles; size and type unknown

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Lorain	OH-LO-012.0000	82.2	82.5	Drain tiles; size and type unknown
Lorain	OH-LO-013.0000	82.5	82.6	Drain tiles; size and type unknown
Lorain	OH-LO-015.0000	82.6	82.7	Drain tiles; size and type unknown
Lorain	OH-LO-018.0000	82.7	83.2	Drain tiles; size and type unknown
Lorain	OH-LO-019.0000	83.2	83.3	Drain tiles; size and type unknown
Lorain	OH-LO-022.0000	83.4	83.7	Drain tiles; 4" plastic and clay; 2.5' depth
Lorain	OH-LO-026.0000	83.9	84.4	Drain tiles; 4" plastic and clay; 2' to 4' depth
Lorain	OH-LO-027.0000	84.4	84.5	Drain tiles; size and type unknown
Lorain	OH-LO-028.0000	84.5	84.7	Drain tiles; size and type unknown
Lorain	OH-LO-030.0000	84.7	84.9	Drain tiles; 4" plastic and clay; 2.5' depth
Lorain	OH-LO-032.0000	85.3	85.3	Drain tiles; 4" plastic and clay; 2.5' depth
Lorain	OH-LO-033.0000 OH-LO-033.0000-TAR-1-85.5	85.2	85.7	Drain tiles; 4" plastic and clay; 2.5' depth
Lorain	OH-LO-033.0010-TAR-1-85.5	85.5	85.5	Drain tiles; size and type unknown
Lorain	OH-LO-034.0000	85.7	85.8	Drain tiles; size and type unknown
Lorain	OH-LO-035.0000 OH-LO-035.0000-AB-3 OH-LO-035.0000-TAR-2-85.9a	85.8	85.9	Drain tiles; size and type unknown
Lorain	OH-LO-037.0000 OH-LO-037.0000-TAR-3-85.8b OH-LO-001.0001-SA-2-SPRD2	85.9	86.2	Drain tiles; size and type unknown
Lorain	OH-LO-038.0000 OH-LO-038.0000-HTAR-1	86.2	86.4	Drain tiles; size and type unknown
Lorain	OH-LO-039.0000 OH-LO-039.0000-HTAR-1	86.4	86.5	Drain tiles; 4" plastic and clay; 2.5' depth
Lorain	OH-LO-040.0000	86.5	86.7	Drain tiles; 4" plastic and clay; 2.5' depth
Lorain	OH-LO-041.0000 OH-LO-041.0000-TAR-4-87.0 OH-LO-000.0001-SA-3-SPRD2	86.7	87.1	Drain tiles; 4" plastic and clay; 2' to 2.5' depth
Lorain	OH-LO-046.0000	87.1	87.3	Drain tiles; 4" plastic and clay; 2.5' depth
Lorain	OH-LO-047.0000	87.3	87.5	Drain tiles; 4" plastic and clay; 2.5' depth
Lorain	OH-LO-048.0000	87.5	87.7	Drain tiles; 4" plastic and clay; 2.5' depth
Lorain	OH-LO-050.0000 OH-LO-050.0000-VS	87.7	88.2	Drain tiles; size and type unknown
Lorain	OH-LO-052.0000	88.2	88.2	Drain tiles; size and type unknown
Lorain	OH-LO-053.0000	88.2	88.4	Drain tiles; size and type unknown
Lorain	OH-LO-054.0000	88.4	88.4	Drain tiles; size and type unknown
Lorain	OH-LO-055.0000	88.4	88.5	Drain tiles; 4" to 6" plastic and clay; 2.5' depth
Lorain	OH-LO-056.0000	88.5	88.5	Drain tiles; 4" to 6" plastic and clay; 2.5' depth
Lorain	OH-LO-057.0000	88.5	88.7	Drain tiles; size and type unknown; 2.5' depth
Lorain	OH-LO-058.0000	88.7	89.1	Drain tiles; size and type unknown; 2.5' depth
Lorain	OH-LO-059.0000	89.1	89.2	Drain tiles; 4" plastic; 2.5' depth
Lorain	OH-LO-062.0000 OH-LO-062.0000-MLV-7 OH-LO-062.0000-PAR-1-89.2	89.2	89.8	Drain tiles; 4" plastic and clay; 2.5' to 3' depth
Lorain	OH-LO-063.0000	89.8	90.2	Drain tiles; 4" plastic and clay; 2.5' depth
Lorain	OH-LO-068.0000	91.2	91.4	Drain tiles; size and type unknown

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Lorain	OH-LO-070.0000	91.4	91.4	Drain tiles; size and type unknown
Lorain	OH-LO-071.0000 OH-LO-071.0000-TAR-5-91.4	91.4	91.8	Drain tiles; size and type unknown
Lorain	OH-LO-071.0010 OH-LO-071.0010-TAR-5-91.4	91.4	91.8	Drain tiles; 4" plastic and clay; 2' to 3' depth
Lorain	OH-LO-072.0000	91.8	91.8	Drain tiles; 4" clay
Lorain	OH-LO-073.0000 OH-LO-073.0000-TAR-6-92.1 OH-LO-000.0001-SA-6-SPRD2	91.8	92.1	Drain tiles; 4" clay
Lorain	OH-LO-074.0000 OH-LO-074.0000-HTAR-2 OH-LO-074.0000-TAR-6-92.1 OH-LO-074.0000-TAR-6.5-92	92.1	92.4	Drain tiles; 4" clay
Lorain	OH-LO-076.0000 OH-LO-076.0000-TAR-7-92.5	92.4	92.7	Drain tiles; size unknown, clay; 3' depth
Lorain	OH-LO-077.0000	92.7	92.8	Drain tiles; 4" plastic
Lorain	OH-LO-078.0000	92.8	93.0	Drain tiles; size and type unknown
Lorain	OH-LO-079.0000	93.0	93.4	Drain tiles; size and type unknown
Lorain	OH-LO-081.0000	93.4	93.4	Drain tiles; 4" plastic and clay; 2' to 3' depth
Lorain	OH-LO-083.0000	93.5	93.6	Drain tiles; 4" clay
Lorain	OH-LO-084.0000	93.6	94.1	Drain tiles; 4" clay
Lorain	OH-LO-085.0000	94.1	94.2	Drain tiles; 4" clay
Lorain	OH-LO-088.0000	94.4	94.6	Drain tiles; 4" clay
Lorain	OH-LO-091.0000	94.6	95.2	Drain tiles; 4" plastic and clay; 3' depth
Lorain	OH-LO-092.0000	95.2	95.4	Drain tiles; 4" plastic and clay; 3' depth
Lorain	OH-LO-094.0000	95.4	95.5	Drain tiles; 4" to 6" plastic; 3' depth
Lorain	OH-LO-095.0000	95.5	95.6	Drain tiles; 4" to 6" plastic; 3' depth
Lorain	OH-LO-096.0000 OH-LO-096.0000-TAR-8-95.7	95.6	95.8	Drain tiles; size and type unknown
Lorain	OH-LO-097.0000	95.8	95.8	Drain tiles; size and type unknown
Lorain	OH-LO-098.0000	95.8	96.0	Drain tiles; 4" to 6" plastic
Lorain	OH-LO-098.0010	95.8	95.8	Drain tiles; size and type unknown
Lorain	OH-LO-098.0020	95.8	96.0	Drain tiles; size and type unknown
Lorain	OH-LO-099.0000	96.0	96.0	Drain tiles; size and type unknown
Lorain	OH-LO-099.0010	96.0	96.0	Drain tiles; size and type unknown
Lorain	OH-LO-100.0000	96.0	96.2	Drain tiles; size and type unknown
Lorain	OH-LO-100.0010	96.0	96.2	Drain tiles; size and type unknown
Lorain	OH-LO-101.0000	96.2	96.3	Drain tiles; size and type unknown
Lorain	OH-LO-101.0010	96.2	96.3	Drain tiles; size and type unknown
Lorain	OH-LO-103.0000	96.4	96.4	Drain tiles; 12" plastic and clay; 1.5' to 4' depth
Lorain	OH-LO-104.0000	96.4	96.7	Drain tiles; size and type unknown
Lorain	OH-LO-105.0000 OH-LO-105.0000-MLV-8 OH-LO-105.0000-PAR-2-96.8	96.7	96.8	Drain tiles; size and type unknown
Lorain	OH-LO-107.0000	96.8	97.0	Drain tiles; size and type unknown
Lorain	OH-LO-108.0000	97.0	97.3	Drain tiles; size and type unknown
Lorain	OH-LO-109.0000	97.3	97.7	Drain tiles; size unknown; clay and plastic
Lorain	OH-LO-111.0000	97.7	98.0	Drain tiles; size and type unknown
Lorain	OH-LO-112.0000	98.0	98.1	Drain tiles; size and type unknown

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Lorain	OH-LO-114.0000	98.1	98.4	Drain tiles; size unknown; clay and plastic
Lorain	OH-LO-118.0000	98.5	98.8	Drain tiles; size and type unknown
Lorain	OH-LO-120.0000 OH-LO-120.0000-TAR-8.1-99.2A	99.1	99.2	Drain tiles; size and type unknown
Lorain	OH-LO-122.0000 OH-LO-122.0000-TAR-8.1-99.2B	99.2	99.6	Drain tiles; size and type unknown
Lorain	OH-LO-123.0000	99.6	99.7	Drain tiles; size and type unknown
Lorain	OH-LO-124.0000 OH-LO-124.0000-AB-4	99.7	100.0	Drain tiles; size and type unknown
Lorain	OH-LO-124.0100-AB-4	99.7	99.7	Drain tiles; size and type unknown
Lorain	OH-LO-126.0000	100.0	100.3	Drain tiles; 4" clay and plastic
Lorain	OH-LO-127.0000	100.3	100.4	Drain tiles; 4" clay and plastic
Lorain	OH-LO-130.0000	100.6	100.7	Drain tiles; 4" clay and plastic
Lorain	OH-LO-131.0000	100.8	101.0	Drain tiles; 4" clay and plastic
Lorain	OH-LO-132.0000	101.0	101.1	Drain tiles; 4" clay and plastic
Lorain	OH-LO-133.0000	101.1	101.3	Drain tiles; 4" clay and plastic
Huron	OH-HU-002.0000	101.3	101.6	Drain tiles; 4" clay and plastic
Huron	OH-HU-003.0000	101.6	101.6	Drain tiles; 4" clay and plastic
Huron	OH-HU-004.0000	101.6	101.8	Drain tiles; 4" clay and plastic
Huron	OH-HU-005.0000	101.8	101.8	Drain tiles; 4" clay and plastic
Huron	OH-HU-006.0000	101.8	102.3	Drain tiles; 4" clay and plastic
Huron	OH-HU-008.0000	102.4	102.9	Drain tiles; 4" clay and plastic
Huron	OH-HU-009.0000	102.9	103.0	Drain tiles; 4" clay and plastic
Huron	OH-HU-010.0000	103.0	103.1	Drain tiles; 4" clay and plastic
Huron	OH-HU-011.0000	103.1	103.2	Drain tiles; 4" clay and plastic
Huron	OH-HU-012.0000	103.2	103.4	Drain tiles; 4" clay and plastic
Huron	OH-HU-013.0000	103.4	103.7	Drain tiles; 4" plastic
Huron	OH-HU-014.0000	103.7	103.9	Drain tiles; 4" clay and plastic
Huron	OH-HU-016.0000	103.9	104.0	Drain tiles; 4" clay and plastic
Huron	OH-HU-017.0000	104.0	104.0	Drain tiles; 4" clay and plastic
Huron	OH-HU-018.0000	104.0	104.2	Drain tiles; 4" clay and plastic
Huron	OH-HU-019.0000	104.2	104.4	Drain tiles; 4" clay and plastic
Huron	OH-HU-020.0000	104.4	104.6	Drain tiles; 4" clay and plastic
Huron	OH-HU-023.0000	104.6	104.7	Drain tiles; size and type unknown
Huron	OH-HU-024.0000	104.7	104.7	Drain tiles; 4" clay and plastic
Erie	OH-ER-001.0000	104.7	104.7	Drain tiles; size and type unknown
Erie	OH-ER-002.0000	104.7	105.0	Drain tiles; size and type unknown
Erie	OH-ER-003.0000	105.0	105.4	Drain tiles; size and type unknown
Erie	OH-ER-004.0000	105.4	105.5	Drain tiles; size unknown; clay and plastic
Erie	OH-ER-005.0000	105.5	105.9	Drain tiles; size unknown; clay and plastic
Erie	OH-ER-007.0000	105.9	105.9	Drain tiles; 4" to 10" plastic; 2.5' to 3' depth
Erie	OH-ER-008.0000	105.9	106.1	Drain tiles; size and type unknown
Erie	OH-ER-010.0000	106.1	106.2	Drain tiles; size and type unknown
Erie	OH-ER-011.0000	106.2	106.5	Drain tiles; size unknown; PVC and clay; 2' depth
Erie	OH-ER-012.0000	106.5	106.6	Drain tiles; size and type unknown
Erie	OH-ER-013.0000	106.6	106.7	Drain tiles; size unknown, clay and plastic
Erie	OH-ER-014.0000	106.7	106.8	Drain tiles; PVC and clay; 2' to 3' depth

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Erie	OH-ER-015.0000	106.8	107.0	Drain tiles; size unknown; clay and plastic
Erie	OH-ER-016.0000	107.0	107.3	Drain tiles; size unknown; clay and plastic
Erie	OH-ER-017.0000	107.3	107.6	Drain tiles; size unknown; clay and plastic
Erie	OH-ER-019.0000	107.6	107.8	Drain tiles; size and type unknown
Erie	OH-ER-020.0000	107.8	108.0	Drain tiles; size unknown; clay and plastic
Erie	OH-ER-021.0000	108.0	108.0	Drain tiles; size and type unknown
Erie	OH-ER-022.0000	108.0	108.4	Drain tiles; size and type unknown
Erie	OH-ER-023.0000	108.4	108.6	Drain tiles; size and type unknown
Erie	OH-ER-022.0010	108.4	108.6	Drain tiles; PVC and clay; 2' to 3' depth
Erie	OH-ER-025.0000	108.7	109.0	Drain tiles; size unknown, clay and plastic
Erie	OH-ER-026.0000	109.0	109.1	Drain tiles; size unknown, clay and plastic
Erie	OH-ER-027.0000	109.1	109.2	Drain tiles; size and type unknown
Erie	OH-ER-028.0000	109.2	109.4	Drain tiles; size and type unknown
Erie	OH-ER-029.0000	109.4	109.6	Drain tiles; PVC and clay; 2' depth
Erie	OH-ER-030.0000	109.6	109.6	Drain tiles; size and type unknown
Erie	OH-ER-031.0000	109.6	109.8	Drain tiles; size and type unknown
Erie	OH-ER-032.0000	109.8	109.8	Drain tiles; size and type unknown
Erie	OH-ER-033.0000	109.8	110.2	Drain tiles; size and type unknown
Erie	OH-ER-034.0000	110.2	110.2	Drain tiles; size and type unknown
Erie	OH-ER-037.0000 OH-ER-037.0000-TAR-1-110.2 OH-ER-000.0001-SA-1-SPRD2	110.3	110.6	Drain tiles; size and type unknown
Erie	OH-ER-040.0000	110.6	110.8	Drain tiles; size and type unknown
Erie	OH-ER-041.0000	110.8	110.8	Drain tiles; size and type unknown
Erie	OH-ER-042.0000	110.8	110.9	Drain tiles; 4" clay and plastic; 2' to 4' depth
Erie	OH-ER-044.0000	111.1	111.4	Drain tiles; 4" clay and plastic; 2' to 4' depth
Erie	OH-ER-046.0000	111.4	111.5	Drain tiles; 4" clay and plastic; 3' to 4' depth
Erie	OH-ER-047.0000 OH-ER-047.0000-TAR-2-111.6	111.5	111.7	Drain tiles; size and type unknown
Erie	OH-ER-053.0000	111.9	111.9	Drain tiles; size and type unknown
Erie	OH-ER-055.0000	111.9	112.1	Drain tiles; size and type unknown
Erie	OH-ER-059.0000	112.1	112.4	Drain tiles; 4" to 8" plastic
Erie	OH-ER-060.0000	112.4	112.9	Drain tiles; 8" to 10" plastic; 2' to 4' depth
Erie	OH-ER-061.0000	112.9	113.1	Drain tiles; size and type unknown
Erie	OH-ER-061.0010	113.1	113.1	Drain tiles; size and type unknown
Erie	OH-ER-062.0010	113.1	113.3	Drain tiles; size and type unknown
Erie	OH-ER-063.0000	113.1	113.3	Drain tiles; size and type unknown
Erie	OH-ER-064.0000	113.3	113.8	Drain tiles; 4" to 8" clay and plastic; 2' to 3' depth
Erie	OH-ER-067.0000	114.0	114.4	Drain tiles; 4" to 6" clay and plastic; 2' to 3' depth
Erie	OH-ER-068.0000	114.4	114.6	Drain tiles; 4" to 6" clay and plastic; 2' to 3' depth
Erie	OH-ER-070.0000 OH-ER-070.0000-AB-5	114.6	114.8	Drain tiles; 4" clay and plastic; 3' depth
Erie	OH-ER-071.0000	114.8	115.0	Drain tiles; 4" to 8" plastic and clay; 2.5' to 3' depth
Erie	OH-ER-073.0000	115.0	115.2	Drain tiles; 4" to 8" plastic and clay; 2.5' to 3' in depth

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Erie	OH-ER-074.0000	115.2	115.4	Drain tiles; 4" to 8" plastic and clay; 3' depth
Erie	OH-ER-075.0000	115.4	115.6	Drain tiles; size and type unknown
Erie	OH-ER-076.0000 OH-ER-076.0000-TAR-3-115.8 OH-ER-000.0001-SA-2-SPRD2	115.6	115.9	Drain tiles; 4" to 6" clay and 7" plastic; 3' depth
Erie	OH-ER-078.0000 OH-ER-078.0000-TAR-4-115.9 OH-ER-000.0001-SA-2.5-SPRD2	115.9	116.1	Drain tiles; size and type unknown
Erie	OH-ER-080.0000	115.9	116.3	Drain tiles; 4" to 6" clay and 7" plastic; 3' depth
Erie	OH-ER-082.0000 OH-ER-082.0000-MLV-9 OH-ER-082.0000-PAR-1-116.3 OH-ER-000.0001-SA-4-SPRD2 OH-ER-082.0000-TAR-5-116.5	116.3	116.5	Drain tiles; 4" to 6" clay and 7" plastic; 3' depth
Erie	OH-ER-083.0000	116.5	116.5	Drain tiles; size and type unknown
Erie	OH-ER-085.0000	116.6	116.7	Drain tiles; size and type unknown
Erie	OH-ER-086.0000 OH-ER-086.0000-TAR-6-116.8	116.7	116.9	Drain tiles; size and type unknown
Erie	OH-ER-087.0000	116.9	116.9	Drain tiles; 4" plastic
Erie	OH-ER-091.0000 OH-ER-091.0000-TAR-7-117.6 OH-ER-000.0001-SA-5-SPRD2	117.2	117.7	Drain tiles; 4" plastic
Erie	OH-ER-092.0000 OH-ER-092.0000-TAR-8-117.8	117.7	118.1	Drain tiles; 4" plastic and clay
Erie	OH-ER-096.0000	118.3	118.4	Drain tiles; size and type unknown
Erie	OH-ER-101.0000	119.2	119.4	Drain tiles; size and type unknown
Erie	OH-ER-102.0010	119.4	119.4	Drain tiles; size and type unknown
Erie	OH-ER-104.0000	119.4	119.5	Drain tiles; 4" plastic
Erie	OH-ER-106.0000 OH-ER-106.0000-TAR-10-119.8	119.5	119.8	Drain tiles; 4" to 6" clay and plastic
Erie	OH-ER-106.0010 OH-ER-106.0010-TAR-10-119.8	119.5	120.0	Drain tiles; 4" to 6" clay and plastic
Erie	OH-ER-107.0000	119.8	120.1	Drain tiles; 4" and 6" clay
Erie	OH-ER-108.0000	120.0	120.1	Drain tiles; 4" plastic
Erie	OH-ER-109.0000 OH-ER-109.0000-VS	120.1	120.3	Drain tiles; 4" and 6" clay
Erie	OH-ER-110.0000	120.3	120.4	Drain tiles; size unknown, clay
Erie	OH-ER-113.0000	120.9	121.3	Drain tiles; 4" to 6" clay and plastic
Erie	OH-ER-114.0000	121.3	121.6	Drain tiles; 4" to 6" clay and plastic
Erie	OH-ER-115.0000	121.6	122.1	Drain tiles; 4" clay; 2' depth
Erie	OH-ER-116.0000	122.1	122.7	Drain tiles; size and type unknown
Erie	OH-ER-118.0000	122.1	122.3	Drain tiles; 4" to 6" clay and plastic
Erie	OH-ER-119.0000	122.1	122.3	Drain tiles; size and type unknown
Erie	OH-ER-120.0000	122.3	122.5	Drain tiles; size and type unknown
Erie	OH-ER-121.0000	122.5	122.7	Drain tiles; size and type unknown
Erie	OH-ER-122.0000	122.7	123.1	Drain tiles; 6" and 8" plastic and clay
Erie	OH-ER-123.0000	123.1	123.2	Drain tiles; 6" and 8" plastic and clay
Erie	OH-ER-125.0000 OH-ER-125.0000-HTAR-2 OH-ER-125.0000-TAR-11-124.0	123.3	123.6	Drain tiles; 4" to 6" clay and plastic

APPENDIX K-5 (cont’d)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start ᵃ	Milepost End ᵃ	Drain or Irrigation Description
Mainline (cont’d)				
Erie	OH-ER-128.0000 OH-ER-128.0000-TAR-11-124.0	123.6	124.0	Drain tiles; 4" to 6" clay and plastic
Erie	OH-ER-129.0000	124.0	124.4	Drain tiles; 4" to 8" clay and plastic
Erie	OH-ER-130.0000	124.4	124.8	Drain tiles; 4" to 6" clay and plastic
Erie	OH-ER-132.0000 OH-ER-132.0000-MLV-10 OH-ER-132.0000-PAR-2-124.8	124.8	124.9	Drain tiles; 4" to 6" clay and plastic
Erie	OH-ER-133.0000	124.9	125.4	Drain tiles; 4" to 8" clay and plastic
Erie	OH-ER-134.0000	125.4	125.7	Drain tiles; 4" to 6" plastic
Erie	OH-ER-135.0000	125.7	125.8	Drain tiles; 4" to 6" plastic
Erie	OH-ER-141.0000	125.9	126.2	Drain tiles; size and type unknown
Erie	OH-ER-142.0000	126.1	126.2	Drain tiles; size and type unknown
Erie	OH-ER-144.0000	126.3	126.7	Drain tiles; size and type unknown
Erie	OH-ER-144.0020	126.5	126.7	Drain tiles; size and type unknown
Erie	OH-ER-146.0000	126.7	126.8	Drain tiles; size and type unknown
Erie	OH-ER-146.0010	126.7	126.8	Drain tiles; size and type unknown
Erie	OH-ER-146.0020	126.7	126.8	Drain tiles; size and type unknown
Erie	OH-ER-147.0000	126.8	127.3	Drain tiles; size and type unknown
Erie	OH-ER-148.0000	127.3	127.3	Drain tiles; size and type unknown
Erie	OH-ER-149.0000	127.3	127.3	Drain tiles; size and type unknown
Erie	OH-ER-150.0000	127.3	127.6	Drain tiles; size and type unknown
Erie	OH-ER-150.0100	127.6	127.7	Drain tiles; size and type unknown
Erie	OH-ER-153.0000	127.8	127.9	Drain tiles; size and type unknown
Erie	OH-ER-154.0000 OH-ER-154.0000-TAR-12-128.3 OH-ER-000.0001-SA-7-SPRD2	127.9	128.3	Drain tiles; size and type unknown
Erie	OH-ER-158.0000 OH-ER-158.0000-MR OH-ER-158.0000-PAR-3-128.8 OH-ER-158.0000-VS	128.7	128.8	Drain tiles; size and type unknown
Erie	OH-ER-160.0000 OH-ER-160.0000-TAR-14-128.9 OH-ER-000.0001-SA-8-SPRD2	128.8	129.2	Drain tiles; size and type unknown
Erie	OH-ER-161.0000	129.2	129.6	Drain tiles; size and type unknown
Erie	OH-ER-162.0000	129.6	129.7	Drain tiles; size and type unknown
Erie	OH-ER-163.0000 OH-ER-163.0000-AB-6	129.7	130.0	Drain tiles; size and type unknown
Erie	OH-ER-165.0000	130.1	130.2	Drain tiles; size and type unknown
Erie	OH-ER-166.0000	130.2	130.4	Drain tiles; size and type unknown
Erie	OH-ER-167.0000	130.4	130.5	Drain tiles; size and type unknown
Erie	OH-ER-168.0000	130.5	130.6	Drain tiles; size and type unknown
Erie	OH-ER-169.0000	130.6	130.8	Drain tiles; size and type unknown
Erie	OH-ER-171.0000	130.8	131.1	Drain tiles; size and type unknown
Erie	OH-ER-172.0000	131.1	131.5	Drain tiles; size and type unknown
Sandusky	OH-SA-002.0000 OH-SA-000.0001-SA-1-SPRD2	131.5	131.7	Drain tiles; size and type unknown
Sandusky	OH-SA-003.0000	131.7	131.9	Drain tiles; size and type unknown
Sandusky	OH-SA-004.0000	131.9	132.0	Drain tiles; 2’ to 5' point wells
Sandusky	OH-SA-005.0000	132.0	132.1	Drain tiles; 2" to 10" clay and plastic

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Sandusky	OH-SA-006.0000	132.1	132.2	Drain tiles; 2" to 10" clay and plastic
Sandusky	OH-SA-007.0000	132.2	132.5	Drain tiles; 2" to 10" clay and plastic
Sandusky	OH-SA-008.0000 OH-SA-008.0000-TAR-1-132.7 OH-SA-000.0001-SA-2-SPRD2	132.5	132.7	Drain tiles; 2" to 10" clay
Sandusky	OH-SA-010.0000	132.7	132.8	Drain tiles; 4" to 8" clay and plastic; 2' to 4' depth
Sandusky	OH-SA-011.0000	132.8	133.1	Drain tiles; size unknown; clay
Sandusky	OH-SA-012.0000 OH-SA-012.0000-TAR-2-133.3 OH-SA-000.0001-SA-3-SPRD3	133.1	133.4	Drain tiles; 4" to 8" plastic
Sandusky	OH-SA-014.0000	133.4	133.5	Drain tiles; 4" plastic; 1.5' to 2' depth
Sandusky	OH-SA-013.0100	133.5	133.7	Drain tiles; size and type unknown
Sandusky	OH-SA-016.0000	133.5	133.9	Drain tiles; 6" clay; 2.5' depth
Sandusky	OH-SA-017.0010 OH-SA-017.0010-CS	133.9	134.1	Drain tiles; 4" clay, plastic, and concrete; 3' to 5' depth
Sandusky	OH-SA-017.0020 OH-SA-017.0020-CS	133.9	134.1	Drain tiles; 4" clay, plastic, and concrete; 3' to 5' depth
Sandusky	OH-SA-017.0000 OH-SA-017.0000-CS OH-SA-017.0000-PAR-0.5-134.1	133.9	134.1	Drain tiles; 4" clay, plastic, and concrete; 3' to 5' depth
Sandusky	OH-SA-019.0000	134.1	134.4	Drain tiles; 4" clay, plastic, and concrete; 3' to 5' depth
Sandusky	OH-SA-019.0010	134.1	134.4	Drain tiles; size and type unknown
Sandusky	OH-SA-022.0000	134.6	135.4	Drain tiles; 4" to 8" plastic; 2.5' depth
Sandusky	OH-SA-024.0000	135.4	135.9	Drain tiles; size and type unknown
Sandusky	OH-SA-025.0000	135.9	136.4	Drain tiles; 4" to 8" plastic; 2.5' depth
Sandusky	OH-SA-027.0000	136.4	136.9	Drain tiles; up to 10" plastic and clay
Sandusky	OH-SA-028.0000	136.9	137.4	Drain tiles; 4" plastic; 2.5' depth
Sandusky	OH-SA-030.0000	137.4	137.5	Drain tiles; size unknown; plastic and clay
Sandusky	OH-SA-031.0000	137.5	137.9	Drain tiles; size and type unknown
Sandusky	OH-SA-032.0000	137.9	138.0	Drain tiles; 4" plastic; 2.5' depth
Sandusky	OH-SA-033.0000	138.0	138.3	Drain tiles; size and type unknown
Sandusky	OH-SA-034.0000	138.3	138.4	Drain tiles; 4" plastic; 2.5' depth
Sandusky	OH-SA-035.0000	138.4	138.6	Drain tiles; 4" clay
Sandusky	OH-SA-037.0000	138.6	138.7	Drain tiles; size and type unknown
Sandusky	OH-SA-038.0000 OH-SA-038.0000-TAR-3-138.7 OH-SA-000.0001-SA-4-SPRD3	138.7	137.9	Drain tiles; size and type unknown
Sandusky	OH-SA-039.0000	138.8	139.1	Drain tiles; size and type unknown
Sandusky	OH-SA-040.0000	139.1	139.3	Drain tiles; size and type unknown
Sandusky	OH-SA-042.0000	139.3	139.5	Drain tiles; size and type unknown
Sandusky	OH-SA-042.0010	139.3	139.5	Drain tiles; size and type unknown
Sandusky	OH-SA-043.0000	139.5	139.6	Drain tiles; size and type unknown
Sandusky	OH-SA-045.0000	139.6	139.8	Drain tiles; 4" clay and plastic
Sandusky	OH-SA-047.0000	139.9	139.9	Drain tiles; 4" to 6" corrugated
Sandusky	OH-SA-048.0000	139.9	140.1	Drain tiles; 4" and 8" clay; 3' depth
Sandusky	OH-SA-050.0000	140.1	140.7	Drain tiles; size and type unknown
Sandusky	OH-SA-052.0000	140.7	140.7	Drain tiles; 4" and 8" plastic; 2.7' depth
Sandusky	OH-SA-054.0000	140.8	141.3	Drain tiles; 4" and 8" plastic; 2.5' depth

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Sandusky	OH-SA-056.0000	141.3	141.6	Drain tiles; 4" plastic; 2' depth
Sandusky	OH-SA-059.0000	141.6	141.9	Drain tiles; 4" plastic; 2' depth
Sandusky	OH-SA-061.0000	141.9	142.2	Drain tiles; 4" plastic; 2' depth
Sandusky	OH-SA-062.0000	142.2	142.5	Drain tiles; 4" and 8" plastic and clay; 3' depth
Sandusky	OH-SA-063.0000	142.5	142.6	Drain tiles; 4" and 8" plastic and clay; 3' depth
Sandusky	OH-SA-064.0000	142.6	142.7	Drain tiles; 4" and 8" plastic and clay; 3' depth
Sandusky	OH-SA-065.0000	142.7	142.7	Drain tiles; 4",6", and 8" plastic; 2.5' depth
Sandusky	OH-SA-067.0000	142.7	142.8	Drain tiles; 4",6", and 8" plastic; 2.5' depth
Sandusky	OH-SA-068.0000	142.8	143.0	Drain tiles; 4",6", and 8" plastic; 2.5' depth
Sandusky	OH-SA-072.0000	143.3	143.5	Drain tiles; size unknown; clay
Sandusky	OH-SA-073.0000	143.5	143.7	Drain tiles; size unknown; clay
Sandusky	OH-SA-076.0000	143.9	144.2	Drain tiles; 4" and 8" plastic; 3' depth
Sandusky	OH-SA-077.0000	144.2	144.3	Drain tiles; size and type unknown
Sandusky	OH-SA-078.0000	144.3	144.4	Drain tiles; size and type unknown
Sandusky	OH-SA-080.0000	144.4	144.7	Drain tiles; 4" and 8" plastic; 3' depth
Sandusky	OH-SA-081.0000 OH-SA-081.0000-AB-1	144.7	145.2	Drain tiles; 4" and 8" plastic; 3' depth
Sandusky	OH-SA-100.0000	146.6	146.7	Drain tiles; 6", 8", and 10" plastic
Sandusky	OH-SA-101.0000	146.7	147.0	Drain Tile; 4" clay, concrete, and plastic
Sandusky	OH-SA-102.0000	147.0	147.2	Drain tiles; 6" clay; 2.7' depth
Sandusky	OH-SA-105.0000	147.5	147.6	Drain tiles; 4" and 8" plastic; 2.5' depth
Sandusky	OH-SA-107.0000 OH-SA-107.0000-TAR-7-147.7 OH-SA-000.0001-SA-5-SPRD3	147.6	147.7	Drain tiles; 4" to 8" clay; 3' in depth
Sandusky	OH-SA-108.0000	147.7	148.1	Drain tiles; size and type unknown
Sandusky	OH-SA-109.0000	148.1	148.2	Drain tiles; 4" plastic; 2.7' depth
Sandusky	OH-SA-110.0000	148.2	148.3	Drain tiles; 4" plastic; 2.7' depth
Sandusky	OH-SA-112.0000	148.3	148.8	Drain tiles; 4" plastic; 2.7' depth
Sandusky	OH-SA-113.0000	148.8	149.0	Drain tiles; 4" and 8" clay and concrete; 2.7' depth
Sandusky	OH-SA-114.0000	149.0	149.3	Drain tiles; 4" and 8" clay and concrete; 2.7' depth
Sandusky	OH-SA-115.0000	149.3	149.4	Drain tiles; 4" and 8" clay and concrete; 2.7' depth
Sandusky	OH-SA-116.0000	149.4	149.6	Drain tiles; size and type unknown
Sandusky	OH-SA-118.0000	149.6	149.8	Drain tiles; size and type unknown
Sandusky	OH-SA-119.0000	149.8	150.0	Drain tiles; size and type unknown
Sandusky	OH-SA-120.0000	150.0	150.3	Drain tiles; 4" plastic; 3' depth
Sandusky	OH-SA-122.0000	150.3	150.5	Drain tiles; 4" plastic; 2' depth
Sandusky	OH-SA-122.0010	150.3	150.5	Drain tiles; 4" plastic; 3' depth
Sandusky	OH-SA-123.0000	150.5	150.7	Drain tiles; 4" plastic; 2.7' depth
Sandusky	OH-SA-125.0000	150.7	151.2	Drain tiles; 4" to 8" plastic; 2.5' depth
Sandusky	OH-SA-126.0000	151.2	151.3	Drain tiles; size and type unknown
Sandusky	OH-SA-128.0000	151.3	151.4	Drain tiles; size and type unknown
Sandusky	OH-SA-129.0000	151.4	151.5	Drain tiles; 4" and 8" plastic; 2.8' depth
Sandusky	OH-SA-130.0000	151.5	151.7	Drain tiles; size and type unknown

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Sandusky	OH-SA-132.0000 OH-SA-132.0000-MLV-11 OH-SA-132.0000-PAR-1.5-151.7	151.7	151.8	Drain tiles; 4" plastic; 2.7' depth
Sandusky	OH-SA-134.0000	151.9	152.2	Drain tiles; 4" clay and plastic; 3.3' depth
Sandusky	OH-SA-135.0000	152.2	152.5	Drain tiles; 8" plastic; 2.5' depth
Sandusky	OH-SA-136.0000	152.5	152.7	Drain tiles; 4" and 8" plastic; 3' depth
Sandusky	OH-SA-137.0000	152.7	152.7	Drain tiles; 4" and 8" plastic; 3' depth
Sandusky	OH-SA-139.0000	152.7	152.9	Drain tiles; 4" clay
Sandusky	OH-SA-140.0000	152.9	153.0	Drain tiles; 4" plastic; 2' depth
Sandusky	OH-SA-141.0000	153.0	153.2	Drain tiles; 4" plastic; 2' depth
Sandusky	OH-SA-142.0000	153.2	153.5	Drain tiles; size and type unknown
Sandusky	OH-SA-143.0000	153.5	153.7	Drain tiles; 4” plastic; 2.7' depth
Sandusky	OH-SA-145.0000	153.8	154.0	Drain tiles; 4” plastic; 2.7' depth
Sandusky	OH-SA-146.0000	154.0	154.1	Drain tiles; 4" plastic; 2.5' depth
Sandusky	OH-SA-147.0000	154.1	154.1	Drain tiles; 4" plastic
Sandusky	OH-SA-150.0000	154.3	154.6	Drain tiles; 4" clay; 1.7' depth
Sandusky	OH-SA-151.0000	154.6	154.7	Drain tiles; size and type unknown
Sandusky	OH-SA-153.0000	154.7	154.8	Drain tiles; size and type unknown
Sandusky	OH-SA-154.0000	154.8	154.9	Drain tiles; size and type unknown
Sandusky	OH-SA-155.0000	154.9	155.0	Drain tiles; size and type unknown
Sandusky	OH-SA-156.0000 OH-SA-156.0000-TAR-8-155.1 OH-SA-000.0001-SA-6-SPRD3	155.0	155.4	Drain tiles; 10" clay main, 4" to 6" plastic
Sandusky	OH-SA-157.0000	155.4	155.6	Drain tiles; size and type unknown
Sandusky	OH-SA-158.0000	155.6	155.6	Drain tiles; size unknown, plastic
Sandusky	OH-SA-159.0000	155.6	155.9	Drain tiles; 4" plastic
Sandusky	OH-SA-161.0000	155.9	156.3	Drain tiles; size and type unknown
Sandusky	OH-SA-163.0000	156.4	156.6	Drain tiles; size and type unknown
Sandusky	OH-SA-164.0000	156.6	156.9	Drain tiles; 4" plastic; 3' to 4' depth
Sandusky	OH-SA-165.0000	156.9	157.1	Drain tiles; size unknown – possible 6" clay
Sandusky	OH-SA-167.0000	157.1	157.4	Drain tiles; size and type unknown
Sandusky	OH-SA-171.0000	157.7	157.9	Drain tiles; size and type unknown
Sandusky	OH-SA-174.0000	158.2	158.4	Drain tiles; 6" clay; 2' depth
Sandusky	OH-SA-175.0000 OH-SA-175.0000-TAR-9-158.6	158.4	158.6	Drain tiles; 4" clay and plastic; 2' to 3' depth
Sandusky	OH-SA-176.0000 OH-SA-176.0000-TAR-9-158.6 OH-SA-000.0001-SA-7.1-SPRD3	158.6	158.9	Drain tiles; 4" clay and plastic; 2' to 3' depth
Sandusky	OH-SA-177.0000 OH-SA-177.0000-AB-2	158.9	159.0	Drain tiles; 2" and 4" clay; 2' depth
Sandusky	OH-SA-179.0000 OH-SA-179.0000-PAR-9.1-159.3	159.0	159.2	Drain tiles; 4" clay and plastic; 2' to 4' depth
Sandusky	OH-SA-180.0000 OH-SA-180.0000-PAR-9.1-159.3 OH-SA-180.0000-MR OH-SA-180.0000-VS	159.2	159.4	Drain tiles; 4" clay and plastic; 2' to 4' depth
Sandusky	OH-SA-181.0000	159.4	159.4	Drain tiles; 2" and 4" clay; 2' depth
Sandusky	OH-SA-189.0000/	160.3	160.4	Drain tiles; 8" plastic; 2' to 3' depth
Sandusky	OH-SA-190.0000	160.4	160.8	Drain tiles; 8" plastic; 2' to 3' depth
Sandusky	OH-SA-191.0000	160.8	160.8	Drain tiles; size and type unknown

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Sandusky	OH-SA-192.0000	160.8	161.1	Drain tiles; size unknown; clay
Sandusky	OH-SA-194.0000	161.1	161.4	Drain tiles; size unknown; clay
Sandusky	OH-SA-195.0000	161.4	161.4	Drain tiles; 6" and 8" plastic; 3' depth
Sandusky	OH-SA-196.0000	161.4	161.4	Drain tiles; 6" and 8" plastic; 3' depth
Sandusky	OH-SA-197.0000	161.4	161.7	Drain tiles; 6" and 8" plastic; 3' depth
Sandusky	OH-SA-198.0000	161.7	161.9	Drain tiles; 4" clay and plastic; 3' depth
Sandusky	OH-SA-200.0000	161.9	162.2	Drain tiles; 4" clay; 3' depth
Sandusky	OH-SA-201.0000	162.2	162.4	Drain tiles; 6" and 8" plastic; 3' depth
Sandusky	OH-SA-204.0000 OH-SA-204.0000-HTAR-1	162.4	162.5	Drain tiles; size and type unknown
Sandusky	OH-SA-207.0000	162.5	162.8	Drain tiles; 6" clay; 2' depth
Sandusky	OH-SA-208.0000	162.8	162.9	Drain tiles; 4" clay; 1.5' depth
Sandusky	OH-SA-212.0000	163.1	163.2	Drain tiles; 4" and 8" plastic and clay; 2' to 4' depth
Sandusky	OH-SA-216.0000	163.6	163.6	Drain tiles; 4" clay; 2' to 4' depth
Sandusky	OH-SA-217.0000	163.6	163.7	Drain tiles; 4" clay; 2' to 4' depth
Sandusky	OH-SA-218.0000	163.7	163.7	Drain tiles; 4" clay; 2.5' depth
Wood	OH-WO-002.0000	163.7	164.0	Drain tiles; 4" clay
Wood	OH-WO-002.0010	163.7	163.8	Drain tiles; 4" to 6" clay; 2' to 3' depth
Wood	OH-WO-003.0000 OH-WO-003.0000-TAR-1-163.9 OH-WO-000.0001-SA-1-SPRD3	163.8	164.0	Drain tiles; 3" to 4" clay; 3' to 4' depth
Wood	OH-WO-004.0000	164.0	164.1	Drain tiles; size and type unknown
Wood	OH-WO-005.0000	164.1	164.2	Drain tiles; size and type unknown
Wood	OH-WO-006.0000	164.2	164.5	Drain tiles; 4" plastic
Wood	OH-WO-009.0000	164.7	164.9	No drain tile on the south side of existing pipeline
Wood	OH-WO-011.0000	165.0	165.1	Drain tiles; size and type unknown
Wood	OH-WO-013.0000	165.1	165.2	Drain tiles; size and type unknown
Wood	OH-WO-014.0000	165.2	165.4	Drain tiles; size and type unknown
Wood	OH-WO-014.0010	165.2	165.4	Drain tiles; size and type unknown
Wood	OH-WO-015.0000 OH-WO-015.0000-TAR-2-165.5	165.4	165.6	Drain tiles; 4" plastic; 3' depth
Wood	OH-WO-016.0000	165.6	165.7	Drain tiles; 4" and 6" clay and plastic
Wood	OH-WO-017.0000	165.7	165.8	Drain tiles; 4" and 6" plastic
Wood	OH-WO-018.0000	165.8	166.0	Drain tiles; 4" plastic
Wood	OH-WO-021.0000	166.1	166.1	Drain tiles; size and type unknown
Wood	OH-WO-022.0000 OH-WO-022.0000-VS	166.1	166.6	Drain tiles; size and type unknown
Wood	OH-WO-023.0000	166.6	166.7	Drain tiles; size and type unknown
Wood	OH-WO-024.0000 OH-WO-024.0000-TAR-3-166.8	166.7	166.7	Drain tiles; size and type unknown
Wood	OH-WO-026.0000	166.8	167.2	Drain tiles; size and type unknown
Wood	OH-WO-028.0000	167.2	167.4	Drain tiles; size and type unknown
Wood	OH-WO-029.0000	167.4	167.8	Drain tiles; size and type unknown
Wood	OH-WO-029.0010	167.4	167.4	Drain tiles; 4" clay and concrete; 3' depth
Wood	OH-WO-030.0000	167.7	167.8	Drain tiles; size and type unknown

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Wood	OH-WO-031.0000 OH-WO-031.0000-PAR-1-167.8 OH-WO-031.0000-MLV-12	167.8	167.8	Drain tiles; 4" plastic; 2.5' to 3' depth
Wood	OH-WO-033.0000	167.8	168.0	Drain tiles; 4" clay; 2.5' to 3' depth
Wood	OH-WO-034.0000	168.0	168.1	Drain tiles; 4" clay; 2.5' to 3' depth
Wood	OH-WO-035.0000	168.1	168.2	Drain tiles; 4" clay; 2.5' to 3' depth
Wood	OH-WO-036.0000	168.2	168.3	Drain tiles; 4" clay; 2.5' to 3' depth
Wood	OH-WO-037.0000	168.3	168.4	Drain tiles; 4" clay; 3.5' depth
Wood	OH-WO-039.0000	168.4	168.4	Drain tiles; 4" clay; 3.5' depth
Wood	OH-WO-040.0000	168.4	168.9	Drain tiles; size unknown, clay and concrete; 4' depth
Wood	OH-WO-041.0000	168.9	169.4	Drain tiles; 4" clay
Wood	OH-WO-043.0000	169.4	169.9	Drain tiles; 4" plastic
Wood	OH-WO-044.0000	169.9	170.2	Drain tiles; 4" plastic
Wood	OH-WO-045.0000 OH-WO-045.0000-VS	170.2	170.4	Drain tiles; 4" plastic
Wood	OH-WO-047.0000	170.4	170.7	Drain tiles; 4" to 8"; type unknown
Wood	OH-WO-049.0000	170.7	170.8	Drain tiles; size and type unknown
Wood	OH-WO-051.0000	170.8	170.9	Drain tiles; size and type unknown
Wood	OH-WO-052.0000	170.9	170.9	Drain tiles; size and type unknown
Wood	OH-WO-053.0000 OH-WO-053.0000-TAR-4-171.2	170.9	171.2	Drain tiles; size and type unknown
Wood	OH-WO-054.0000 OH-WO-054.0000-TAR-4-171.2 OH-WO-000.0001-SA-5-SPRD3	171.2	171.4	Drain tiles; 4" plastic
Wood	OH-WO-055.0000	171.4	171.4	Drain tiles; 4" plastic
Wood	OH-WO-057.0000	171.4	171.7	Drain tiles; 4" clay and plastic
Wood	OH-WO-058.0000	171.4	171.7	Drain tiles; 4" plastic
Wood	OH-WO-059.0000	171.7	171.8	Drain tiles; 4" clay and plastic
Wood	OH-WO-060.0000	171.8	171.8	Drain tiles; 4" clay and plastic
Wood	OH-WO-061.0000	171.8	171.9	Drain tiles; 3" to 6" clay, plastic, and cement
Wood	OH-WO-062.0000	171.9	172.0	Drain tiles; size and type unknown
Wood	OH-WO-063.0000	172.0	172.2	Drain tiles; 4" clay and plastic
Wood	OH-WO-064.0000	172.2	172.2	Drain tiles; size unknown, clay and plastic
Wood	OH-WO-065.0000	172.2	172.3	Drain tiles; size unknown, clay and plastic
Wood	OH-WO-066.0000	172.3	172.5	Drain tiles; 4" clay, concrete, and plastic
Wood	OH-WO-067.0000	172.5	172.5	Drain tiles; size and type unknown
Wood	OH-WO-068.0000	172.5	172.6	Drain tiles; size and type unknown
Wood	OH-WO-070.0000	172.6	172.8	Drain tiles; 4" clay, concrete, and plastic
Wood	OH-WO-071.0000	172.8	172.9	Drain tiles; 4" plastic
Wood	OH-WO-072.0000	172.9	173.0	Drain tiles; 4" plastic
Wood	OH-WO-073.0000	173.0	173.3	Drain tiles; 4" plastic
Wood	OH-WO-076.0010	173.4	173.5	Drain tiles; size and type unknown
Wood	OH-WO-079.0000	173.6	173.7	Drain tiles; 4" plastic
Wood	OH-WO-084.0000	174.0	174.0	Drain tiles; 4" to 10" clay
Wood	OH-WO-085.0000	174.0	174.2	Drain tiles; 4" to 10" clay
Wood	OH-WO-086.0000	174.2	174.5	Drain tiles; 4" plastic

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Wood	OH-WO-088.0000 OH-WO-088.0000-AB-3 OH-WO-088.0000-TAR-6-174.5	174.5	174.6	Drain tiles; 4" plastic
Wood	OH-WO-088.0100-AB-3	174.5	174.6	Drain tiles; 4" plastic
Wood	OH-WO-089.0000	174.6	174.7	Drain tiles; 4" plastic
Wood	OH-WO-090.0000	174.7	174.7	Drain tiles; 4" plastic
Wood	OH-WO-091.0000	174.7	174.9	Drain tiles; 4" plastic
Wood	OH-WO-092.0000 OH-WO-000.0001-SA-6-SPRD3	174.9	175.0	Drain tiles; size and type unknown
Wood	OH-WO-093.0000 OH-WO-093.0000-TAR-7-175.1 OH-WO-000.0001-SA-6.1-SPRD3	175.0	175.1	Drain tiles; size and type unknown
Wood	OH-WO-095.0000	175.2	175.2	Drain tiles; size and type unknown
Wood	OH-WO-096.0000	175.2	175.4	Drain tiles; size and type unknown
Wood	OH-WO-097.0000	175.4	175.4	Drain tiles; 4" clay, concrete, and plastic
Wood	OH-WO-099.0000	175.4	175.6	Drain tiles; size unknown, plastic
Wood	OH-WO-101.0000	175.6	176.1	Drain tiles; 4" to 6" plastic
Wood	OH-WO-102.0000	176.1	176.2	Drain tiles; 4" to 6" plastic
Wood	OH-WO-103.0000	176.2	176.6	Drain tiles; size unknown; clay
Wood	OH-WO-105.0000	176.6	176.8	Drain tiles; 4" clay and plastic
Wood	OH-WO-106.0000	176.8	176.9	Drain tiles; 4" clay and plastic
Wood	OH-WO-107.0000	176.9	176.9	Drain tiles; 4" clay and plastic
Wood	OH-WO-108.0000	176.9	177.0	Drain tiles; 4" clay and plastic
Wood	OH-WO-109.0000	177.0	177.0	Drain tiles; 4" clay and plastic
Wood	OH-WO-110.0000	177.0	177.3	Drain tiles; 4" to 6" plastic
Wood	OH-WO-112.0000	177.3	177.7	Drain tiles; size and type unknown
Wood	OH-WO-113.0000	177.7	177.8	Drain tiles; 4" to 6" plastic
Wood	OH-WO-114.0000	177.8	177.8	Drain tiles; 4" clay and plastic
Wood	OH-WO-115.0000	177.8	178.1	Drain tiles; 4" clay and plastic
Wood	OH-WO-117.0000	178.1	178.3	Drain tiles; 4" clay and plastic
Wood	OH-WO-118.0000	178.3	178.4	Drain tiles; 4" clay and plastic
Wood	OH-WO-119.0000	178.4	178.4	Drain tiles; size and type unknown
Wood	OH-WO-120.0000	178.4	178.5	Drain tiles; 4" clay
Wood	OH-WO-122.0000	178.6	178.8	Drain tiles; 4" clay
Wood	OH-WO-123.0000 OH-WO-123.0000-TAR-8-179.1 OH-WO-000.0001-SA-7-SPRD3	178.8	179.1	Drain tiles; 4" clay, concrete, and plastic
Wood	OH-WO-125.0000 OH-WO-125.0000-TAR-9-179.2	179.1	179.2	Drain tiles; 4" clay and plastic
Wood	OH-WO-126.0000	179.2	179.3	Drain tiles; 4" clay and plastic
Wood	OH-WO-127.0000	179.3	179.3	Drain tiles; 4" plastic
Wood	OH-WO-128.0000	179.3	179.5	Drain tiles; 4" and 10" clay, cement, and PVC; 2.25' to 3.1' depth
Wood	OH-WO-129.0000	179.5	179.5	Drain tiles; 4"; type unknown
Wood	OH-WO-130.0000	179.5	179.7	Drain tiles; 6" clay; 4' depth
Wood	OH-WO-131.0000 OH-WO-131.0000-TAR-10-179.9 OH-WO-131.0000-TAR-11-180.1	179.7	180.2	Drain tiles; 4" to 6" clay; 4' depth
Wood	OH-WO-134.0000	180.2	180.5	Drain tiles; size and type unknown
Wood	OH-WO-135.0000	180.5	180.7	Drain tiles; size and type unknown

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Wood	OH-WO-137.0000	180.8	181.0	Drain tiles; size and type unknown
Wood	OH-WO-139.0000	181.0	181.2	Drain tiles; size and type unknown
Wood	OH-WO-141.0000 OH-WO-141.0000-HTAR-1 OH-WO-141.0000-TAR-12-181.3	181.2	181.4	Drain tiles; size and type unknown
Lucas	OH-LC-016.0000	181.8	182.1	Drain tiles; 4" clay and plastic
Lucas	OH-LC-017.0000 OH-LC-017.0000-TAR-1-182.1 OH-LC-000.0001-SA-1-SPRD3 OH-LC-017.0000-VS	182.1	182.1	Drain tiles; 4" clay
Lucas	OH-LC-019.0000	182.1	182.4	Drain tiles; 4" clay
Lucas	OH-LC-020.0000	182.4	182.6	Drain tiles; size and type unknown
Lucas	OH-LC-021.0000	182.6	182.8	Drain tiles; size and type unknown
Lucas	OH-LC-022.0000	182.8	182.9	Drain tiles; 3" plastic
Lucas	OH-LC-023.0000	182.9	183.1	Drain tiles; 3" to 4" plastic
Lucas	OH-LC-025.0000	183.1	183.3	Drain tiles; 4" clay
Lucas	OH-LC-027.0000	183.4	183.5	Drain tiles; 4" clay
Lucas	OH-LC-028.0000 OH-LC-028.0000-CS	183.4	183.6	Drain tiles; 4" clay and plastic
Lucas	OH-LC-029.0000	183.6	183.7	Drain tiles; 3" to 4" plastic
Lucas	OH-LC-030.0000	183.7	184.0	Drain tiles; 3" to 4" plastic and clay
Lucas	OH-LC-031.0000	184.0	184.1	Drain tiles; 4" to 5" plastic and clay
Lucas	OH-LC-032.0000	184.1	184.2	Drain tiles; 4" to 6" plastic, some clay
Lucas	OH-LC-034.0000	184.3	184.5	Drain tiles; 4" clay
Lucas	OH-LC-035.0000	184.5	184.8	Drain tiles; 3" to 4" plastic and clay
Lucas	OH-LC-037.0000 OH-LC-037.0000-TAR-2-185.3	184.8	185.2	Drain tiles; 3" to 4" clay
Lucas	OH-LC-038.0000 OH-LC-038.0000-TAR-2-185.3	185.2	185.3	Drain tiles; 3" to 4" plastic and clay
Lucas	OH-LC-041.0000	185.3	185.5	Drain tiles; 4" clay
Lucas	OH-LC-042.0000	185.5	185.8	Drain tiles; size and type unknown
Lucas	OH-LC-043.0000	185.8	186.0	Drain tiles; 4" clay
Lucas	OH-LC-044.0000	186.0	186.3	Drain tiles; 4" clay
Lucas	OH-LC-046.0000	186.3	186.6	Drain tiles; 4" to 5" clay
Lucas	OH-LC-047.0000	186.6	186.6	Drain tiles; 4" to 5" clay
Lucas	OH-LC-048.0000	186.6	186.8	Drain tiles; 4" to 5" clay
Lucas	OH-LC-049.0000	186.8	187.1	Drain tiles; 4" to 5" plastic and clay
Lucas	OH-LC-050.0000	187.1	187.3	Drain tiles; 4" to 6" plastic and clay
Lucas	OH-LC-052.0000	187.3	187.6	Drain tiles; 6" plastic
Lucas	OH-LC-055.0000	187.9	188.1	Drain tiles; 4" to 5" plastic and clay
Lucas	OH-LC-056.0000	188.1	188.4	Drain tiles; 4" clay
Lucas	OH-LC-058.0000	188.4	188.6	Drain tiles; 4" to 6" plastic and clay
Lucas	OH-LC-059.0000	188.6	188.6	Drain tiles; 4" to 6" plastic and clay
Lucas	OH-LC-060.0000	188.6	188.8	Drain tiles; 4" to 6" plastic and clay
Lucas	OH-LC-061.0000	188.8	188.9	Drain tiles; 4" and 6" plastic
Lucas	OH-LC-063.0000	188.9	189.1	Drain tiles; 4" and 5" plastic
Lucas	OH-LC-064.0000 OH-LC-064.0000-PAR-2-189.2 OH-LC-064.0000-MLV-13	189.1	189.3	Drain tiles; 6" plastic

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Henry	OH-HY-002.0000	189.4	189.7	Drain tiles; size and type unknown
Henry	OH-HY-004.0000	189.8	190.0	Drain tiles; 4" to 6" plastic
Henry	OH-HY-006.0000	190.0	190.2	Drain tiles; size and type unknown
Fulton	OH-FU-001.0000	190.2	190.5	Drain tiles; size and type unknown
Fulton	OH-FU-003.0000/	190.5	190.9	Drain tiles; size and type unknown
Fulton	OH-FU-004.0000	190.9	191.5	Drain tiles; 4" plastic
Fulton	OH-FU-006.0000 OH-FU-006.0000-AB-1	191.5	191.6	Drain tiles; size and type unknown
Fulton	OH-FU-007.0000	191.6	192.0	Drain tiles; size and type unknown
Fulton	OH-FU-008.0000	192.0	192.3	Drain tiles; size and type unknown
Fulton	OH-FU-010.0000	192.3	192.8	Drain tiles; size and type unknown
Fulton	OH-FU-012.0000	192.8	193.0	Drain tiles; size and type unknown
Fulton	OH-FU-013.0000	193.0	193.3	Drain tiles; size and type unknown
Fulton	OH-FU-017.0000	193.8	194.1	Drain tiles; size and type unknown
Fulton	OH-FU-018.0000	194.1	194.3	Drain tiles; 4" PVC and 8" main
Fulton	OH-FU-019.0000	194.3	194.8	Drain tiles; 4" PVC
Fulton	OH-FU-021.0000	194.8	195.1	Drain tiles; size and type unknown
Fulton	OH-FU-022.0000	195.1	195.3	Drain tiles; size and type unknown
Fulton	OH-FU-023.0000	195.3	195.6	Drain tiles; 4" and 6" sand slot and clay
Fulton	OH-FU-025.0000	195.6	195.9	Drain tiles; 4" and 6" PVC and clay
Fulton	OH-FU-027.0000	195.9	196.2	Drain tiles; 4" PVC
Fulton	OH-FU-029.0000	196.2	196.7	Drain tiles; 4" and 3" PVC and clay
Fulton	OH-FU-030.0000	196.7	196.8	Drain tiles; 4", 8", and 10" plastic; 4' to 5' depth
Fulton	OH-FU-031.0000	196.8	197.3	Drain tiles; 4", 8", and 10" plastic; 4' to 5' depth
Fulton	OH-FU-033.0000	197.3	197.8	Drain tiles; size and type unknown
Fulton	OH-FU-033.0010	197.8	197.8	Drain tiles; size and type unknown
Fulton	OH-FU-035.0000	197.9	198.0	Drain tiles; 4" and 10" clay and PVC
Fulton	OH-FU-036.0000	198.0	198.0	Drain tiles; 4" and 10" clay and PVC
Fulton	OH-FU-037.0000	198.0	198.3	Drain tiles; size and type unknown
Fulton	OH-FU-039.0000	198.3	198.8	Drain tiles; 4" and 10" PVC
Fulton	OH-FU-040.0000	198.8	199.0	Drain tiles; 4" and 10" PVC
Fulton	OH-FU-042.0000	199.1	199.3	Drain tiles; 4" and 10" PVC
Fulton	OH-FU-044.0000 OH-FU-044.0000-VS	199.3	199.4	Drain tiles; 20" plastic and clay
Fulton	OH-FU-045.0000	199.4	199.6	Drain tiles; size and type unknown
Fulton	OH-FU-046.0000	199.6	199.7	Drain tiles; 4" PVC
Fulton	OH-FU-047.0000	199.7	200.0	Drain tiles; 4" PVC and clay
Fulton	OH-FU-049.0000	200.0	200.2	Drain tiles; size and type unknown
Fulton	OH-FU-050.0000	200.2	200.2	Drain tiles; 4" feed, 6" main; plastic
Fulton	OH-FU-051.0000 OH-FU-051.0000-TAR-1-200.7	200.2	200.5	Drain tiles; 20" plastic and clay
Fulton	OH-FU-052.0000 OH-FU-052.0000-TAR-1-200.7 OH-FU-000.0001-SA-1-SPRD3	200.5	200.6	Drain tiles; 20" plastic and clay
Fulton	OH-FU-053.0000 OH-FU-053.0000-TAR-1-200.7	200.6	200.8	Drain tiles; 20" plastic and clay
Fulton	OH-FU-054.0000	200.8	200.9	Drain tiles; 4" clay and plastic

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Fulton	OH-FU-057.0000	200.9	201.4	Drain tiles; size unknown, plastic
Fulton	OH-FU-058.0000	201.4	201.6	Drain tiles; 4" clay and plastic
Fulton	OH-FU-061.0000	201.6	201.8	Drain tiles; size and type unknown
Fulton	OH-FU-062.0000	201.8	202.2	Drain tiles; size and type unknown
Fulton	OH-FU-063.0000	202.2	202.7	Drain tiles; 4", 8", and 10" clay, plastic, and concrete
Fulton	OH-FU-065.0000	202.7	202.8	Drain tiles; 4" PVC; 4' depth
Fulton	OH-FU-066.0000	202.8	203.0	Drain tiles; 4" PVC; 4' depth
Fulton	OH-FU-067.0000	203.0	203.2	Drain tiles; 4" PVC; 4' depth
Fulton	OH-FU-068.0000	203.2	203.4	Drain tiles; 4" PVC; 4' depth
Fulton	OH-FU-069.0000	203.4	203.8	Drain tiles; 4" PVC; 4' depth
Fulton	OH-FU-071.0000	203.8	203.9	Drain tiles; 4", 6", and 8" plastic and clay
Fulton	OH-FU-072.0000	203.9	204.3	Drain tiles; 4" to 6" clay and PVC; 4' depth
Fulton	OH-FU-073.0000	204.3	204.4	Drain tiles; 4" to 6" clay and PVC; 4' depth
Fulton	OH-FU-075.0000	204.4	204.8	Drain tiles; 4" PVC; 2' to 3' depth
Fulton	OH-FU-076.0000	204.8	204.9	Drain tiles; 4" clay and plastic; 26" to 30" depth
Fulton	OH-FU-078.0000	204.9	205.3	Drain tiles; 4" clay and plastic; 26" to 30" depth
Fulton	OH-FU-079.0000	204.9	205.3	Drain tiles; 4" PVC; 2' to 3' depth
Fulton	OH-FU-080.0000	205.3	205.5	Drain tiles; 8" PVC and clay; 4' depth
Fulton	OH-FU-081.0000	205.5	206.0	Drain tiles; 4" clay and plastic; 3' depth
Fulton	OH-FU-083.0000 OH-FU-083.0000-AB-2	206.0	206.2	Drain tiles; 4" PVC; 2' to 3' depth
Fulton	OH-FU-084.0000	206.2	206.5	Drain tiles; 4", 6", and 8" plastic and clay; 2' to 3' depth
Fulton	OH-FU-085.0000	206.5	206.7	Drain tiles; 4", 6", and 8" plastic and clay; 2' to 3' depth
Fulton	OH-FU-086.0000	206.7	207.0	Drain tiles; 4", 6", and 8" plastic and clay; 2' to 3' depth
Fulton	OH-FU-088.0000/	207.0	207.2	Drain tiles; 4", 6", and 8" plastic and clay; 2' to 3' depth
Fulton	OH-FU-089.0000	207.2	207.4	Drain tiles; 4" plastic and clay; 3' depth
Fulton	OH-FU-090.0000	207.4	207.8	Drain tiles; 4", 6", and 8" plastic and clay; 2' to 3' depth
Fulton	OH-FU-092.0000	207.8	207.9	Drain tiles; 4", 6", and 8" plastic and clay; 2' to 3' depth
Fulton	OH-FU-093.0000	207.8	207.9	Drain tiles; 12" plastic
Fulton	OH-FU-094.0000	207.9	208.0	Drain tiles; size unknown, plastic
Fulton	OH-FU-095.0000 OH-FU-095.0000-TAR-2-208.2 OH-FU-000.0001-SA-2-SPRD3 OH-FU-000.0001-SA-3-SPRD3	208.0	208.2	Drain tiles; size and type unknown
Fulton	OH-FU-096.0000	208.2	208.3	Drain tiles; size and type unknown
MICHIGAN				
Mainline				
Lenawee	MI-LE-001.0000 MI-LE-001.0000-TAR-1-208.3 MI-LE-000.0001-SA-1-SPRD4 MI-LE-000.0001-SA-2-SPRD4 MI-LE-003.0000-MLV-14	208.3	208.5	Drain tiles; 4" clay and plastic

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Lenawee	MI-LE-002.0000	208.5	208.7	Drain tiles; 4" clay and plastic
Lenawee	MI-LE-003.0000 MI-LE-003.0000-MLV-15 MI-LE-003.0000-PAR-1-208.9	208.7	209.0	Drain tiles; 4" clay and plastic
Lenawee	MI-LE-005.0000	209.0	209.5	Drain tiles; 4" and 6" clay
Lenawee	MI-LE-006.0000	209.5	209.7	Drain tiles; 4" and 8" clay and plastic
Lenawee	MI-LE-007.0000	209.7	210.0	Drain tiles; 4" and 8" clay and plastic
Lenawee	MI-LE-010.0000	210.0	210.2	Drain tiles; 4" and 8" clay and plastic
Lenawee	MI-LE-011.0000	210.2	210.5	Drain tiles; 4" clay
Lenawee	MI-LE-012.0000	210.5	211.0	Drain tiles; 4" and 8" clay and plastic
Lenawee	MI-LE-014.0000	211.0	211.5	Drain tiles; 4" and 8" clay and plastic
Lenawee	MI-LE-015.0000	211.5	212.0	Drain tiles; 4" plastic
Lenawee	MI-LE-017.0000	212.0	212.5	Drain tiles; 4" and 8" clay and plastic
Lenawee	MI-LE-018.0000	212.5	213.0	Drain tiles; 4" plastic
Lenawee	MI-LE-020.0000	213.0	213.5	Drain tiles; 4" and 6" plastic
Lenawee	MI-LE-021.0000	213.5	214.0	Drain tiles; 4" and 6" clay and plastic
Lenawee	MI-LE-023.0000	214.0	214.3	Drain tiles; 4" and 6" clay and plastic
Lenawee	MI-LE-024.0000	214.3	214.5	Drain tiles; 4" and 6" clay and plastic
Lenawee	MI-LE-025.0000	214.5	214.8	Drain tiles; 4" and 6" clay and plastic
Lenawee	MI-LE-026.0000	215.1	215.2	Drain tiles; 4" clay
Lenawee	MI-LE-027.0000	215.8	215.9	Drain tiles; 4" plastic
Lenawee	MI-LE-030.0000	215.9	216.0	Drain tiles; size and type unknown
Lenawee	MI-LE-031.0000	216.0	216.3	Drain tiles; 4" and 8" clay and plastic
Lenawee	MI-LE-032.0000	216.3	216.7	Drain tiles; 4" and 8" clay and plastic
Lenawee	MI-LE-034.0000	216.7	216.8	Drain tiles; 4" clay
Lenawee	MI-LE-035.0000	216.8	217.1	Drain tiles; 4" and 8" plastic
Lenawee	MI-LE-038.0000	217.1	217.4	Drain tiles; 4", 6", and 8" plastic
Lenawee	MI-LE-039.0000	217.4	217.9	Drain tiles; 4" plastic
Lenawee	MI-LE-040.0000	217.9	218.4	Drain tiles; 4" clay
Lenawee	MI-LE-042.0000	218.4	218.9	Drain tiles; 4" plastic
Lenawee	MI-LE-043.0000	218.9	219.0	Drain tiles; 4" clay
Lenawee	MI-LE-044.0000	219.0	219.2	Drain tiles; 4" clay
Lenawee	MI-LE-045.0000	219.2	219.3	Drain tiles; 4" clay
Lenawee	MI-LE-046.0000	219.3	219.5	Drain tiles; 4" clay
Lenawee	MI-LE-047.0000	219.6	219.8	Drain tiles; size and type unknown
Lenawee	MI-LE-049.0010	219.6	219.8	Drain tiles; 4" clay
Lenawee	MI-LE-050.0000	219.8	220.1	Drain tiles; 4" clay and 4" and 8" plastic
Lenawee	MI-LE-052.0000	220.1	220.2	Drain tiles; 4" clay and 4" and 8" plastic
Lenawee	MI-LE-053.0000	220.2	220.4	Drain tiles; 4" clay
Lenawee	MI-LE-054.0000	220.4	220.4	Drain tiles; 4" clay
Lenawee	MI-LE-055.0010	220.4	220.4	Drain tiles; 4" clay
Lenawee	MI-LE-056.0000	220.4	220.6	Drain tiles; 4" clay
Lenawee	MI-LE-057.0000	220.6	220.7	Drain tiles; 4" clay
Lenawee	MI-LE-059.0000 MI-LE-059.0000-AB-1 MI-LE-059.0000-TAR-2-220.7	220.7	221.0	Drain tiles; 4" and 8" plastic
Lenawee	MI-LE-059.0100-AB-1	220.7	221.0	Drain tiles; 4" clay
Lenawee	MI-LE-060.0000	221.0	221.0	Drain tiles; 4" clay and 4" and 8" plastic

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Lenawee	MI-LE-061.0000	221.0	221.2	Drain tiles; 4" to 8" plastic
Lenawee	MI-LE-062.0000	221.2	221.2	Drain tiles; 4" clay and 4" and 8" plastic
Lenawee	MI-LE-063.0000	221.2	221.3	Drain tiles; 4" to 6" clay
Lenawee	MI-LE-065.0000	221.3	221.6	Drain tiles; 4" to 8" plastic
Lenawee	MI-LE-066.0000	221.6	221.8	Drain tiles; 4" to 6" clay
Lenawee	MI-LE-067.0000	221.8	222.0	Drain tiles; 4" to 8" plastic
Lenawee	MI-LE-069.0000	222.1	222.2	Drain tiles; 4" to 6" clay
Lenawee	MI-LE-070.0000	222.2	222.7	Drain tiles; 6" plastic, 4" metal
Lenawee	MI-LE-072.0000	222.7	222.8	Drain tiles; size and type unknown
Lenawee	MI-LE-073.0000	222.8	223.1	Drain tiles; 4" clay and plastic
Lenawee	MI-LE-074.0000	223.1	223.2	Drain tiles; size unknown, plastic
Lenawee	MI-LE-076.0000	223.3	223.5	Drain tiles; 4" clay and plastic
Lenawee	MI-LE-077.0000	223.5	223.8	Drain tiles; size unknown, plastic
Lenawee	MI-LE-078.0000	223.8	224.1	Drain tiles; 4" clay and plastic
Lenawee	MI-LE-079.0000	224.1	224.1	Drain tiles; 4" clay and plastic
Lenawee	MI-LE-080.0000	224.1	224.4	Drain tiles; 4" clay and plastic
Lenawee	MI-LE-082.0000	224.4	224.6	Drain tiles; size and type unknown
Lenawee	MI-LE-083.0000	224.6	224.9	Drain tiles; size unknown, plastic
Lenawee	MI-LE-084.0000	224.9	225.0	Drain tiles; 8" and 4" plastic
Lenawee	MI-LE-086.0000	225.0	225.1	Drain tiles; 8" and 4" plastic
Lenawee	MI-LE-087.0000	225.1	225.5	Drain tiles; 3" to 12" plastic
Lenawee	MI-LE-088.0000	225.5	225.6	Drain tiles; size and type unknown
Lenawee	MI-LE-091.0000	225.7	226.1	Drain tiles; 6" clay
Lenawee	MI-LE-092.0000	226.1	226.3	Drain tiles; 4" clay
Lenawee	MI-LE-093.0000 MI-LE-093.0000-TAR-3-226.4	226.3	226.6	Drain tiles; 10" plastic
Lenawee	MI-LE-095.0000	226.7	227.0	Drain tiles; 10" plastic
Lenawee	MI-LE-097.0000	227.0	227.2	Drain tiles; size and type unknown
Lenawee	MI-LE-098.0000	227.2	227.5	Drain tiles; 10" plastic
Lenawee	MI-LE-100.0000	227.6	227.6	Drain tiles; 4" clay and plastic
Lenawee	MI-LE-101.0000	227.6	227.9	Drain tiles; 4" clay and plastic
Lenawee	MI-LE-000.0010-CERT-Y-1-SPRD-4	N/A	N/A	Drain tiles; 6" clay
Lenawee	MI-LE-102.0000	227.9	228.0	Drain tiles; 8" clay and plastic
Lenawee	MI-LE-103.0000 MI-LE-103.0000-PAR-2-228.2 MI-LE-103.0000-MLV-15	228.0	228.2	Drain tiles; 3" to 4" clay and plastic
Lenawee	MI-LE-105.0000	228.2	228.5	Drain tiles; size and type unknown
Lenawee	MI-LE-106.0000	228.5	228.5	Drain tiles; size and type unknown
Lenawee	MI-LE-106.0010	228.5	228.5	Drain tiles; size and type unknown
Lenawee	MI-LE-107.0000	228.5	228.8	Drain tiles; 4" clay and plastic
Lenawee	MI-LE-108.0000	228.8	229.4	Drain tiles; 4" to 12" plastic
Lenawee	MI-LE-110.0000	229.4	229.5	Drain tiles; size unknown; clay and plastic
Lenawee	MI-LE-111.0000 MI-LE-111.0000-TAR-4-229.6 MI-LE-000.0001-SA-4-SPRD4	229.5	229.8	Drain tiles; 4", 5", 6", and 8" clay and plastic
Lenawee	MI-LE-112.0000	229.8	229.9	Drain tiles; multiple sizes; clay and plastic
Lenawee	MI-LE-113.0000	229.9	230.1	Drain tiles; multiple sizes; clay and plastic
Lenawee	MI-LE-115.0000	230.1	230.3	Drain tiles; multiple sizes; clay and plastic

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start ª	Milepost End ª	Drain or Irrigation Description
Mainline (cont'd)				
Lenawee	MI-LE-116.0000	230.3	230.4	Drain tiles; 4" clay
Monroe	MI-MR-002.0000	230.4	230.5	Drain tiles; 4" to 6" clay and plastic
Monroe	MI-MR-003.0000	230.5	230.7	Drain tiles; multiple sizes; clay and plastic
Monroe	MI-MR-006.0000 MI-MR-006.0000-TAR-1-230.7	230.7	230.8	Drain tiles; size unknown, plastic
Monroe	MI-MR-007.0000	230.8	231.1	Drain tiles; multiple sizes; clay and plastic
Monroe	MI-MR-008.0000	231.1	231.2	Drain tiles; size and type unknown
Monroe	MI-MR-010.0000	231.3	231.3	Drain tiles; multiple sizes; clay and plastic
Monroe	MI-MR-012.0000	231.3	231.8	Drain tiles; size and type unknown
Monroe	MI-MR-013.0000	231.8	231.9	Drain tiles; size unknown; clay
Monroe	MI-MR-015.0000	231.9	232.2	Drain tiles; size unknown; clay
Monroe	MI-MR-016.0000	232.2	232.2	Drain tiles; 4" plastic
Monroe	MI-MR-018.0000	232.2	232.3	Drain tiles; 4" to 8" plastic
Monroe	MI-MR-019.0000	232.3	232.5	Drain tiles; 4" to 6" plastic
Monroe	MI-MR-021.0000	232.5	232.7	Drain tiles; multiple sizes; clay and plastic
Monroe	MI-MR-022.0000	232.7	232.8	Drain tiles; multiple sizes; clay and plastic
Monroe	MI-MR-023.0000	232.8	233.0	Drain tiles; 4" clay
Monroe	MI-MR-025.0000	233.1	233.1	Drain tiles; 4" to 8" plastic
Monroe	MI-MR-027.0000	233.1	233.2	Drain tiles; size and type unknown
Monroe	MI-MR-028.0000	233.2	233.3	Drain tiles; size unknown; clay
Monroe	MI-MR-029.0000	233.4	233.7	Drain tiles; size and type unknown
Monroe	MI-MR-030.0000	233.7	233.8	Drain tiles; size and type unknown
Monroe	MI-MR-031.0000	233.8	234.0	Drain tiles; size and type unknown
Monroe	MI-MR-032.0000	234.0	234.0	Drain tiles; 6" plastic
Monroe	MI-MR-033.0000	234.0	234.3	Drain tiles; 6" plastic
Monroe	MI-MR-035.0000	234.3	234.6	Drain tiles; size unknown; clay
Monroe	MI-MR-039.0000	234.6	235.0	Drain tiles; size and type unknown
Monroe	MI-MR-040.0000	235.0	235.2	Drain tiles; size and type unknown
Monroe	MI-MR-041.0000	235.2	235.4	Drain tiles; multiple sizes; plastic
Monroe	MI-MR-042.0000	235.4	235.7	Drain tiles; size and type unknown
Monroe	MI-MR-043.0000	235.7	235.7	Drain tiles; size and type unknown
Monroe	MI-MR-044.0000	235.7	236.0	Drain tiles; size and type unknown
Monroe	MI-MR-045.0000 MI-MR-045.0000-AB-2	236.0	236.3	Drain tiles; size and type unknown
Monroe	MI-MR-048.0000	236.3	236.6	Drain tiles; size and type unknown
Monroe	MI-MR-049.0000	236.6	236.8	Drain tiles; multiple sizes; clay and plastic
Washtenaw	MI-WA-001.0000 MI-WA-001.0000-TAR-1-237.2	236.9	237.3	Drain tiles; 8" and 4" clay and plastic
Washtenaw	MI-WA-001.0001-TAR-1-237.2	236.8	237.3	Drain tiles; 8" and 4" clay and plastic
Washtenaw	MI-WA-002.0000 MI-WA-002.0000-HTAR-1	237.3	237.5	Drain tiles; 8" and 4" clay and plastic
Washtenaw	MI-WA-003.0000	237.6	237.9	Drain tiles; 8" and 4" clay and plastic
Washtenaw	MI-WA-005.0000	237.9	238.0	Drain tiles; size and type unknown
Washtenaw	MI-WA-006.0000	238.0	238.2	Drain tiles; 8" and 4" clay and plastic
Washtenaw	MI-WA-008.0000	238.2	238.5	Drain tiles; 8" mains and 4" runs; clay and plastic
Washtenaw	MI-WA-009.0010	238.5	238.7	Drain tiles; size and type unknown
Washtenaw	MI-WA-010.0000	238.5	238.7	Drain tiles; 8" and 4" clay and plastic

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Washtenaw	MI-WA-011.0000	238.7	238.9	Drain tiles; 4" plastic
Washtenaw	MI-WA-012.0000	238.9	239.2	Drain tiles; 4" to 6" cement
Washtenaw	MI-WA-013.0000	239.2	239.3	Drain tiles; size and type unknown
Washtenaw	MI-WA-015.0000	239.3	239.6	Drain tiles; 4" to 6" clay
Washtenaw	MI-WA-016.0010-TAR-2-239.6	239.6	239.6	Drain tiles; size and type unknown
Washtenaw	MI-WA-018.0000	239.7	240.0	Drain tiles; size and type unknown
Washtenaw	MI-WA-018.0010	239.9	239.9	Drain tiles; 4" plastic
Washtenaw	MI-WA-020.0000	240.0	240.1	Drain tiles; size and type unknown
Washtenaw	MI-WA-021.0000	240.1	240.1	Drain tiles; size and type unknown
Washtenaw	MI-WA-022.0000	240.1	240.5	Drain tiles; size and type unknown
Washtenaw	MI-WA-023.0000	240.5	240.7	Drain tiles; 4" to 6" plastic
Washtenaw	MI-WA-024.0000	240.7	240.8	Drain tiles; size and type unknown
Washtenaw	MI-WA-025.0000	240.8	241.2	Drain tiles; 4" and 6" plastic
Washtenaw	MI-WA-027.0000	241.2	241.2	Drain tiles; 4" and 6" plastic
Washtenaw	MI-WA-028.0000	241.2	241.5	Drain tiles; 4" and 6" clay and plastic
Washtenaw	MI-WA-029.0000	241.5	241.6	Drain tiles; 4" and 6" clay and plastic
Washtenaw	MI-WA-030.0000	241.8	241.8	Drain tiles; 4" and 6" clay and plastic
Washtenaw	MI-WA-032.0000	241.8	242.1	Drain tiles; 4" to 6" plastic
Washtenaw	MI-WA-033.0000	242.1	242.3	Drain tiles; 4" and 6" clay and plastic
Washtenaw	MI-WA-035.0000 MI-WA-035.0000-TAR-3-242.4 MI-WA-000.0001-SA-3-SPRD4	242.3	242.5	Drain tiles; 4" and 6" clay and plastic
Washtenaw	MI-WA-036.0000	242.5	242.8	Drain tiles; 4" and 6" clay and plastic
Washtenaw	MI-WA-037.0000	242.8	242.9	Drain tiles; 4" and 6" clay and plastic
Washtenaw	MI-WA-038.0000	242.9	243.0	Drain tiles; 4" and 6" clay and plastic
Washtenaw	MI-WA-039.0000	243.0	243.0	Drain tiles; size and type unknown
Washtenaw	MI-WA-040.0000	243.0	243.1	Drain tiles; 4" and 6" clay and plastic
Washtenaw	MI-WA-041.0000	243.1	243.3	Drain tiles; 4" and 6" clay and plastic
Washtenaw	MI-WA-043.0000	243.3	243.8	Drain tiles; 4" and 6" clay and plastic
Washtenaw	MI-WA-045.0000	243.8	243.9	Drain tiles; 4" and 6" clay and plastic
Washtenaw	MI-WA-046.0000	243.9	244.3	Drain tiles; size and type unknown
Washtenaw	MI-WA-047.0000	244.3	244.4	Drain tiles; 4" and 6" clay and plastic
Washtenaw	MI-WA-048.0000	244.4	244.7	Drain tiles; 4" to 6" clay
Washtenaw	MI-WA-049.0000	244.7	244.9	Drain tiles; size and type unknown
Washtenaw	MI-WA-051.0000	245.0	245.2	Drain tiles; size and type unknown
Washtenaw	MI-WA-055.0000	245.3	245.3	Drain tiles; size and type unknown
Washtenaw	MI-WA-056.0000	245.3	245.4	Drain tiles; size and type unknown
Washtenaw	MI-WA-057.0000	245.4	245.5	Drain tiles; size and type unknown
Washtenaw	MI-WA-058.0000	245.5	245.6	Drain tiles; size and type unknown
Washtenaw	MI-WA-059.0000	245.6	245.6	Drain tiles; size and type unknown
Washtenaw	MI-WA-060.0000	245.6	245.7	Drain tiles; size and type unknown
Washtenaw	MI-WA-063.0000 MI-WA-063.0000-TAR-4-246.2	245.8	246.3	Drain tiles; 8" and 4" clay
Washtenaw	MI-WA-064.0000 MI-WA-064.0000-AB-1	246.3	246.6	Drain tiles; 4" clay
Washtenaw	MI-WA-064.0010 MI-WA-064.0010-AB-1	246.3	246.6	Drain tiles; size and type unknown
Washtenaw	MI-WA-066.0000	246.6	247.1	Drain tiles; 4" clay

APPENDIX K-5 (cont'd)

Agricultural Drain Tiles and Irrigation Systems Crossed by the NGT Project

State, Facility, County	Tract Number(s)	Milepost Start [a]	Milepost End [a]	Drain or Irrigation Description
Mainline (cont'd)				
Washtenaw	MI-WA-067.0000 MI-WA-067.0000-PAR-1-247.4 MI-WA-000.0001-SA-5-SPRD4 MI-WA-067.0000-MLV-16	247.1	247.4	Drain tiles; 4" clay
Washtenaw	MI-WA-068.0010	247.4	247.4	Drain tiles; 4" corrugated
Washtenaw	MI-WA-074.0010	247.9	248.0	Drain tiles; size unknown; clay and corrugated
Washtenaw	MI-WA-076.0000	247.9	248.0	Drain tiles; size unknown; clay and corrugated
Washtenaw	MI-WA-077.0000	248.0	248.0	Drain tiles; size unknown; clay and corrugated
Washtenaw	MI-WA-078.0000	248.0	248.0	Drain tiles; size unknown; clay and corrugated
Washtenaw	MI-WA-079.0000	248.0	248.1	Drain tiles; size unknown; clay and corrugated
Washtenaw	MI-WA-080.0000	248.1	248.1	Drain tiles; size unknown; clay and corrugated
Washtenaw	MI-WA-081.0000	248.1	248.1	Drain tiles; size unknown; clay and corrugated
Washtenaw	MI-WA-081.0010	248.1	248.1	Drain tiles; size unknown; clay and corrugated
Washtenaw	MI-WA-087.0000	248.4	248.4	Drain tiles; size unknown, clay
Washtenaw	MI-WA-089.0000	248.5	248.5	Drain tiles; size and type unknown
Washtenaw	MI-WA-091.0000	248.5	248.6	Drain tiles; size and type unknown
Washtenaw	MI-WA-091.0100	248.5	248.6	Drain tiles; size and type unknown
Washtenaw	MI-WA-092.0000	248.6	248.7	Drain tiles; 8" clay
Washtenaw	MI-WA-094.0000	248.7	248.9	Drain tiles; 8" clay

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a Mileposts are approximate.

APPENDIX K-6

ROADWAYS CROSSED BY THE NGT PROJECT

APPENDIX K-6

Roadways Crossed by the NGT Project

State, Facility, County	Approximate Milepost	Road Name	Road Surface	Public or Private	Proposed Construction Method
OHIO					
TGP Interconnecting Pipeline					
Columbiana	0.1	County Road 842	Gravel	Public	Open-Cut
Columbiana	0.1	Unnamed	Gravel	Private	Open-Cut
Columbiana	0.6	Hagan Road	Gravel	Public	Open-Cut
Columbiana	0.6	Tunnel Hill Road	Paved	Public	Open-Cut
Mainline					
Columbiana	1.1	Mechanicstown Road	Paved	Public	Bore
Columbiana	1.7	Unnamed	Dirt	Private	Open-Cut
Columbiana	1.8	Driveway	Gravel	Private	Open-Cut
Columbiana	2.0	U.S. Highway 30	Paved	Public	Bore
Columbiana	2.2	Campbell Road	Gravel	Public	Open-Cut
Columbiana	2.3	Driveway	Gravel	Private	Open-Cut
Columbiana	2.7	Unnamed	Dirt	Private	Open-Cut
Columbiana	2.8	Unnamed	Dirt	Private	Open-Cut
Columbiana	2.9	Unnamed	Dirt	Private	Open-Cut
Columbiana	3.3	Campbell Road	Paved	Public	Open-Cut
Columbiana	3.5	Buffalo Road	Paved	Public	Open-Cut
Columbiana	4.6	Driveway	Dirt	Private	Open-Cut
Columbiana	4.6	Driveway	Dirt	Private	Open-Cut
Columbiana	4.9	Driveway	Gravel	Private	Open-Cut
Columbiana	4.9	County Road 813	Gravel	Public	Bore
Columbiana	5.0	County Road 812 Weaver Road	Paved	Public	Open-Cut
Columbiana	5.6	County Road 402	Paved	Public	Open-Cut
Columbiana	5.6	Driveway	Gravel	Private	Open-Cut
Columbiana	6.1	Unnamed	Dirt	Private	Open-Cut
Columbiana	6.3	County Road 710	Paved	Public	Open-Cut
Columbiana	6.4	Unnamed	Gravel	Private	Open-Cut
Columbiana	7.2	Unnamed	Gravel	Private	Open-Cut
Columbiana	7.3	Unnamed	Gravel	Private	Open-Cut
Columbiana	7.6	Field Road	Gravel	Private	Open-Cut
Columbiana	7.7	State Highway 172	Paved	Public	Bore
Columbiana	8.0	Driveway	Paved	Private	HDD
Columbiana	8.0	Knox School Road	Paved	Public	HDD
Columbiana	8.2	Unnamed	Dirt	Private	HDD
Columbiana	9.9	Driveway	Gravel	Private	Open-Cut
Columbiana	10.0	County Road 705	Paved	Public	Bore
Columbiana	10.0	Mountz Road	Paved	Public	Open-Cut
Columbiana	10.1	Driveway	Gravel	Private	Open-Cut
Columbiana	10.5	County Road 703	Paved	Public	Open-Cut
Columbiana	10.7	Unnamed	Dirt	Private	Open-Cut
Columbiana	11.3	County Road 701	Paved	Public	Bore
Columbiana	12.4	Georgetown Road	Paved	Public	Bore
Columbiana	12.5	Mahoning Avenue	Paved	Public	Open-Cut
Stark	13.2	Bowman Street NE	Paved	Public	Bore

APPENDIX K-6 (cont'd)

Roadways Crossed by the NGT Project

State, Facility, County	Approximate Milepost	Road Name	Road Surface	Public or Private	Proposed Construction Method
Mainline (cont'd)					
Stark	13.3	Field Road	Dirt	Private	Open-Cut
Stark	13.3	Field Road	Dirt	Private	Open-Cut
Stark	14.0	Salem Church Street NE	Paved	Public	Open-Cut
Stark	14.1	State Highway 183	Paved	Public	Bore
Stark	14.8	Cenfield Street NE	Paved	Public	Bore
Stark	15.8	Driveway	Gravel	Private	Open-Cut
Stark	16.2	Beechwood Avenue	Paved	Public	Bore
Stark	16.7	Fredrick Avenue NE	Paved	Public	Open-Cut
Stark	17.8	Cartway Street NE	Dirt	Private	Bore
Stark	18.3	Easton Street NE	Paved	Public	Bore
Stark	18.6	Oakhill Avenue NE	Paved	Public	Bore
Stark	19.2	Unnamed	Dirt	Private	Open-Cut
Stark	19.6	Parks Avenue	Paved	Public	Bore
Stark	20.4	U.S. Highway 62	Paved	Public	Bore
Stark	20.8	Schmucker Avenue NE	Gravel	Public	Open-Cut
Stark	21.2	Beech Street NE	Paved	Public	Bore
Stark	21.7	State Highway 173	Paved	Public	Bore
Stark	22.0	Columbus Road	Paved	Public	Bore
Stark	22.2	Marlboro Avenue	Paved	Public	Bore
Stark	23.2	French Avenue	Paved	Public	Bore
Stark	23.5	Paris Avenue	Paved	Public	Bore
Stark	24.2	State Highway 44	Paved	Public	Bore
Stark	24.9	Unnamed	Dirt	Private	Open-Cut
Stark	25.0	Preston Avenue	Gravel	Public	Open-Cut
Stark	25.5	St. Peters Church Road	Paved	Public	Open-Cut
Stark	26.4	Immel Avenue	Paved	Public	Open-Cut
Stark	26.8	Field Road	Grass	Private	Open-Cut
Stark	26.9	Field Road	Grass	Private	Open-Cut
Stark	27.2	Gans Avenue NE	Paved	Public	Bore
Stark	28.2	Middlebranch Avenue NE	Paved	Public	Bore
Stark	29.3	State Highway 43	Paved	Public	Open-Cut
Stark	30.0	Field Road	Grass	Private	Open-Cut
Stark	30.3	Market Avenue N.	Paved	Public	Bore
Stark	30.8	Coblentz Avenue NW	Paved	Public	Bore
Stark	31.6	Field Road	Gravel	Private	Open-Cut
Stark	31.7	Field Road	Dirt	Private	Open-Cut
Stark	31.9	Midway Street NW	Paved	Public	Bore
Stark	32.1	County Road U	Paved	Public	Bore
Stark	32.8	Dotwood Street NW	Paved	Public	Open-Cut
Stark	33.0	Wright Road NW	Paved	Public	Open-Cut
Stark	33.1	Cleveland Avenue NW	Paved	Public	Bore
Stark	33.2	Driveway	Paved	Private	Open-Cut
Stark	33.2	Crosby Street NW	Paved	Public	Bore
Stark	33.2	Driveway	Paved	Private	Open-Cut

APPENDIX K-6 (cont'd)

Roadways Crossed by the NGT Project

State, Facility, County	Approximate Milepost	Road Name	Road Surface	Public or Private	Proposed Construction Method
Mainline (cont'd)					
Stark	34.0	Cain Street NW	Paved	Public	Bore
Summit	34.4	Field Road	Dirt	Private	Open-Cut
Summit	35.0	Mayfair Road	Paved	Public	Bore
Summit	35.5	Interstate 77	Paved	Public	Bore
Summit	36.8	Greensburg Road	Paved	Public	Bore
Summit	37.4	Massillon Road	Paved	Public	Open-Cut
Summit	37.8	Koons Road	Paved	Public	Open-Cut
Summit	38.3	Thursby Road	Paved	Public	Open-Cut
Summit	38.6	Unnamed	Paved	Private	Open-Cut
Summit	38.6	Driveway	Paved	Private	Open-Cut
Summit	39.0	Koons Road	Paved	Public	Open-Cut
Summit	39.8	Arlington Road	Paved	Public	Open-Cut
Summit	39.8	Field Road	Dirt	Private	Open-Cut
Summit	40.2	Killinger Road	Paved	Public	Open-Cut
Summit	40.8	Driveway	Gravel	Private	Open-Cut
Summit	41.2	Christman Road	Paved	Public	HDD
Summit	41.5	Driveway	Paved	Private	Open-Cut
Summit	41.5	E. Comet Road	Paved	Public	Open-Cut
Summit	42.1	Driveway	Gravel	Private	Open-Cut
Summit	42.1	S. Main Street	Paved	Public	Bore
Summit	42.2	Unnamed	Paved	Private	Open-Cut
Summit	42.7	S. Myers Road	Paved	Public	Open-Cut
Summit	43.6	Manchester Road	Paved	Public	Open-Cut
Summit	43.7	Driveway	Gravel	Private	Open-Cut
Summit	44.3	Hampsher Road	Paved	Public	Open-Cut
Summit	44.9	Grove Road	Paved	Public	Bore
Summit	45.5	W. Nimisila Road	Paved	Public	Bore
Summit	46.2	Rheam Road	Paved	Public	Open-Cut
Summit	46.3	Driveway	Gravel	Private	Open-Cut
Summit	46.8	Unnamed	Paved	Private	Open-Cut
Summit	46.8	Center Road	Paved	Public	Open-Cut
Summit	46.9	Driveway	Dirt	Private	Open-Cut
Summit	46.9	Driveway	Dirt	Private	Open-Cut
Summit	47.9	Van Buren Road	Paved	Public	HDD
Summit	48.8	Fairland Road	Paved	Public	Open-Cut
Summit	49.4	S. Cleveland Massillon Road	Paved	Public	Open-Cut
Summit	49.9	Kungle Road	Paved	Public	Open-Cut
Summit	50.4	Taylor Road	Paved	Public	Bore
Wayne	50.6	Driveway	Dirt	Private	Open-Cut
Wayne	50.9	Driveway	Dirt	Private	Open-Cut
Wayne	50.9	Driveway	Dirt	Private	Open-Cut
Wayne	51.1	State Highway 21	Paved	Public	Bore
Wayne	51.4	Hametown Road	Paved	Public	Bore
Wayne	52.0	Grill Road	Paved	Public	Bore

APPENDIX K-6 (cont'd)

Roadways Crossed by the NGT Project

State, Facility, County	Approximate Milepost	Road Name	Road Surface	Public or Private	Proposed Construction Method
Mainline (cont'd)					
Wayne	52.4	Unnamed	Gravel	Private	Open-Cut
Wayne	52.9	County Road 61	Paved	Public	Open-Cut
Wayne	53.0	County Road 5A	Paved	Public	Bore
Wayne	53.2	Unnamed	Dirt	Private	Open-Cut
Wayne	53.5	County Road 209	Paved	Public	Bore
Wayne	53.6	State Highway 585	Paved	Public	Bore
Wayne	54.1	County Road 100	Paved	Public	Bore
Wayne	54.6	County Road 94	Paved	Public	Bore
Wayne	55.0	Field Road	Dirt	Private	Open-Cut
Wayne	55.7	State Highway 94	Paved	Public	Bore
Wayne	56.2	Driveway	Dirt	Private	Open-Cut
Wayne	56.6	Hatfield Road	Paved	Public	Open-Cut
Wayne	56.6	Eastern Road	Paved	Public	Open-Cut
Medina	56.8	Rittman Road	Paved	Public	Bore
Medina	57.2	Eastern Road	Paved	Public	Bore
Medina	57.3	State Highway 57	Paved	Public	Bore
Medina	57.7	County Road 150	Paved	Public	Bore
Medina	58.0	County Road 18	Paved	Public	Bore
Medina	58.3	County Road 145	Paved	Public	Bore
Medina	58.7	Driveway	Dirt	Private	Open-Cut
Medina	59.4	Mennonite Road	Paved	Public	Open-Cut
Medina	60.3	Acme Road	Paved	Public	Bore
Medina	61.3	Rawiga Road	Paved	Public	Bore
Medina	61.4	Seville Road	Paved	Public	Bore
Medina	62.6	Greenwich Road	Paved	Public	Bore
Medina	63.1	Driveway	Dirt	Private	Open-Cut
Medina	63.2	Interstate 76	Paved	Public	Bore
Medina	63.8	Field Road	Dirt	Private	Open-Cut
Medina	64.2	Guilford Road	Paved	Public	Bore
Medina	64.4	Blake Road	Paved	Public	Bore
Medina	65.8	Hubbard Valley Road	Paved	Public	Bore
Medina	65.9	Good Road	Paved	Public	Bore
Medina	66.0	Interstate 71	Paved	Public	Bore
Medina	66.7	Wooster Pike Road	Paved	Public	Bore
Medina	67.1	Summer Ridge Drive	Paved	Private	Open-Cut
Medina	68.3	County Road 40	Paved	Public	Bore
Medina	68.3	County Road 50	Paved	Public	Bore
Medina	68.8	Driveway	Paved	Private	Open-Cut
Medina	69.3	Lake Road	Paved	Public	Bore
Medina	70.8	Driveway	Gravel	Private	Open-Cut
Medina	70.9	State Highway 162	Paved	Public	Bore
Medina	71.2	Driveway	Dirt	Private	HDD
Medina	71.4	Unnamed	Dirt	Private	HDD
Medina	71.8	Driveway	Gravel	Private	Open-Cut

APPENDIX K-6 (cont'd)

Roadways Crossed by the NGT Project

State, Facility, County	Approximate Milepost	Road Name	Road Surface	Public or Private	Proposed Construction Method
Mainline (cont'd)					
Medina	71.9	Lafayette Road	Paved	Public	Bore
Medina	72.5	Carlton Road	Paved	Public	Bore
Medina	73.2	Field Road	Dirt	Private	Open-Cut
Medina	73.7	W. Smith Road	Paved	Public	Open-Cut
Medina	74.1	Branch Road	Paved	Public	Bore
Medina	75.0	Stone Road	Paved	Public	Open-Cut
Medina	75.3	Driveway	Dirt	Private	Open-Cut
Medina	75.8	Field Road	Dirt	Private	Open-Cut
Medina	76.1	Driveway	Gravel	Private	Open-Cut
Medina	76.3	Beck Road	Paved	Public	Open-Cut
Medina	76.8	Unnamed	Dirt	Private	Open-Cut
Medina	77.0	State Highway 18	Paved	Public	Bore
Medina	78.0	Spieth Road	Paved	Public	Bore
Medina	79.1	Erhart Road	Paved	Public	Bore
Medina	79.6	Kennedy Road	Paved	Public	Bore
Lorain	81.2	Neff Road	Paved	Public	Bore
Lorain	82.6	State Highway 83	Paved	Public	Bore
Lorain	82.7	Law Road	Paved	Public	Bore
Lorain	83.9	Mennel Road	Paved	Public	Bore
Lorain	84.7	State Highway 303	Paved	Public	Bore
Lorain	85.9	County Road 49	Paved	Public	Bore
Lorain	87.1	County Road 26	Paved	Public	Bore
Lorain	88.2	Wheeler Road	Paved	Public	Bore
Lorain	89.2	State Highway 301	Paved	Public	Bore
Lorain	90.3	County Road 48	Paved	Public	Bore
Lorain	91.4	Diagonal Road	Paved	Public	Bore
Lorain	91.3	Unnamed	Grass	Private	Open-Cut
Lorain	92.4	County Road 38	Paved	Public	HDD
Lorain	93.4	County Road 75 Hallauer Road	Paved	Public	Bore
Lorain	93.4	U.S. Highway 20	Paved	Public	Bore
Lorain	94.6	State Highway 58	Paved	Public	Bore
Lorain	95.4	Unnamed	Gravel	Private	Open-Cut
Lorain	96.8	Quarry Road	Paved	Public	Bore
Lorain	97.7	County Road 51	Paved	Public	Bore
Lorain	98.5	Gifford Road	Paved	Public	Bore
Lorain	99.2	State Highway 511	Paved	Public	Bore
Lorain	100.0	Baird Road	Paved	Public	Bore
Lorain	100.6	County Road 34	Paved	Public	Bore
Huron	101.3	County Line Road	Paved	Public	Bore
Huron	102.4	County Road 63	Paved	Public	Open-Cut
Huron	103.9	State Highway 60	Paved	Public	Bore
Huron	104.6	W. River Road	Paved	Public	HDD
Erie	105.9	Florence Wakeman Road	Paved	Public	Open-Cut
Erie	106.1	Burr Road	Paved	Public	Bore

APPENDIX K-6 (cont'd)

Roadways Crossed by the NGT Project

State, Facility, County	Approximate Milepost	Road Name	Road Surface	Public or Private	Proposed Construction Method
Mainline (cont'd)					
Erie	107.6	County Road 59	Paved	Public	Bore
Erie	108.6	State Highway 113	Paved	Public	Bore
Erie	110.2	County Road 17	Paved	Public	HDD
Erie	110.3	Interstate 80	Paved	Public	HDD
Erie	110.3	Thorpe Road	Dirt	Private	Open-Cut
Erie	111.1	County Road 134	Paved	Public	Bore
Erie	112.1	County Road 13	Paved	Public	Bore
Erie	112.1	State Highway 61	Paved	Public	Bore
Erie	113.1	County Road 132	Paved	Public	Bore
Erie	113.7	Unnamed	Gravel	Private	Open-Cut
Erie	113.8	County Road 131	Paved	Public	Bore
Erie	114.5	Driveway	Dirt	Private	Open-Cut
Erie	114.6	County Road 128	Paved	Public	Bore
Erie	115.0	County Road 127	Paved	Public	Bore
Erie	116.3	County Road 126	Paved	Public	Bore
Erie	116.6	Driveway	Gravel	Private	Open-Cut
Erie	117.2	State Highway 13	Paved	Public	HDD
Erie	118.1	Hoover Road	Paved	Public	Bore
Erie	118.7	Driveway	Gravel	Private	Open-Cut
Erie	119.2	County Road 123	Paved	Public	Bore
Erie	119.4	Driveway	Gravel	Private	Open-Cut
Erie	119.4	Driveway	Gravel	Private	Open-Cut
Erie	119.5	Driveway	Gravel	Private	Open-Cut
Erie	119.5	U.S. Highway 250 N.	Paved	Public	Bore
Erie	120.4	Patrol Road	Paved	Private	Open-Cut
Erie	120.5	Driveway	Paved	Private	Open-Cut
Erie	120.9	County Road 13	Paved	Public	Bore
Erie	122.1	Thomas Road	Paved	Public	Bore
Erie	123.2	County Road 44 Ransom Road	Paved	Public	Bore
Erie	124.0	Driveway	Gravel	Private	Open-Cut
Erie	124.8	County Road 43	Paved	Public	Bore
Erie	125.8	County Road 108	Paved	Public	Bore
Erie	126.2	State Highway 99	Paved	Public	Bore
Erie	126.7	State Highway 4	Paved	Public	Bore
Erie	127.4	Driveway	Paved	Private	Open-Cut
Erie	127.7	Portland Road	Paved	Public	Bore
Erie	128.4	Maple Avenue	Paved	Public	Bore
Erie	128.8	Billings Road	Paved	Public	Bore
Erie	130.1	Deyo Road	Paved	Public	Bore
Erie	130.6	Driveway	Paved	Private	Open-Cut
Erie	130.8	State Highway 269	Paved	Public	Bore
Sandusky	131.5	County Road 1 County Road 312	Paved	Public	Bore
Sandusky	132.7	Interstate 80	Paved	Public	Bore

APPENDIX K-6 (cont'd)

Roadways Crossed by the NGT Project

State, Facility, County	Approximate Milepost	Road Name	Road Surface	Public or Private	Proposed Construction Method
Mainline (cont'd)					
Sandusky	133.3	Unnamed	Dirt	Private	Open-Cut
Sandusky	133.4	County Road 302	Paved	Public	Open-Cut
Sandusky	133.5	State Highway 101	Paved	Public	Bore
Sandusky	134.1	County Road 294	Paved	Public	Bore
Sandusky	135.4	County Road 278	Paved	Public	Open-Cut
Sandusky	136.4	County Road 268	Paved	Public	Bore
Sandusky	137.4	County Road 260	Paved	Public	Bore
Sandusky	137.5	County Road 233	Paved	Public	Bore
Sandusky	138.6	State Highway 510	Paved	Public	Bore
Sandusky	139.3	State Highway 412	Paved	Public	Bore
Sandusky	139.6	County Road 244	Paved	Public	Open-Cut
Sandusky	140.1	County Road 238	Paved	Public	Open-Cut
Sandusky	140.7	County Road 232	Paved	Public	Bore
Sandusky	140.7	County Road 241	Paved	Public	Open-Cut
Sandusky	141.3	County Road 226	Paved	Public	Open-Cut
Sandusky	141.6	County Road 239	Paved	Public	Bore
Sandusky	141.9	County Road 222	Paved	Public	Open-Cut
Sandusky	142.7	U.S. Highway 6	Paved	Public	Bore
Sandusky	143.3	County Road 202	Paved	Public	Bore
Sandusky	143.9	County Road 198	Paved	Public	Bore
Sandusky	144.4	County Road 188	Paved	Public	Bore
Sandusky	144.8	Interstate 80	Paved	Public	Bore
Sandusky	145.2	County Road 234	Paved	Public	Bore
Sandusky	146.2	State Highway 53	Paved	Public	Bore
Sandusky	146.5	County Road 170	Paved	Public	Bore
Sandusky	147.2	Interstate 80	Paved	Public	Bore
Sandusky	147.5	County Road 89	Paved	Public	Bore
Sandusky	148.3	State Highway 19	Paved	Public	Bore
Sandusky	149.6	County Road 142	Paved	Public	Open-Cut
Sandusky	150.3	County Road 128	Paved	Public	Bore
Sandusky	150.7	County Road 122	Paved	Public	Bore
Sandusky	151.7	County Road 106	Paved	Public	Bore
Sandusky	152.7	State Highway 590	Paved	Public	Bore
Sandusky	153.8	County Road 92	Paved	Public	Bore
Sandusky	154.2	State Highway 20	Paved	Public	Bore
Sandusky	154.4	Unnamed	Dirt	Private	Open-Cut
Sandusky	154.7	County Road 87 Long Road	Paved	Public	Bore
Sandusky	155.9	County Road 74	Paved	Public	Bore
Sandusky	157.1	County Road 66	Paved	Public	Bore
Sandusky	157.5	Driveway	Gravel	Private	Open-Cut
Sandusky	157.6	Driveway	Gravel	Private	Open-Cut
Sandusky	157.6	County Road 62	Paved	Public	Bore
Sandusky	158.2	State Highway 300	Paved	Public	Bore
Sandusky	158.6	Unnamed	Dirt	Private	Open-Cut

APPENDIX K-6 (cont'd)

Roadways Crossed by the NGT Project

State, Facility, County	Approximate Milepost	Road Name	Road Surface	Public or Private	Proposed Construction Method
Mainline (cont'd)					
Sandusky	158.9	Unnamed	Paved	Private	Open-Cut
Sandusky	159.0	County Road 93	Paved	Public	Open-Cut
Sandusky	159.7	County Road 38	Paved	Public	Open-Cut
Sandusky	160.3	County Road 32	Paved	Public	Bore
Sandusky	161.1	County Road 48	Paved	Public	Open-Cut
Sandusky	161.4	Driveway	Gravel	Private	Open-Cut
Sandusky	161.9	County Road 24	Paved	Public	Open-Cut
Sandusky	162.3	County Road 117	Paved	Public	HDD
Sandusky	162.6	State Highway 105	Paved	Public	HDD
Sandusky	163.1	County Road 139	Paved	Public	Bore
Wood	163.7	U.S. Highway 23	Paved	Public	Bore
Wood	164.5	State Highway 582	Paved	Public	Bore
Wood	164.9	County Road 16	Paved	Public	Bore
Wood	166.1	County Road 15	Paved	Public	Bore
Wood	166.3	Unnamed	Grass	Private	Open-Cut
Wood	167.2	County Road 111	Paved	Public	Bore
Wood	167.8	County Road 292	Paved	Public	Bore
Wood	168.4	County Road 11	Paved	Public	Bore
Wood	169.4	County Road 10	Paved	Public	Bore
Wood	170.4	Caris Road	Paved	Public	Open-Cut
Wood	170.8	County Road 272	Paved	Public	Open-Cut
Wood	172.6	State Highway 199	Paved	Public	Bore
Wood	173.5	Carter Road	Paved	Public	Bore
Wood	174.5	County Road 92	Paved	Public	Bore
Wood	175.1	Interstate 75	Paved	Public	Bore
Wood	175.4	Getz Road	Dirt	Private	Open-Cut
Wood	175.6	County Road 90	Paved	Public	Open-Cut
Wood	176.6	State Highway 25	Paved	Public	Bore
Wood	176.9	Driveway	Gravel	Private	Open-Cut
Wood	177.3	County Road 99 Pargillis Road	Paved	Public	Open-Cut
Wood	178.1	County Road 97 Hull Prairie Road	Paved	Public	Bore
Wood	179.9	State Highway 64	Paved	Public	HDD
Wood	181.0	County Road 235	Paved	Public	Bore
Wood	181.2	State Highway 65	Paved	Public	HDD
Lucas	181.8	Driveway	Paved	Private	HDD
Lucas	181.8	U.S. Highway 24	Paved	Public	HDD
Lucas	182.1	Driveway	Gravel	Private	Open-Cut
Lucas	182.1	Driveway	Gravel	Private	Open-Cut
Lucas	183.1	County Road 137	Paved	Public	Bore
Lucas	183.4	U.S. Highway 24	Paved	Public	Bore
Lucas	184.3	County Road 221	Paved	Public	Bore
Lucas	184.8	County Road 152	Paved	Public	Bore
Lucas	185.3	Heller Road	Paved	Public	Bore

APPENDIX K-6 (cont'd)

Roadways Crossed by the NGT Project

State, Facility, County	Approximate Milepost	Road Name	Road Surface	Public or Private	Proposed Construction Method
Mainline (cont'd)					
Lucas	185.3	Field Road	Gravel	Private	Open-Cut
Lucas	186.3	State Highway 295	Paved	Public	Bore
Lucas	187.3	Yawberg Road	Paved	Public	Open-Cut
Lucas	187.9	County Road 111	Paved	Public	Bore
Lucas	188.4	Manore Road	Paved	Public	Bore
Lucas	188.9	County Road 109	Paved	Public	Bore
Lucas	189.3	County Road 1	Paved	Public	Bore
Henry	190.2	County Road W County Road A	Paved	Public	Bore
Fulton	190.5	County Road 2	Paved	Public	Bore
Fulton	191.5	County Road B	Paved	Public	Bore
Fulton	191.6	Driveway	Dirt	Private	Open-Cut
Fulton	192.3	County Road 3	Paved	Public	Open-Cut
Fulton	192.8	County Road C	Paved	Public	Bore
Fulton	193.8	County Road D	Paved	Public	Bore
Fulton	194.8	County Road E	Paved	Public	Bore
Fulton	195.6	County Road EF	Paved	Public	Bore
Fulton	196.2	County Road F	Paved	Public	Bore
Fulton	197.3	U.S. Highway 20A	Paved	Public	Bore
Fulton	198.3	County Road H	Paved	Public	Bore
Fulton	199.1	Interstate 80	Paved	Public	Bore
Fulton	199.3	County Road J	Paved	Public	Bore
Fulton	200.0	County Road 3	Paved	Public	Bore
Fulton	200.9	State Highway 64	Paved	Public	Bore
Fulton	201.6	County Road L	Paved	Public	Bore
Fulton	202.7	County Road M	Paved	Public	Open-Cut
Fulton	203.8	County Road N	Paved	Public	Bore
Fulton	204.4	County Road 2	Paved	Public	Bore
Fulton	204.9	U.S. Highway 20	Paved	Public	Bore
Fulton	206.0	County Road S	Paved	Public	Bore
Fulton	207.0	County Road T	Paved	Public	Bore
Fulton	207.8	County Road U	Gravel	Public	Bore
MICHIGAN					
Mainline					
Lenawee	209.0	Yankee Road	Paved	Public	Bore
Lenawee	210.0	E. Mulberry Road	Paved	Public	Bore
Lenawee	211.0	E. Ridgeville Road	Paved	Public	Open-Cut
Lenawee	212.0	E. Weston Road	Paved	Public	Open-Cut
Lenawee	213.0	Fike Road	Paved	Public	Open-Cut
Lenawee	214.0	E. Horton Road	Paved	Public	Open-Cut
Lenawee	215.1	Beamer Road	Paved	Public	HDD
Lenawee	215.8	E. Gorman Road	Gravel	Public	Open-Cut
Lenawee	216.7	State Highway 223	Paved	Public	Bore
Lenawee	217.1	Driggs Road	Paved	Public	Bore
Lenawee	218.4	Rouget Road	Paved	Public	Open-Cut

APPENDIX K-6 (cont'd)

Roadways Crossed by the NGT Project

State, Facility, County	Approximate Milepost	Road Name	Road Surface	Public or Private	Proposed Construction Method
Mainline (cont'd)					
Lenawee	219.2	Pope Road	Dirt	Private	Open-Cut
Lenawee	219.6	S. Wellsville Highway	Paved	Public	Bore
Lenawee	220.1	Deerfield Road	Paved	Public	Bore
Lenawee	220.7	Forche Road	Paved	Public	Open-Cut
Lenawee	221.3	S. Blissfield Highway	Paved	Public	Bore
Lenawee	222.1	McMahon Road	Paved	Public	Open-Cut
Lenawee	222.7	Garno Road	Paved	Public	Open-Cut
Lenawee	223.2	Laberdee Road	Gravel	Public	Open-Cut
Lenawee	224.4	Holloway Road	Paved	Public	Bore
Lenawee	225.0	Britton Highway	Paved	Public	Bore
Lenawee	225.6	Sutton Road	Gravel	Public	Open-Cut
Lenawee	226.7	Hoagland Highway	Gravel	Public	Open-Cut
Lenawee	227.0	Pocklington Road	Gravel	Public	Open-Cut
Lenawee	227.5	Downing Highway	Gravel	Public	Open-Cut
Lenawee	228.2	State Highway 50 Monroe Road	Paved	Public	Bore
Lenawee	229.4	Kniffen Road	Gravel	Public	Open-Cut
Lenawee	230.1	Downing Highway	Gravel	Public	Open-Cut
Lenawee Monroe	230.4	N. County Line Highway	Paved	Public	Open-Cut
Monroe	230.7	Milwaukee Road	Paved	Public	Open-Cut
Monroe	231.3	Couper Road	Gravel	Public	Open-Cut
Monroe	231.3	Couper Road	Gravel	Public	Open-Cut
Monroe	232.2	Far Road	Gravel	Public	Open-Cut
Monroe	232.5	Cone Road	Paved	Public	Bore
Monroe	233.1	Welch Road	Gravel	Public	Bore
Monroe	234.3	Hickory Road	Paved	Public	Bore
Monroe	234.6	Dennison Road	Paved	Public	Bore
Monroe	235.7	Field Road	Grass	Private	Open-Cut
Monroe	236.3	Redman Road	Paved	Public	Bore
Monroe	236.3	Petersburg Road	Gravel	Public	Bore
Washtenaw	237.6	Mooreville Road	Paved	Public	HDD
Washtenaw	238.2	Platt Road	Paved	Public	Bore
Washtenaw	239.2	Unknown	Gravel	Private	Open-Cut
Washtenaw	239.3	Willow Road	Paved	Public	Bore
Washtenaw	239.6	State Highway 23	Paved	Public	Bore
Washtenaw	240.0	Carpenter Road	Paved	Public	Bore
Washtenaw	241.1	N. Sanford Road	Paved	Public	Bore
Washtenaw	241.8	Mc Crone Road	Gravel	Public	Open-Cut
Washtenaw	242.3	Judd Road	Gravel	Public	Open-Cut
Washtenaw	243.3	Pitman Road	Gravel	Public	Open-Cut
Washtenaw	243.8	Hitchingham Road	Gravel	Public	Open-Cut
Washtenaw	245.0	Whittaker Road	Paved	Public	Bore
Washtenaw	245.2	Willis Road	Paved	Public	Bore
Washtenaw	246.6	Tuttle Hill Road	Gravel	Public	Open-Cut

APPENDIX K-6 (cont'd)

Roadways Crossed by the NGT Project

State, Facility, County	Approximate Milepost	Road Name	Road Surface	Public or Private	Proposed Construction Method
Mainline (cont'd)					
Washtenaw	247.4	Bemis Road	Dirt	Public	Bore
Washtenaw	248.0	Bunton Road	Paved	Public	Bore
Washtenaw	248.1	Martz Road	Paved	Public	Bore
Washtenaw	248.7	Mc Kean Road	Paved	Public	Bore
Washtenaw	249.7	Unnamed	Gravel	Private	Open-Cut
Washtenaw	250.1	Driveway	Paved	Private	Open-Cut
Washtenaw	250.2	Textile Road	Paved	Public	Bore
Washtenaw	251.1	Bridge Road	Paved	Public	HDD
Washtenaw	251.1	Unnamed	Gravel	Private	HDD
Washtenaw	251.4	S. Grove Street	Paved	Public	Bore
Washtenaw	251.7	Lakeview Avenue	Paved	Public	HDD
Washtenaw	251.7	Wiard Road S.	Paved	Public	HDD
Washtenaw	251.7	Interstate 94	Paved	Public	HDD
Washtenaw	251.7	Wiard Road N.	Paved	Public	HDD
Washtenaw	252.0	Coolidge Avenue	Paved	Public	Open-Cut
Washtenaw	252.2	State Street	Paved	Public	Open-Cut
Washtenaw	252.3	Watson Street	Paved	Public	Open-Cut
Washtenaw	252.4	Wiard Road	Paved	Public	Bore
Washtenaw	252.4	Wiard Road – Connecting Road	Paved	Public	Bore
Washtenaw	252.8	Tyler Road	Paved	Public	Bore
Washtenaw	252.9	Wiard Road – Connecting Road	Paved	Public	Bore
Washtenaw	252.9	Wiard Road – Connecting Road	Paved	Public	Bore
Washtenaw	253.2	Airport Drive	Paved	Public	Bore
Washtenaw	253.3	Wiard Road	Paved	Public	Bore
Washtenaw	253.5	Driveway	Paved	Private	Open-Cut
Washtenaw	253.6	Driveway	Paved	Private	Open-Cut
Washtenaw	253.7	Thoroughbred Road	Paved	Private	Open-Cut
Washtenaw	253.8	Northern Drive	Paved	Private	Open-Cut
Washtenaw	254.0	Eastbound U.S. Highway 12 Exit Ramp	Paved	Public	HDD
Washtenaw	254.2	Eastbound U.S. Highway 12	Paved	Public	HDD
Washtenaw	254.2	Westbound U.S. Highway 12 Overpass	Paved	Public	HDD
Washtenaw	254.3	Westbound U.S. Highway 12	Paved	Public	HDD
Washtenaw	254.8	Unnamed	Dirt	Private	Open-Cut
Washtenaw	255.0	Driveway	Dirt	Private	Open-Cut
Washtenaw	255.0	Driveway	Gravel	Private	Open-Cut

APPENDIX K-7

ROADWAYS CROSSED BY THE TEAL PROJECT

APPENDIX K-7

Roadways Crossed by the TEAL Project

State, County, Facility	MP	Road Name	Road Surface	Public or Private	Proposed Construction Method
OHIO					
Monroe County					
Proposed Pipeline Loop	0.1	Headley Ridge Road	Paved	Public	Open cut
	1.0	Unnamed Road	Dirt	Private	Open cut
	1.4	Brock Ridge Road	Paved	Public	Open cut
	2.6	Cain Ridge Road	Paved	Public	Open cut
	3.5	Dry Ridge Road	Paved	Public	Open cut
	3.6	State Route OH-556	Paved	Public	Bore

APPENDIX L

SOCIOECONOMIC TABLES

APPENDIX L-1

AVERAGE DAILY TRAFFIC COUNTS ON ROADS IN THE NGT PROJECT AREA

APPENDIX L-1

Average Daily Traffic Counts on Roads in the NGT Project Area

State, Facility, County	Milepost [a]	Road Name	Average Daily Traffic Count
OHIO			
TGP Interconnecting Pipeline			
Columbiana	0.1	CR 842	Not Available
Columbiana	N/A	State Route 644	1,670
Columbiana	0.6	Hagan Road	Not Available
Columbiana	0.6	Tunnel Hill Road	Not Available
Mainline Pipeline			
Columbiana	1.1	Mechanicstown Road	193
Columbiana	2.0	US 30	7,250
Columbiana	2.0	Campbell Road	Not Available
Columbiana	3.3	Campbell Road	Not Available
Columbiana	3.5	Buffalo Road	Not Available
Columbiana	4.9	CR 813	Not Available
Columbiana	5.0	CR 812/Weaver Road	129
Columbiana	5.6	CR 402	1,280
Columbiana	6.3	CR 710	Not Available
Columbiana	7.7	SH 172	2,920
Columbiana	8.0	Knox School Road	Not Available
Columbiana	10.0	CR 705	22
Columbiana	10.0	Mountz Road	208
Columbiana	10.5	CR 703	135
Columbiana	11.3	CR 701	1,228
Columbiana	12.4	Georgetown Road	Not Available
Columbiana	12.5	Mahoning Avenue	Not Available
Stark	13.2	Bowman Street NE	Not Available
Stark	14.0	Salem Church Street NE	Not Available
Stark	14.1	SH 183	6,300
Stark	14.8	Cenfield Street NE	Not Available
Stark	16.0	Beechwood Avenue	2,600
Stark	16.0	Fredrick Avenue NE	Not Available
Stark	17.8	Cartway Street NE	Not Available
Stark	18.3	Easton Street NE	2,100
Stark	18.6	Oakhill Avenue NE	Not Available
Stark	19.6	Parks Avenue	Not Available
Stark	20.4	US 62	20,000
Stark	20.8	Schmucker Avenue NE	Not Available
Stark	21.2	Beech Street NE	2,200
Stark	21.7	SH 173	8,000
Stark	22.0	Columbus Road	893
Stark	22.2	Marlboro Avenue	670
Stark	23.2	French Avenue	Not Available
Stark	23.5	Paris Avenue	1,000
Stark	24.2	SH 44	6,950
Stark	25.0	Preston Ave	Not Available
Stark	25.5	St. Peters Church Road	Not Available
Stark	26.4	Immel Avenue	Not Available
Stark	27.2	Gans Avenue NE	Not Available
Stark	28.2	Middlebranch Avenue NE	2,254
Stark	29.3	SH 43	4,811

APPENDIX L-1 (cont'd)

Average Daily Traffic Counts on Roads in the NGT Project Area

State, Facility, County	Milepost [a]	Road Name	Average Daily Traffic Count
Mainline Pipeline (cont'd)			
Stark	30.3	Market Avenue N	6,105
Stark	30.8	Coblentz Avenue NW	Not Available
Stark	31.9	Midway Street NW	Not Available
Stark	32.1	CR U	Not Available
Stark	32.8	Dotwood Street NW	Not Available
Stark	33.0	Wright Road NW	1,055
Stark	33.1	Cleveland Avenue NW	12,300
Stark	33.2	Crosby Street NW	Not Available
Stark	34.0	Cain Street NW	Not Available
Stark	N/A	SH 619	10,700
Mahoning	N/A	OH 45	5,506
Mahoning	N/A	Gladstone Rd	Not Available
Mahoning	N/A	N Bailey Rd	4,262
Mahoning	N/A	I-76	34,880
Stark	N/A	OH 225	6,602
Stark	N/A	US 62T	8,464
Stark	N/A	OH 173	5,400
Summit	35.0	Mayfair Road	4,176
Summit	35.5	I-77	75,355
Summit	36.0	Greensburg Road	7,500
Summit	37.4	Massillon Road	9,600
Summit	37.8	Koons Road	Not Available
Summit	38.3	Thursby Road	Not Available
Summit	39.0	Koons Road	Not Available
Summit	39.0	Arlington Road	4,300
Summit	40.0	Killinger Road	Not Available
Summit	41.0	Christman Road	Not Available
Summit	41.5	E Comet Road	Not Available
Summit	42.1	S Main Street	4,699
Summit	42.7	S Myers Road	Not Available
Summit	N/A	ST Route 236	2,170
Summit	43.0	Manchester Road	8,700
Summit	44.3	Hampsher Road	Not Available
Summit	44.9	Grove Road	Not Available
Summit	45.5	W Nimisila Road	Not Available
Summit	46.2	Rheam Road	Not Available
Summit	46.8	Center Road	4,610
Summit	47.9	Van Buren Road	1,006
Summit	48.8	Fairland Road	Not Available
Summit	49.4	S Cleveland Massillon Road	3,008
Summit	49.0	Kungle Road	Not Available
Summit	50.4	Taylor Road	765
Summit	N/A	SH 619	10,000
Summit	N/A	Snyder Avenue	6,750
Summit	N/A	W Wooster Road	9,500
Summit	N/A	I-76	47,200
Summit	N/A	HWY 585	19,000
Summit	N/A	SH 21	31,000

APPENDIX L-1 (cont'd)

Average Daily Traffic Counts on Roads in the NGT Project Area

State, Facility, County	Milepost [a]	Road Name	Average Daily Traffic Count
Mainline Pipeline (cont'd)			
Wayne	51.0	SH 21	12,940
Wayne	51.0	Hametown Road	475
Wayne	52.0	Grill Road	358
Wayne	52.0	CR 61	1,300
Wayne	53.0	CR 5A	4,000
Wayne	53.5	CR 209	6,657
Wayne	53.6	SH 585	19,000
Wayne	54.0	CR 94	358
Wayne	54.1	CR 100	1,231
Wayne	55.7	SH 94	1,453
Wayne	56.6	Hatfield Road	216
Wayne	56.6	Eastern Road	1,738
Wayne	N/A	SH 57	9,000
Wayne	N/A	Edwards Road	3,300
Wayne	N/A	Collier Road	1,700
Wayne	N/A	Doylestown Road	4,500
Trumbull	N/A	OH 45	6,770
Portage	N/A	I-76	30,580
Portage	N/A	OH 225	4,670
Portage	N/A	US 224	6,559
Medina	56.8	Rittman Road	1,901
Medina	57.0	SH 57	10,000
Medina	57.7	CR 150	1,660
Medina	58.0	CR 18	174
Medina	58.3	CR 145	1,100
Medina	59.0	Mennonite Road	1,800
Medina	60.3	Acme Road	98
Medina	61.3	Rawiga Road	573
Medina	61.4	Seville Road	1,800
Medina	62.6	Greenwich Road	650
Medina	63.2	I-76	35,000
Medina	64.2	Guilford Road	460
Medina	64.4	Blake Road	1,048
Medina	65.8	Hubbard Valley Road	145
Medina	65.9	Good Road	486
Medina	66.0	I-71	50,000
Medina	66.7	Wooster Pike Road	10,000
Medina	67.1	Summer Ridge Drive	Not Available
Medina	68.3	CR 40	1,647
Medina	68.3	CR 50	765
Medina	69.0	Lake Road	1,968
Medina	70.9	SH 162	3,500
Medina	71.9	Lafayette Road	7,000
Medina	72.5	Carlton Road	364
Medina	73.7	W. Smith Road	966
Medina	74.1	Branch Road	5,300
Medina	75.0	Stone Road	680
Medina	76.3	Beck Road	267

APPENDIX L-1 (cont'd)

Average Daily Traffic Counts on Roads in the NGT Project Area

State, Facility, County	Milepost [a]	Road Name	Average Daily Traffic Count
Mainline Pipeline (cont'd)			
Medina	77.0	SH 18	7,500
Medina	78.0	Spieth Road	650
Medina	79.1	Erhart Road	176
Medina	79.6	Kennedy Road	28
Medina	N/A	Avon Belden Road	5,200
Lorain	81.2	Neff Road	Not Available
Lorain	82.6	SH 83	5,400
Lorain	82.7	Law Road	Not Available
Lorain	83.9	Mennell Road	813
Lorain	84.7	SH 303	2,700
Lorain	85.9	CR 49	Not Available
Lorain	87.1	CR 26	2,413
Lorain	88.2	Wheeler Road	Not Available
Lorain	89.2	SH 301	8,663
Lorain	90.0	CR 48	1,286
Lorain	91.0	Diagonal Road	1,862
Lorain	92.4	CR 38	Not Available
Lorain	93.4	Hallauer Road /CR 75	Not Available
Lorain	93.4	US 20	25,000
Lorain	94.6	SH 58	10,000
Lorain	96.8	Quarry Road	Not Available
Lorain	97.7	CR 51	Not Available
Lorain	98.0	Gifford Road	Not Available
Lorain	99.2	SH 511	1,660
Lorain	100.0	Baird Road	Not Available
Lorain	100.6	CR 34	Not Available
Lorain	N/A	I-80	40,000
Lorain	N/A	CR 302	4,000
Lorain	N/A	SH 113	3,000
Cuyahoga	N/A	I-71	90,000
Cuyahoga	N/A	I-80	40,000
Huron	101.3	County Line Road	Not Available
Huron	102.4	CR 63	604
Huron	103.9	SH 60	1,500
Huron	104.6	West Road	566
Huron	N/A	US Route 20	4,500
Huron	N/A	OH 598	1,293
Huron	N/A	OH 61	4,580
Erie	105.9	Florence Wakeman Road	1,000
Erie	106.1	Burr Road	Not Available
Erie	107.6	CR 59	Not Available
Erie	108.6	SH 113	3,000
Erie	110.2	CR 17	557
Erie	110.3	I-80	40,000
Erie	111.1	CR 134	Not Available
Erie	112.0	CR 13	1,500
Erie	112.0	SH 61	2,760
Erie	113.1	CR 132	1,625

APPENDIX L-1 (cont'd)

Average Daily Traffic Counts on Roads in the NGT Project Area

State, Facility, County	Milepost [a]	Road Name	Average Daily Traffic Count
Mainline Pipeline (cont'd)			
Erie	113.8	CR 131	372
Erie	114.6	CR 128	294
Erie	115.0	CR 127	260
Erie	116.3	CR 126	624
Erie	117.2	SH 13	4,060
Erie	118.1	Hoover Road	483
Erie	119.2	CR 123	1,251
Erie	119.5	US Highway 250 N	14,000
Erie	120.4	Patrol Road	Not Available
Erie	120.5	Patrol Road	Not Available
Erie	120.9	CR 13	2,111
Erie	122.1	Thomas Road	363
Erie	123.2	Ransom Rd/CR 44	38
Erie	124.8	CR 43	445
Erie	125.8	CR 108	Not Available
Erie	126.2	SH 99	2,800
Erie	126.7	SH 4	10,000
Erie	127.7	Portland Road	2,700
Erie	128.4	Maple Avenue	99
Erie	128.8	Billings Road	141
Erie	130.1	Deyo Road	Not Available
Erie	130.8	State Hwy 269	3,700
Erie	N/A	SH 60	3,000
Erie	N/A	Florence Wakeman Rd	Not Available
Erie	N/A	Joppa Rd	472
Erie	N/A	OH 61	2,975
Erie	N/A	OH 113	2,065
Marion	N/A	OH 309	9,072
Marion	N/A	OH 98	2,756
Crawford	N/A	OH 98	3.940
Crawford	N/A	OH 598	1,054
Richland	N/A	OH 598	919
Sandusky	131.5	CR 1/ CR 312	505
Sandusky	132.7	I-80	40,000
Sandusky	133.4	CR 302	200
Sandusky	133.5	SH 101	2,600
Sandusky	134.1	CR 294	272
Sandusky	135.4	CR 278	193
Sandusky	136.0	CR 268	410
Sandusky	137.0	CR 260	443
Sandusky	137.5	CR 233	Not Available
Sandusky	138.6	SH 510	1,480
Sandusky	139.3	SH 412	1,800
Sandusky	139.6	CR 244	Not Available
Sandusky	140.1	CR 238	Not Available
Sandusky	140.0	CR 232	218
Sandusky	140.0	CR 241	Not Available
Sandusky	141.3	CR 226	Not Available

APPENDIX L-1 (cont'd)

Average Daily Traffic Counts on Roads in the NGT Project Area

State, Facility, County	Milepost [a]	Road Name	Average Daily Traffic Count
Mainline Pipeline (cont'd)			
Sandusky	141.6	CR 239	Not Available
Sandusky	141.9	CR 222	Not Available
Sandusky	142.7	US 6	7,000
Sandusky	143.3	CR 202	Not Available
Sandusky	143.9	CR 198	200
Sandusky	144.4	CR 188	Not Available
Sandusky	144.8	I-80	40,396
Sandusky	145.2	CR 234	Not Available
Sandusky	146.0	SH 53	10,000
Sandusky	146.5	CR 170	304
Sandusky	147.2	I-80	41,748
Sandusky	147.5	CR 89	855
Sandusky	148.3	SH 19	4,400
Sandusky	149.6	CR 142	Not Available
Sandusky	150.3	CR 128	934
Sandusky	150.7	CR 122	Not Available
Sandusky	151.7	CR 106	221
Sandusky	152.7	SH 590	1,658
Sandusky	153.8	CR 92	Not Available
Sandusky	154.2	SH 20	10,163
Sandusky	154.7	CR 87/Long Road	Not Available
Sandusky	155.9	CR 74	142
Sandusky	157.1	CR 66	625
Sandusky	157.6	CR 62	142
Sandusky	158.2	SH 300	1,488
Sandusky	159.0	CR 93	Not Available
Sandusky	159.7	CR 38	Not Available
Sandusky	160.3	CR 32	703
Sandusky	161.1	CR 48	Not Available
Sandusky	161.0	CR 24	Not Available
Sandusky	162.0	CR117	922
Sandusky	162.0	SH 105	1,600
Sandusky	163.1	CR 139	Not Available
Sandusky	N/A	SH 582	520
Wood	163.7	US 23	13,000
Wood	164.5	SH 582	3,000
Wood	164.9	CR 16	Not Available
Wood	166.1	CR 15	2,064
Wood	167.2	CR 111	1,042
Wood	167.8	CR 292	Not Available
Wood	168.4	CR 11	1,113
Wood	169.4	CR 10	567
Wood	170.4	Caris Road	236
Wood	170.8	CR 272	Not Available
Wood	172.6	SH 199	2,300
Wood	173.5	Carter Road	Not Available
Wood	174.5	CR 92	645
Wood	175.1	I-75	54,000

APPENDIX L-1 (cont'd)

Average Daily Traffic Counts on Roads in the NGT Project Area

State, Facility, County	Milepost [a]	Road Name	Average Daily Traffic Count
Mainline Pipeline (cont'd)			
Wood	175.6	CR 90	1,074
Wood	176.6	SH 25	9,000
Wood	177.0	CR 99/Pargillis Rd	Not Available
Wood	178.0	CR 97/Hull Prairie Rd	513
Wood	179.9	SH 64	4,470
Wood	181.0	CR 235	Not Available
Wood	181.2	SH 65	3,200
Wood	N/A	Interstate 475	48,150
Wood	N/A	I-75	61,050
Wood	N/A	OH 582	5,279
Wood	N/A	OH 25	8,410
Lucas	181.8	US 24	27,000
Lucas	183.1	CR 137	205
Lucas	183.4	HWY 24	16,210
Lucas	184.3	CR 221	56
Lucas	184.8	CR 152	56
Lucas	185.3	Heller Road	358
Lucas	186.3	SH 295	1,000
Lucas	187.3	Yawberg Road	248
Lucas	187.9	CR 111	405
Lucas	188.4	Manore Road	119
Lucas	188.9	CR 109	894
Lucas	189.3	CR 1	Not Available
Lucas	N/A	US 64	3,000
Lucas	N/A	US 20A	17,300
Lucas	N/A	I-90/I-80	23,000
Lucas	N/A	I-475	65,000
Lucas	N/A	US 23	60,000
Lucas	N/A	US 20	10,000
Lucas	N/A	St Lawrence Dr	Not Available
Lucas	N/A	John Q Carey Dr	Not Available
Lucas	N/A	George Hardy Dr	Not Available
Lucas	N/A	Tiffin St	761
Lucas	N/A	Millard Ave	731
Lucas	N/A	Front St	12,170
Lucas	N/A	Oak St	8,431
Lucas	N/A	Woodville Rd	20,865
Lucas	N/A	Clayton St	20,865
Lucas	N/A	S Summit St	24,466
Lucas	N/A	Broadway St	17,693
Lucas	N/A	Logan St	1,600
Lucas	N/A	S Erie St	1,370
Lucas	N/A	I-280	57,757
Lucas	N/A	I-75	72,000
Lucas	N/A	I-475	90,691
Lucas	N/A	US 23	61,448
Henry	190.2	CR W /County Road A	1,050
Fulton	190.0	CR 2	Not Available

APPENDIX L-1 (cont'd)

Average Daily Traffic Counts on Roads in the NGT Project Area

State, Facility, County	Milepost [a]	Road Name	Average Daily Traffic Count
Mainline Pipeline (cont'd)			
Fulton	191.5	CR B	490
Fulton	192.3	CR 3	607
Fulton	192.8	CR C	Not Available
Fulton	193.8	CR D	Not Available
Fulton	194.8	CR E	Not Available
Fulton	195.6	CR EF	226
Fulton	196.2	CR F	Not Available
Fulton	197.3	US 20A	18,000
Fulton	198.3	CR H	Not Available
Fulton	199.1	I-80	13,000
Fulton	199.3	CR J	328
Fulton	200.0	CR 3	Not Available
Fulton	200.9	SH 64	750
Fulton	201.6	CR L	Not Available
Fulton	202.7	CR M	Not Available
Fulton	203.0	CR N	Not Available
Fulton	204.0	CR 2	Not Available
Fulton	204.9	US 20	5,000
Fulton	206.0	CR S	Not Available
Fulton	207.0	CR T	268
Fulton	207.8	CR U	1,700
MICHIGAN			
Mainline			
Lenawee	209.0	Yankee Road	Not Available
Lenawee	210.0	E Mulberry Road	3,048
Lenawee	211.0	E Ridgeville Road	Not Available
Lenawee	212.0	E Weston Road	856
Lenawee	213.0	Fike Road	Not Available
Lenawee	214.0	E Horton Road	Not Available
Lenawee	215.1	Beamer Road	1,207
Lenawee	215.8	E Gorman Road	229
Lenawee	216.7	SH 223	10,000
Lenawee	217.1	Driggs Road	Not Available
Lenawee	218.4	Rouget Road	3,100
Lenawee	219.0	Pope Road	Not Available
Lenawee	219.0	Wellsville Highway	Not Available
Lenawee	220.1	Deerfield Road	3,800
Lenawee	220.7	Forche Road	Not Available
Lenawee	221.3	S Blissfield Highway	2,200
Lenawee	222.1	McMahon Road	Not Available
Lenawee	222.7	Garno Road	Not Available
Lenawee	223.2	Laberdee Road	Not Available
Lenawee	224.4	Holloway Road	500
Lenawee	225.0	Britton Highway	789
Lenawee	225.6	Sutton Road	Not Available
Lenawee	226.7	Hoagland Highway	Not Available
Lenawee	227.0	Pocklington Road	Not Available
Lenawee	227.5	Downing Highway	Not Available

APPENDIX L-1 (cont'd)

Average Daily Traffic Counts on Roads in the NGT Project Area

State, Facility, County	Milepost [a]	Road Name	Average Daily Traffic Count
Mainline Pipeline (cont'd)			
Lenawee	228.2	SH 50	7,000
Lenawee	229.4	Kniffen Road	Not Available
Lenawee	230.1	Downing Highway	Not Available
Lenawee	N/A	Bucholtz Highway	306
Lenawee	N/A	Rogers Highway	1,700
Lenawee	N/A	Ridge Highway	3,300
Lenawee	N/A	Brewer Road	500
Lenawee/Monroe	230.4	N County Line Hwy	201
Monroe	N/A	N County Line Hwy	Not Available
Monroe	230.7	Milwaukee Road	61
Monroe	231.3	Couper Road	Not Available
Monroe	232.2	Far Road	Not Available
Monroe	232.5	Cone Road	1,699
Monroe	233.1	Welch Road	Not Available
Monroe	234.0	Hickory Road	Not Available
Monroe	234.0	Dennison Road	500
Monroe	236.0	Redman Road	518
Monroe	236.0	Petersburg Road	Not Available
Monroe	N/A	SH 23	35,000
Monroe	N/A	SH 223	7,500
Monroe	N/A	SH 50	7,000
Monroe	N/A	US 23	43,300
Monroe	N/A	Tecumseh Rd	7,700
Washtenaw	237.6	Mooreville Road	2,912
Washtenaw	238.2	Platt Road	3,430
Washtenaw	239.3	Willow Road	2,707
Washtenaw	239.6	SH 23	58,000
Washtenaw	240.0	Carpenter Road	4,265
Washtenaw	241.1	Sanford Road	Not Available
Washtenaw	241.8	McCrone Road	Not Available
Washtenaw	242.3	Judd Road	Not Available
Washtenaw	243.3	Pitman Road	Not Available
Washtenaw	243.8	Hitchingham Road	Not Available
Washtenaw	245.0	Whittaker Road	6,694
Washtenaw	245.2	Willis Road	5,100
Washtenaw	246.6	Tuttle Hill Road	Not Available
Washtenaw	247.4	Bemis Road	733
Washtenaw	248.0	Bunton Road	Not Available
Washtenaw	248.1	Martz Road	Not Available
Washtenaw	248.7	McKean Road	Not Available
Washtenaw	250.2	Textile Road	11,221
Washtenaw	251.1	Bridge Road	7,603
Washtenaw	251.4	S Grove Street	3,564
Washtenaw	251.7	Lakeview Avenue	Not Available
Washtenaw	251.7	Willow Run Fwy S	Not Available
Washtenaw	251.7	I-94	96,000
Washtenaw	251.7	Willow Run Fwy N	Not Available
Washtenaw	252.0	Coolidge Avenue	Not Available

APPENDIX L-1 (cont'd)

Average Daily Traffic Counts on Roads in the NGT Project Area

State, Facility, County	Milepost [a]	Road Name	Average Daily Traffic Count
Mainline Pipeline (cont'd)			
Washtenaw	252.2	State Street	334
Washtenaw	252.3	Watson Street	Not Available
Washtenaw	252.4	Wiard Rd	3,213
Washtenaw	252.4	Connecting Road	Not Available
Washtenaw	252.8	Tyler Road	1,820
Washtenaw	252.9	Ramp	3,213
Washtenaw	252.9	Connecting Rd	Not Available
Washtenaw	253.0	Airport Dr	1,024
Washtenaw	253.0	Wiard Rd	Not Available
Washtenaw	253.0	Thoroughbred Rd	Not Available
Washtenaw	253.0	Northern Dr	Not Available
Washtenaw	254.0	US 12 Ramp	20,000
Washtenaw	254.0	US-12 Eastbound	23,945
Washtenaw	254.0	US 12 Overpass	Not Available
Washtenaw	254.0	US Hwy 12 Westbound	23,900
Washtenaw	N/A	Wiard Road	3,200
Washtenaw	N/A	Ridge Highway	6,600
Washtenaw	N/A	Dennison Road	500
Washtenaw	N/A	Mooreville Road	7,000
Washtenaw	N/A	Stony Creek Road	5,800
Washtenaw	N/A	Rawsonville Road	12,000

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[a] Approximate milepost along the pipeline rounded to the nearest tenth. If a milepost number is not applicable (N/A), then the road does not cross the pipeline route.

Sources: Ohio: ODOT, 2015a; 2015b.
Michigan: MDOT, 2015; State of Michigan, 2013.

APPENDIX L-2

AVERAGE DAILY TRAFFIC COUNTS ON ROADS IN THE TEAL PROJECT AREA

APPENDIX L-2

Average Daily Traffic Counts on Roads in the TEAL Project Area

State, Facility, County	Milepost [a]	Road Name	Average Daily Traffic Count
OHIO			
Loopline			
Monroe	N/A	Ohio State Route 145	1,690
Monroe	N/A	Township Hwy 945	Not Available
Monroe	0.1	Headley Ridge Road	216
Monroe	1.4	Brock Ridge Road	Not Available
Monroe	2.6	Cain Ridge Road	Not Available
Monroe	N/A	Township Hwy 702	Not Available
Monroe	3.5	Dry Ridge Road	Not Available
Monroe	N/A	German Ridge Road	442
Monroe	N/A	Krebs Hill Road	516
Monroe	3.6	Ohio State Route 556	800
Connecting Pipeline			
Columbiana	N/A	US 30	7,250
Columbiana	N/A	Ohio State Route 644	1,670
Columbiana	N/A	Hagen Road	Not Available
Columbiana	N/A	Tunnel Hill Road	Not Available
Proposed Salineville Compressor Station			
Columbiana	N/A	US 30	7,250
Columbiana	N/A	Ohio State Route 644	1,670
Columbiana	N/A	Ohio State Route 518	720
Columbiana	N/A	Yellow Creek Church Road	Not Available
Line 73 Launcher/Receiver Site			
Monroe	N/A	Krebs Hill Road	516
Monroe	N/A	Steiger Ridge Road	Not Available
Line 73 Regulator Site			
Monroe	N/A	German Ridge Road	442
Monroe	N/A	Township Hwy 211	Not Available
Monroe	N/A	Township Hwy 210	Not Available

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[a] Approximate milepost along the pipeline rounded to the nearest 0.1 of a mile. If a milepost number is not applicable (N/A), then the road does not cross the pipeline route.

Sources: ODOT, 2015a; 2015b.

APPENDIX L-3

RACIAL, ETHNIC, AND POVERTY STATISTICS FOR CENSUS TRACTS WITHIN 1 MILE OF THE NGT PIPELINE AND MAJOR ABOVEGROUND FACILITIES IN OHIO

APPENDIX L-3

Racial, Ethnic, and Poverty Statistics for Census Tracts Within 1 Mile of the NGT Pipeline and Major Aboveground Facilities in Ohio

Location	Total Population [a]	White (%) [a, b]	African American (%) [a]	Native American & Alaska Native (%) [a]	Asian (%) [a]	Native Hawaiian & Pacific Islander (%) [a]	Other Race (%) [a]	Two or More Races (%) [a]	Hispanic or Latino Origin - Any Race (%) [a]	Total Minority Population (%) [a]	Percent Below Poverty Level (%) [c]
FEDERAL											
U.S.	311,536,594	74	12.6	0.8	4.9	0.2	4.7	2.8	16.6	26.0	15.4
STATE											
Ohio	11,290,586	82.9	12.1	0.2	1.7	0.0	0.8	2.2	3.2	17.1	15.8
LOCAL											
Carroll County *											
CT 7201	3,544	98.3	0.0	0.0	0.0	0.0	1.1	0.6	1.1	1.7	6.4
Columbiana County											
CT 9509	3,921	97.2	1.1	0.0	0.6	0.0	0.0	0.9	0.2	2.8	6.1
CT 9510 [d]	5,633	95.7	1.6	0.0	1.1	0.0	0.3	0.3	1.1	4.3	16.0
CT 9512 [d]	4,926	96.3	0.0	1.2	0.0	0.0	0.1	1.9	0.5	3.7	12.2
Erie County											
CT 403	6,090	95.1	0.4	0.4	0.5	0.1	1.0	2.3	1.4	4.9	12.6
CT 417	6,470	93.0	0.0	0.1	0.3	0.0	0.4	1.7	5.4	7.0	8.1
CT 418	6,360	95.3	0.6	0.2	0.5	0.0	0.0	2.2	1.3	4.7	5.8
Fulton County											
CT 401	3,095	94.0	0.5	0.0	0.1	0.0	2.7	2.0	3.2	6.0	9.5
CT 402	4,596	95.5	0.8	0.2	0.0	0.0	0.3	0.2	3.4	4.5	6.7
CT 403	4,891	96.6	0.0	0.0	0.6	0.0	0.1	1.6	1.2	3.4	10.1
Henry County											
CT 1	4,892	93.6	0.9	0.2	0.1	0.3	0.3	0.7	4.3	6.4	10.9
Huron County											
CT 9154	4,818	97.7	0.0	0.7	0.0	0.0	0.1	0.9	0.8	2.3	10.4
Lorain County											
CT 571	3,790	91.0	0.7	0.0	0.1	0.0	0.1	0.8	7.3	9.0	7.0
CT 601	3,720	63.9	24.4	0.0	0.6	0.0	0.5	9.2	5.3	36.1	12.4
CT 602	5,489	75.5	10.8	0.1	4.2	0.1	0.2	7.7	2.4	24.5	18.6
CT 771	3,450	95.8	0.9	0.0	0.3	0.0	0.0	0.0	3.0	4.2	7.3
CT 921	2,438	94.4	0.3	0.0	0.7	0.0	0.0	0.8	4.3	5.6	5.5
CT 931	2,958	97.1	0.1	1.2	0.0	0.0	0.4	0.5	1.1	2.9	8.7
CT 941	8,159	96.6	0.3	0.0	0.2	0.0	0.0	1.2	1.7	3.4	4.2
CT 951	8,822	80.6	15.0	0.4	0.6	0.0	0.8	1.7	1.9	19.4	2.2
Lucas County											

APPENDIX L-3 (cont'd)

Racial, Ethnic, and Poverty Statistics for Census Tracts Within 1 Mile of the NGT Pipeline and Major Aboveground Facilities in Ohio

Location	Total Population [a]	White (%) [a, b]	African American (%) [a]	Native American & Alaska Native (%) [a]	Asian (%) [a]	Native Hawaiian & Pacific Islander (%) [a]	Other Race (%) [a]	Two or More Races (%) [a]	Hispanic or Latino Origin - Any Race (%) [a]	Total Minority Population (%) [a]	Percent Below Poverty Level (%) [c]
LOCAL (cont'd)											
Lucas County											
CT 89.01	5,133	94.4	1.1	1.0	1.0	0.0	0.0	0.9	3.0	5.6	6.3
CT 89.02 [d]	6,242	92.3	0.6	0.0	4.2	0.0	0.2	0.5	2.6	7.7	4.9
CT 93	1,772	99.3	0.6	0.0	0.0	0.0	0.0	0.1	0.0	0.7	4.9
CT 96	3,348	94.1	0.6	0.4	2.6	0.0	0.1	0.3	2.9	5.9	7.3
Medina County											
CT 4020	5,176	94.5	0.0	0.3	0.0	0.0	0.3	0.3	4.8	5.5	4.9
CT 4030.01	3,283	96.9	0.0	0.8	0.0	0.0	1.9	0.4	0.0	3.1	8.5
CT 4030.02	3,135	95.9	0.7	0.0	0.2	0.0	0.0	1.4	1.9	4.1	3.0
CT 4070	6,380	94.6	0.3	0.0	2.3	0.0	0.7	1.6	1.1	5.4	2.5
CT 4081	7,209	86.7	9.2	0.9	0.0	0.0	0.0	1.4	2.1	13.3	12.2
CT 4082.01	4,220	89.5	4.3	0.0	0.3	0.0	4.2	0.2	2.4	10.5	18.0
CT 4090.02	4,591	93.7	1.4	0.0	0.9	0.0	1.4	2.1	1.7	6.3	7.4
CT 4120	4,243	98.9	0.1	0.0	0.1	0.0	0.0	0.4	0.5	1.1	2.8
CT 4130 [d]	5,496	97.5	0.2	0.0	0.2	0.0	1.1	0.6	0.4	2.5	5.0
CT 4172	7,306	95.1	0.0	1.1	0.3	0.0	0.0	2.0	1.9	4.9	4.3
CT 4173	4,699	94.5	0.4	0.0	0.9	0.0	1.1	3.1	0.9	5.5	13.0
Sandusky County											
CT 9608	3,534	96.7	0.2	0.0	0.5	0.0	0.7	0.7	1.9	3.3	7.4
CT 9609	3,434	94.6	0.4	0.0	0.0	0.0	0.6	1.3	4.1	5.4	10.4
CT 9610	4,081	90.0	0.2	0.9	1.6	0.8	0.2	2.0	5.9	10.0	9.5
CT 9621 [d]	4,897	97.2	0.3	0.0	0.1	0.0	0.2	1.5	0.9	2.8	8.9
Stark County											
CT 7109	4,356	94.9	2.4	0.0	0.0	0.0	0.0	2.7	0.1	5.1	3.6
CT 7110	7,229	96.2	0.7	0.0	0.0	0.0	0.0	3.0	0.1	3.8	5.7
CT 7111.12	5,414	98.3	0.0	0.0	1.1	0.0	0.5	0.0	0.2	1.7	1.7
CT 7111.21	6,552	92.1	1.1	0.0	1.3	0.0	0.0	2.8	2.6	7.9	2.3
CT 7111.22	5,802	92.1	0.6	0.0	5.4	0.0	0.4	0.0	1.9	7.9	10.8
CT 7112.11	6,695	97.5	0.5	0.0	0.0	0.0	0.3	1.7	0.2	2.5	8.7
CT 7113.11	8,046	91.0	1.1	0.0	3.4	0.0	0.1	2.9	2.4	9.0	3.7
CT 7121.02	7,406	87.8	2.4	0.0	0.2	0.0	1.1	6.5	2.1	12.2	11.8
CT 7127	5,502	99.0	0.0	0.0	0.2	0.0	0.0	0.1	0.6	1.0	6.3

APPENDIX L-3 (cont'd)

Racial, Ethnic, and Poverty Statistics for Census Tracts Within 1 Mile of the NGT Pipeline and Major Aboveground Facilities in Ohio

Location	Total Population [a]	White (%) [a, b]	African American (%) [a]	Native American & Alaska Native (%) [a]	Asian (%) [a]	Native Hawaiian & Pacific Islander (%) [a]	Other Race (%) [a]	Two or More Races (%) [a]	Hispanic or Latino Origin - Any Race (%) [a]	Total Minority Population (%) [a]	Percent Below Poverty Level (%) [c]
LOCAL (cont'd)											
CT 7128	4,780	96.7	0.5	0.0	0.4	0.0	0.0	1.5	0.9	3.3	8.8
Summit County											
CT 5314.01	7,176	97.3	0.3	0.0	0.1	0.0	0.0	1.8	0.5	2.7	5.3
CT 5315	8,186	92.1	0.9	0.0	3.8	0.0	0.0	2.0	1.3	7.9	5.5
CT 5316.02	3,032	98.1	0.0	0.5	1.4	0.0	0.0	0.0	0.0	1.9	1.1
CT 5317.01	3,552	96.1	1.4	0.0	0.4	0.0	0.0	0.5	1.5	3.9	6.5
CT 5317.02	4,421	99.1	0.0	0.2	0.0	0.0	0.0	0.0	0.7	0.9	8.8
CT 5320.01	3,697	95.1	2.7	0.0	0.0	0.0	0.3	0.3	1.9	4.9	8.6
CT 5329.99	5,977	89.3	4.9	0.0	2.1	0.0	0.0	3.3	0.5	10.7	9.4
Wayne County											
CT 29.01	3,588	97.2	0.3	0.0	0.4	0.0	0.0	1.2	1.5	2.8	8.2
CT 29.02	5,099	95.7	1.9	0.0	0.0	0.0	0.0	0.8	2.5	4.3	4.6
CT 34	3,228	94.1	0.8	0.0	1.1	0.0	0.0	3.9	0.0	5.9	17.7
CT 35	3,522	98.9	0.0	0.5	0.0	0.0	0.0	0.6	0.0	1.1	6.9
Wood County											
CT 207	6,611	92.1	1.0	0.0	2.7	0.0	2.4	0.0	2.6	7.9	18.0
CT 210	3,913	96.2	0.1	0.0	0.3	0.0	1.9	0.7	3.4	3.8	6.0
CT 211	3,930	89.6	0.3	0.2	1.0	0.0	1.1	4.0	6.3	10.4	8.7
CT 212	5,649	91.8	1.4	0.0	1.6	0.0	0.5	2.3	2.9	8.2	4.5

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a U.S. Census Bureau, 2013c.
b White Alone, Not Hispanic or Latino
c U.S. Census Bureau, 2013d.
d Census tract contains an aboveground facility.
* Includes census tracts within one mile of the proposed pipeline facilities and major aboveground facilities, but Carroll County does not contain any NGT Project facilities.
Grey highlighted values indicate percentage exceeds thresholds defined in text, and is an environmental justice population.

APPENDIX L-4

RACIAL, ETHNIC, AND POVERTY STATISTICS FOR CENSUS TRACTS WITHIN 1 MILE OF THE NGT PIPELINE AND MAJOR ABOVEGROUND FACILITIES IN MICHIGAN

APPENDIX L-4

Racial, Ethnic, and Poverty Statistics for Census Tracts within 1 Mile of the NGT Pipeline and Major Aboveground Facilities in Michigan

Location	Total Population [a]	White (%) [a, b]	African American (%) [a]	Native American & Alaska Native (%) [a]	Asian (%) [a]	Native Hawaiian & Pacific Islander (%) [a]	Other Race (%) [a]	Two or More Races (%) [a]	Hispanic or Latino Origin – Any Race (%) [a]	Total Minority Population (%) [a]	Percent Below Poverty Level (%) [c]
FEDERAL											
U.S.	311,536,594	74	12.6	0.8	4.9	0.2	4.7	2.8	16.6	26.0	15.4
STATE											
Michigan	9,886,095	79.3	14	0.6	2.5	0.0	1.1	2.5	4.5	20.7	16.8
LOCAL											
Lenawee County											
CT 601	3,581	93.4	1.6	0.3	0.8	0.0	0.1	2.1	2.3	6.6	8.4
CT 612	1,776	91.2	0.0	0.0	0.1	0.0	0.6	3.2	6.4	8.8	9.1
CT 620	2,872	89.6	0.5	0.6	0.0	0.0	1.1	4.2	6.9	10.4	10.5
CT 621	4,385	93.7	0.0	0.0	0.0	0.0	1.3	2.3	5.0	6.3	9.0
CT 622	2,603	93.4	0.0	0.0	0.8	0.0	4.6	0.0	2.7	6.6	15.0
Monroe County											
CT 8307	3,482	94.7	1.1	0.0	0.0	0.0	0.0	0.9	3.9	5.3	7.3
CT 8308	6,718	96.9	0.0	0.1	0.6	0.0	0.2	1.8	0.8	3.1	16.5
Washtenaw County											
CT 4074	5,376	37.8	40.2	0.8	2.6	0.0	3.2	11.1	7.4	62.2	21.7
CT 4119 [d]	3,938	59.0	30.8	1.4	0.9	0.0	0.3	5.0	3.4	41.0	25.8
CT 4120	3,991	69.0	17.6	0.5	0.2	0.0	0.3	9.2	4.3	31.0	19.2
CT 4121	3,456	53.7	31.6	1.9	0.5	0.0	0.0	6.3	6.9	46.3	22.0
CT 4123	2,928	22.4	68.3	0.6	0.5	0.0	0.0	7.4	0.8	77.6	17.6
CT 4126	2,710	55.8	31.7	0.6	2.3	0.0	0.5	5.2	4.5	44.2	17.9
CT 4127	4,972	56.5	29.1	2.0	4.4	0.0	0.0	5.8	4.6	43.5	21.0
CT 4130	3,685	46.6	47.7	0.0	1.6	0.0	0.4	0.9	3.1	53.4	15.1
CT 4132	4,151	72.5	17.5	0.0	0.0	0.0	0.6	7.0	6.1	27.5	14.0
CT 4134.02	5,244	66.3	23.0	0.2	3.8	0.0	1.5	4.7	2.8	33.7	2.4
CT 4200	3,469	85.2	5.1	0.4	0.0	0.0	0.3	7.2	2.0	14.8	7.3
CT 4202	3,304	88.4	5.7	0.0	0.2	0.0	1.6	3.8	0.2	11.6	5.9
CT 4211	3,797	89.2	0.0	0.0	1.9	0.0	0.0	4.6	4.3	10.8	5.1
CT 4219	1,350	35.2	43.0	2.0	0.0	0.0	7.3	5.9	17.2	64.8	0.0
CT 4222	7,250	91.8	0.7	0.0	1.1	0.0	0.9	2.6	3.5	8.2	2.3
CT 9840	58	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.8
Wayne County											
CT 5645.04	6,099	67.1	12.1	0.0	15.2	0.0	0.3	2.4	3.3	32.9	6.0

APPENDIX L-4 (cont'd)

Racial, Ethnic, and Poverty Statistics for Census Tracts within 1 Mile of the NGT Pipeline and Major Aboveground Facilities in Michigan

Location	Total Population [a]	White (%) [a, b]	African American (%) [a]	Native American & Alaska Native (%) [a]	Asian (%) [a]	Native Hawaiian & Pacific Islander (%) [a]	Other Race (%) [a]	Two or More Races (%) [a]	Hispanic or Latino Origin – Any Race (%) [a]	Total Minority Population (%) [a]	Percent Below Poverty Level (%) [c]
LOCAL (cont'd)											
CT 5881	2,457	86.7	6.5	0.0	0.0	0.0	1.0	5.5	2.7	13.3	19.0
CT 5882	3,080	47.6	44.8	0.3	0.7	0.0	1.3	2.6	3.4	52.4	20.2
CT 5883	5,325	79.3	15.5	0.0	1.5	0.0	0.0	2.8	1.2	20.7	5.5
CT 5894	5,613	84.1	8.7	0.0	0.0	0.0	0.0	1.5	5.7	15.9	13.1

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a U.S. Census Bureau, 2013a
b White Alone, Not Hispanic or Latino
c U.S. Census Bureau, 2013b
d Census tract contains an aboveground facility
Grey highlight = Values indicate percentage exceeds thresholds defined in text and is an environmental justice population

APPENDIX L-5

RACIAL, ETHNIC, AND POVERTY STATISTICS FOR CENSUS TRACTS WITHIN 1 MILE OF THE TEAL PIPELINE AND MAJOR ABOVEGROUND FACILITIES

APPENDIX L-5

Racial, Ethnic, and Poverty Statistics for Census Tracts Within 1 Mile of the TEAL Pipeline and Major Aboveground Facilities

Location	Total Population [a]	White (%) [a, b]	African American (%) [a]	Native American & Alaska Native (%) [a]	Asian (%) [a]	Native Hawaiian & Pacific Islander (%) [a]	Other Race (%) [a]	Two or More Races (%) [a]	Hispanic or Latino Origin – Any Race (%) [a]	Total Minority Population (%) [a]	Percent Below Poverty Level (%) [a]
FEDERAL											
U.S.	311,536,594	74	12.6	0.8	4.9	0.2	4.7	2.8	16.6	26.0	15.4
STATE											
Ohio	11,290,586	82.9	12.1	0.2	1.7	0.0	0.8	2.2	3.2	17.1	15.8
LOCAL											
Belmont County											
CT 101	4,268	93.6	3.2	0.0	0.0	0.0	0.1	3.2	0.0	6.4	16.8
CT 103 [d]	3,245	99.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	8.3
Carroll County*											
CT 7201	3,544	98.3	0.0	0.0	0.0	0.0	1.1	0.6	1.1	1.7	6.4
Columbiana County											
CT 9510	5,633	95.7	1.6	0.0	1.1	0.0	0.3	0.3	1.1	4.3	16.0
CT 9512 [d]	4,926	96.3	0.0	1.2	0.0	0.0	0.1	1.9	0.5	3.7	12.2
Jefferson County*											
CT 121	2,894	99.0	0.3	0.0	0.0	0.0	0.0	0.5	0.1	1.0	11.4
Monroe County											
CT 9666	3,373	98.6	0.0	0.2	0.0	0.0	0.0	0.9	0.3	1.4	14.8
CT 9667	3,737	95.6	0.4	0.3	0.0	0.0	0.0	3.1	1.3	4.4	13.9

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a U.S. Census Bureau, 2013a
b White Alone, Not Hispanic or Latino
c U.S. Census Bureau, 2013b
d Census tract contains an aboveground facility
* Includes census tracts within 1 mile of the proposed pipeline facilities and major aboveground facilities, but Carroll and Jefferson Counties do not contain any project facilities
Grey highlight = Values indicate percentage exceeds thresholds defined in text and is an environmental justice population

APPENDIX M

NSA FIGURES

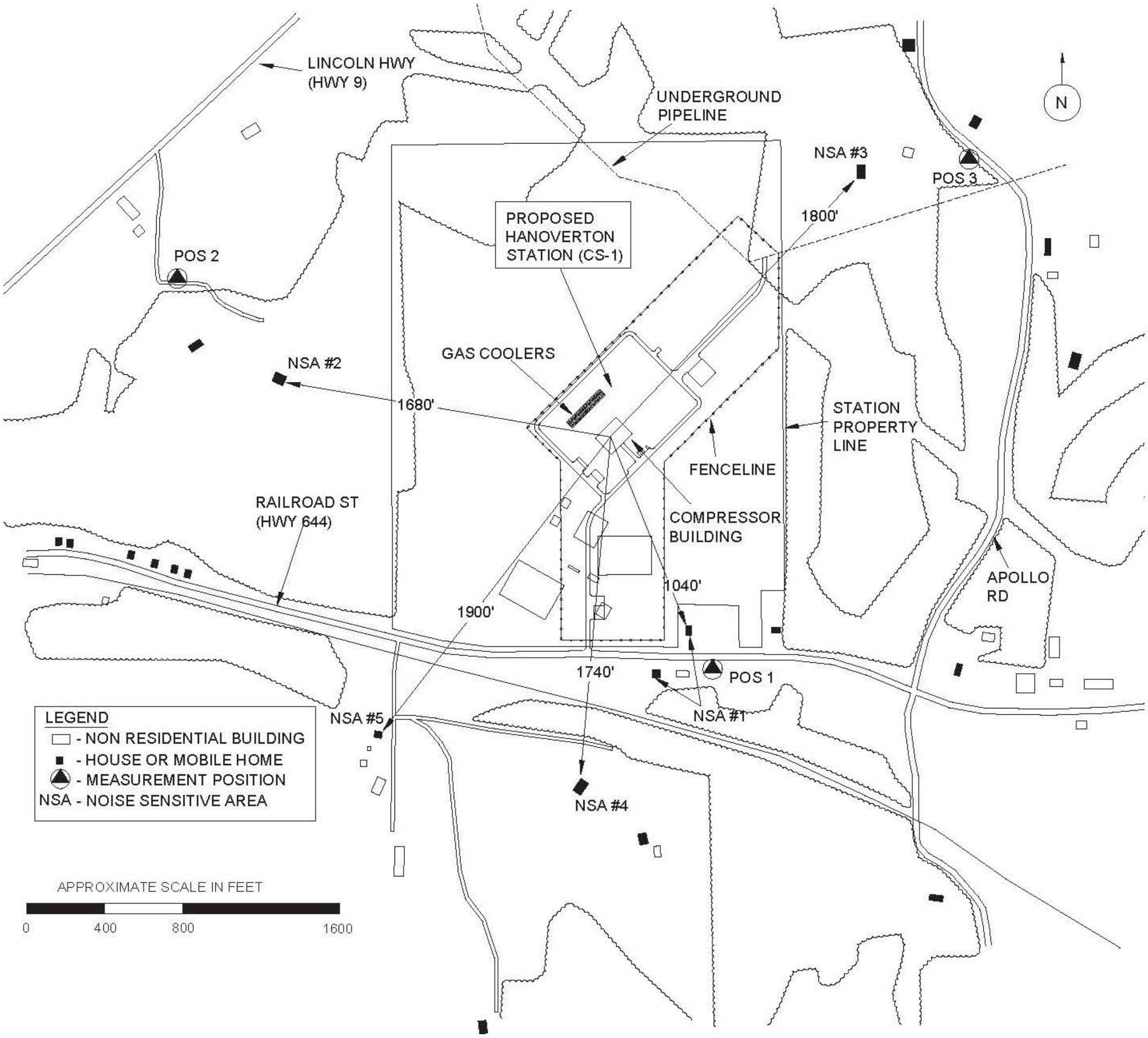

Figure 4.12.2-1
NGT and TEAL Projects
Noise-Sensitive Areas near the Hanoverton Compressor Station

Date: (2/19/2016) **Source:** Z:\Clients\Q_T\SpectraNexus\ArcGIS\2016\01\DEIS\Noise\Figure_4.12.2-1.mxd

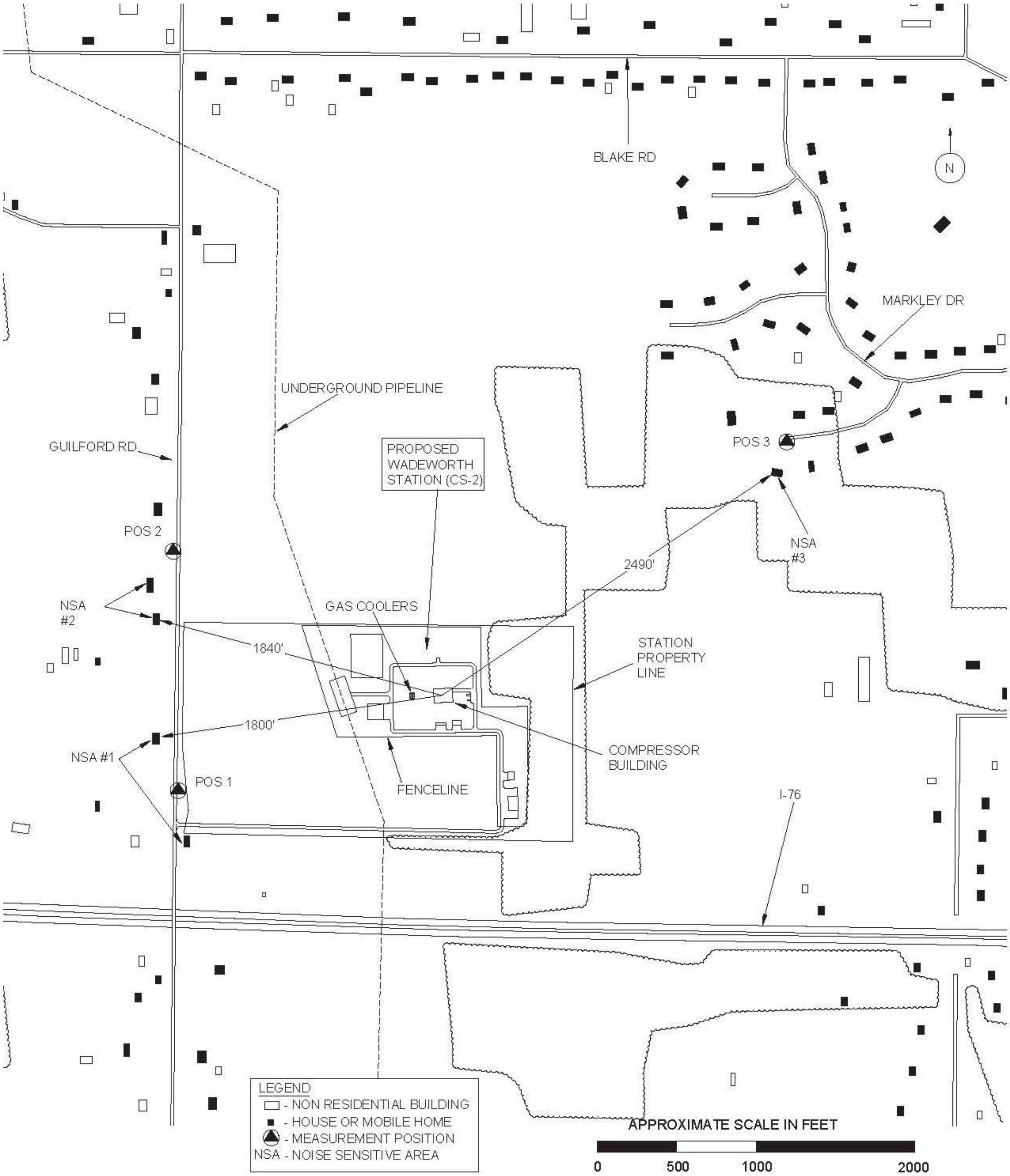

Figure 4.12.2-2

NGT and TEAL Projects

Noise Sensitive Areas near the Wadsworth Compressor Station

Date: (2/19/2016) **Source:** Z:\Clients\Q_T\SpectraNexus\ArcGIS\2016\01\DEIS\Noise\Figure_4.12.2-2.mxd

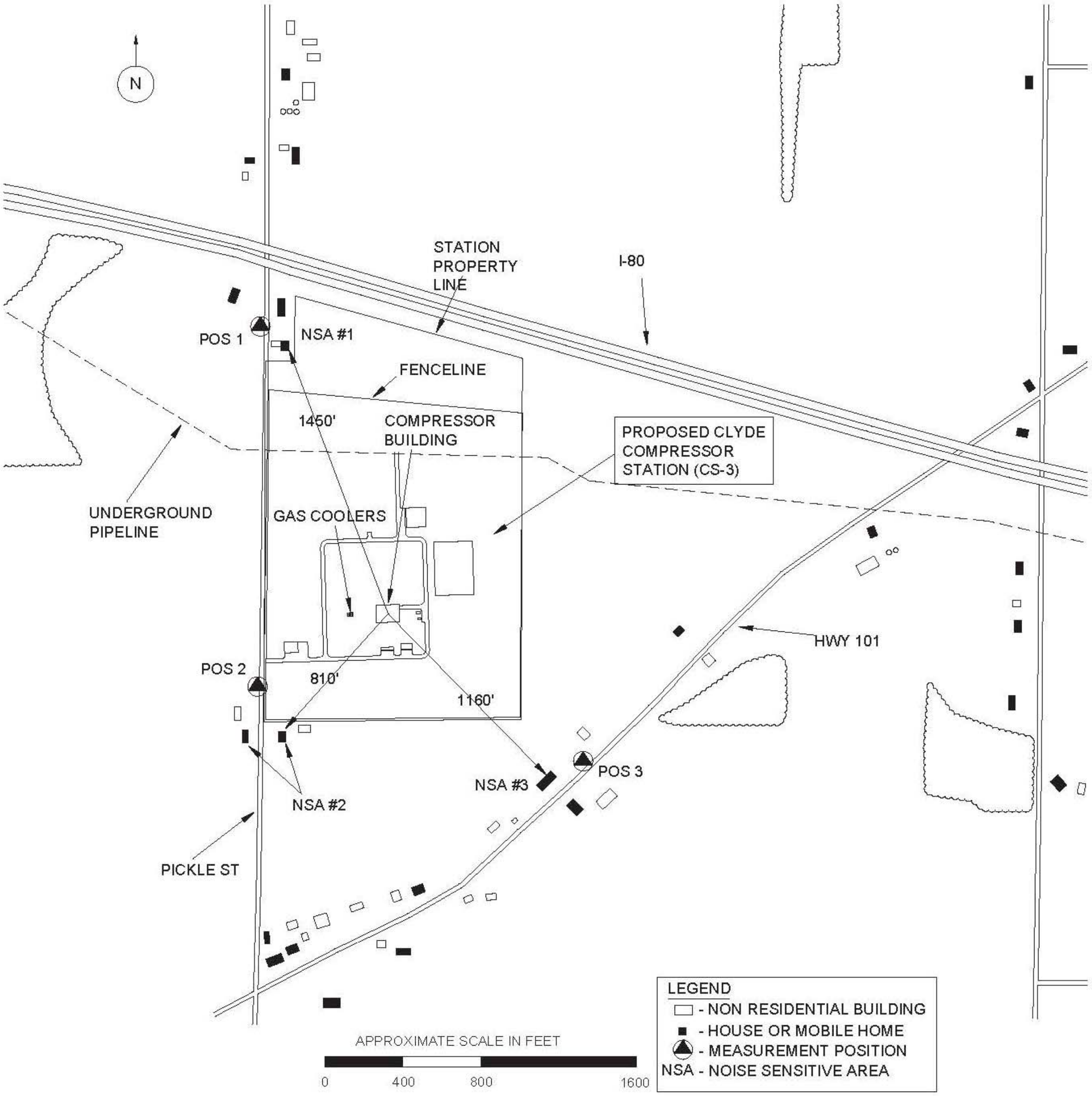

Figure 4.12.2-3

NGT and TEAL Projects

Noise-Sensitive Areas near the Clyde Compressor Station

Date: (2/19/2016) **Source:** Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\01\DEIS\Noise\Figure_4.12.2-3.mxd

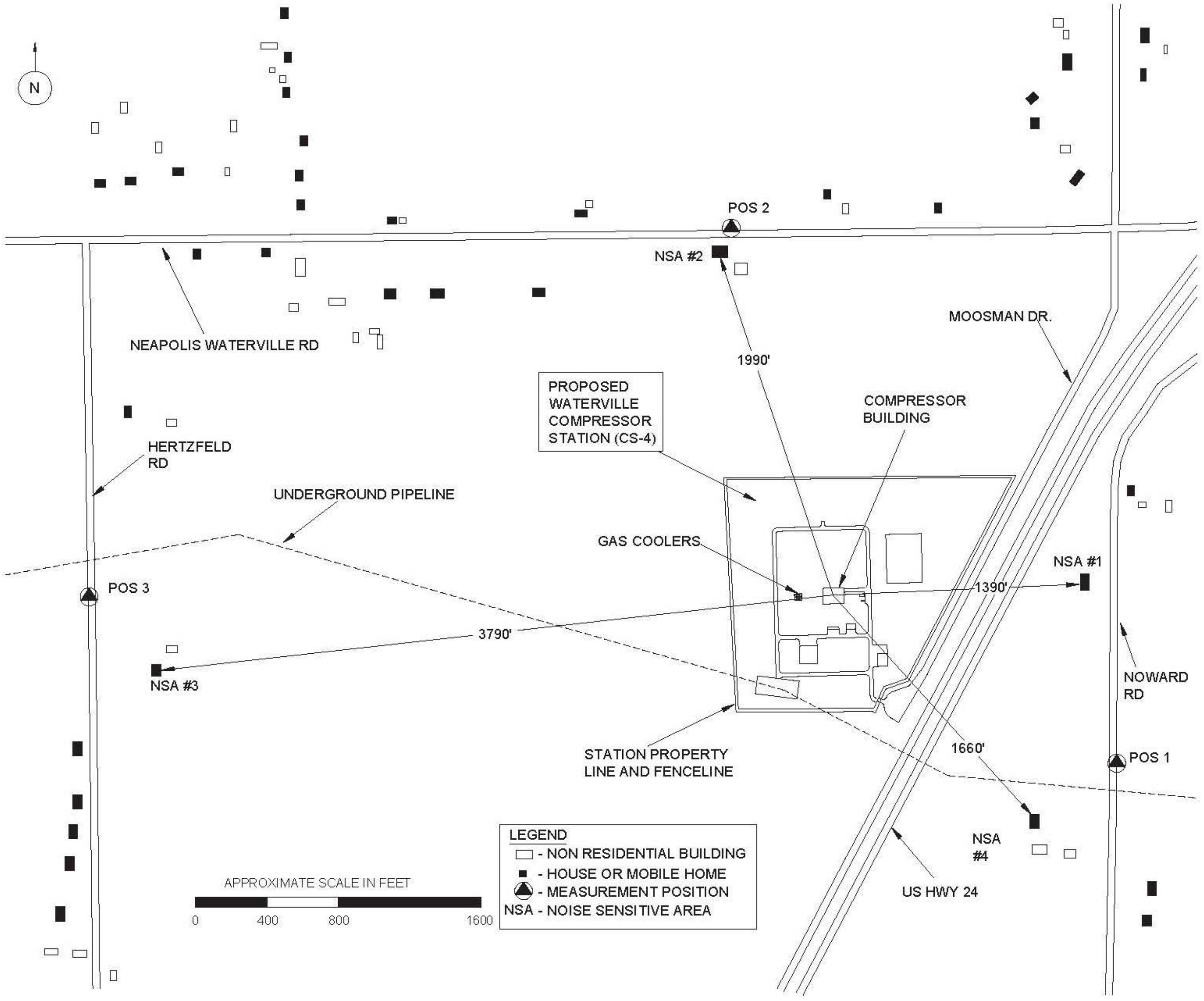

Figure 4.12.2-4
NGT and TEAL Projects
Noise-Sensitive Areas near the
Waterville Compressor Station

Date: (2/19/2016) **Source:** Z:\Clients\O_T\Spectra\Nexus\ArcGIS\2016\01\DEIS\Noise\Figure_4.12.2-4.mxd

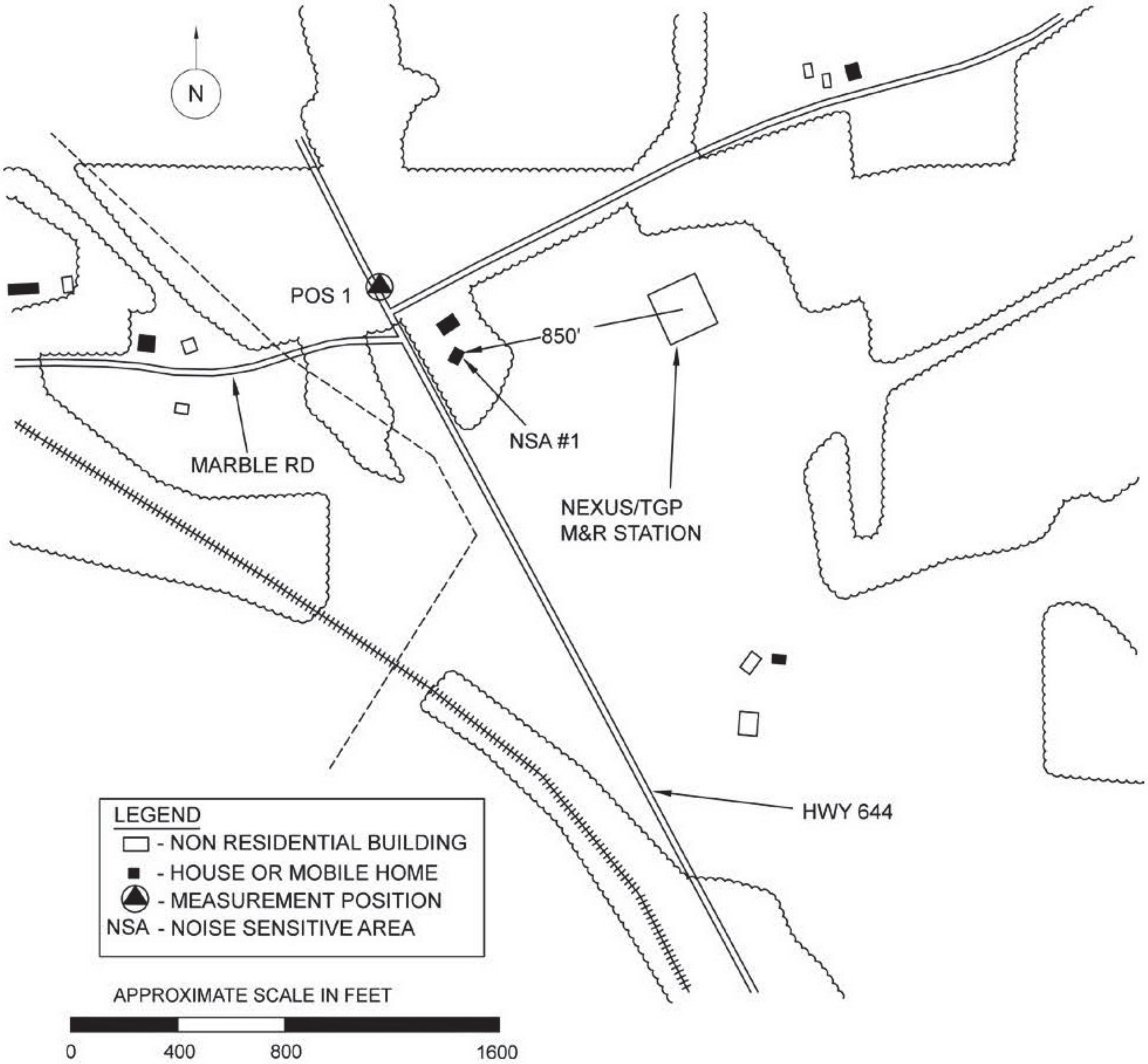

Figure 4.12.2-5
NGT and TEAL Projects
Noise-Sensitive Areas near the MR01 M and R Station

Date: (2/19/2016) Source: Z:\Clients\Q_T\SpectraNexus\ArcGIS\2016\01\DEIS\Noise\Figure_4.12.2-5.mxd

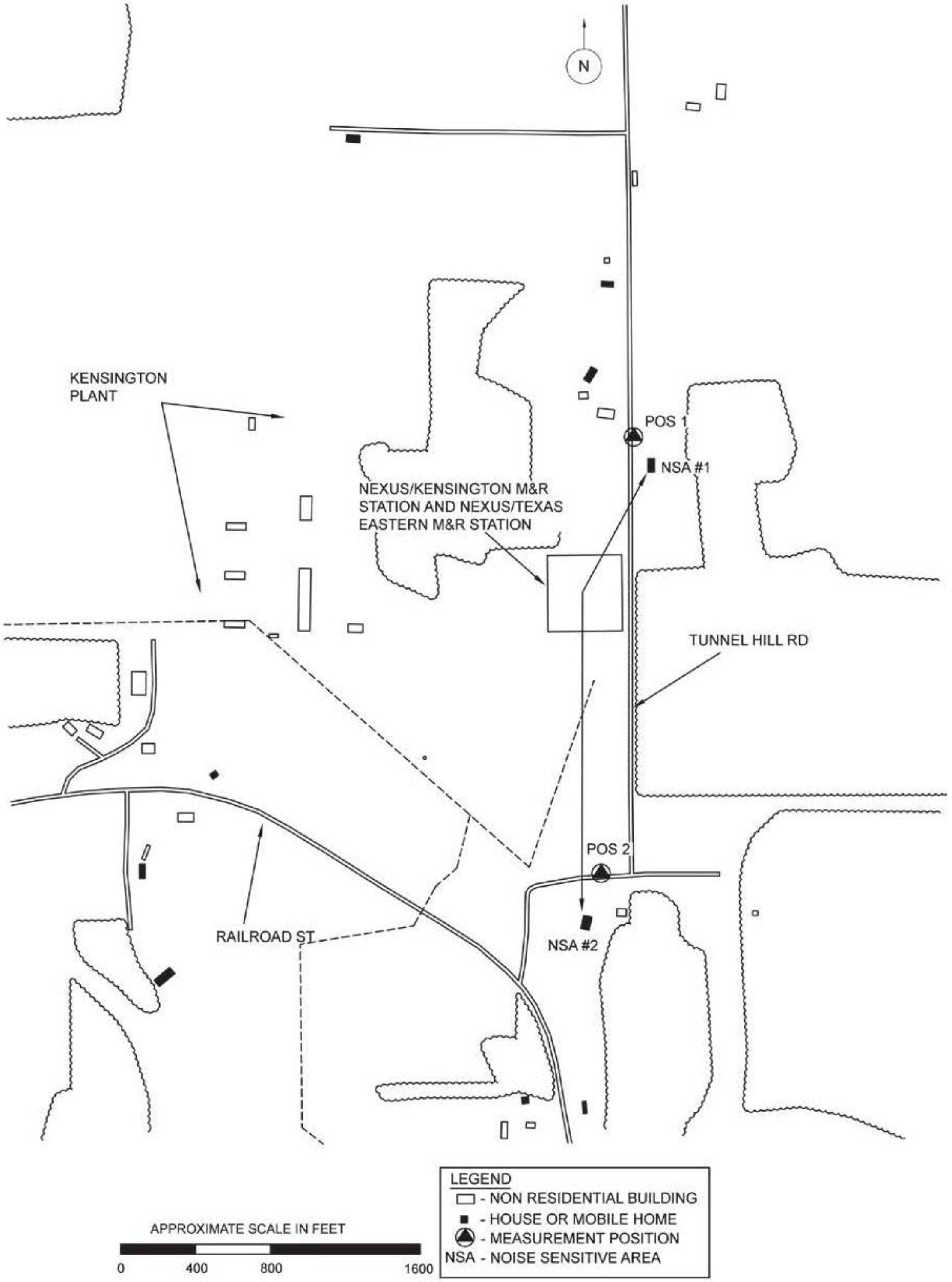

Figure 4.12.2-6
NGT and TEAL Projects
Noise-Sensitive Areas near
the MR02 and MR03 M and R Stations

Date: (2/19/2016) **Source:** Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\01\DEIS\Noise\Figure_4.12.2-6.mxd

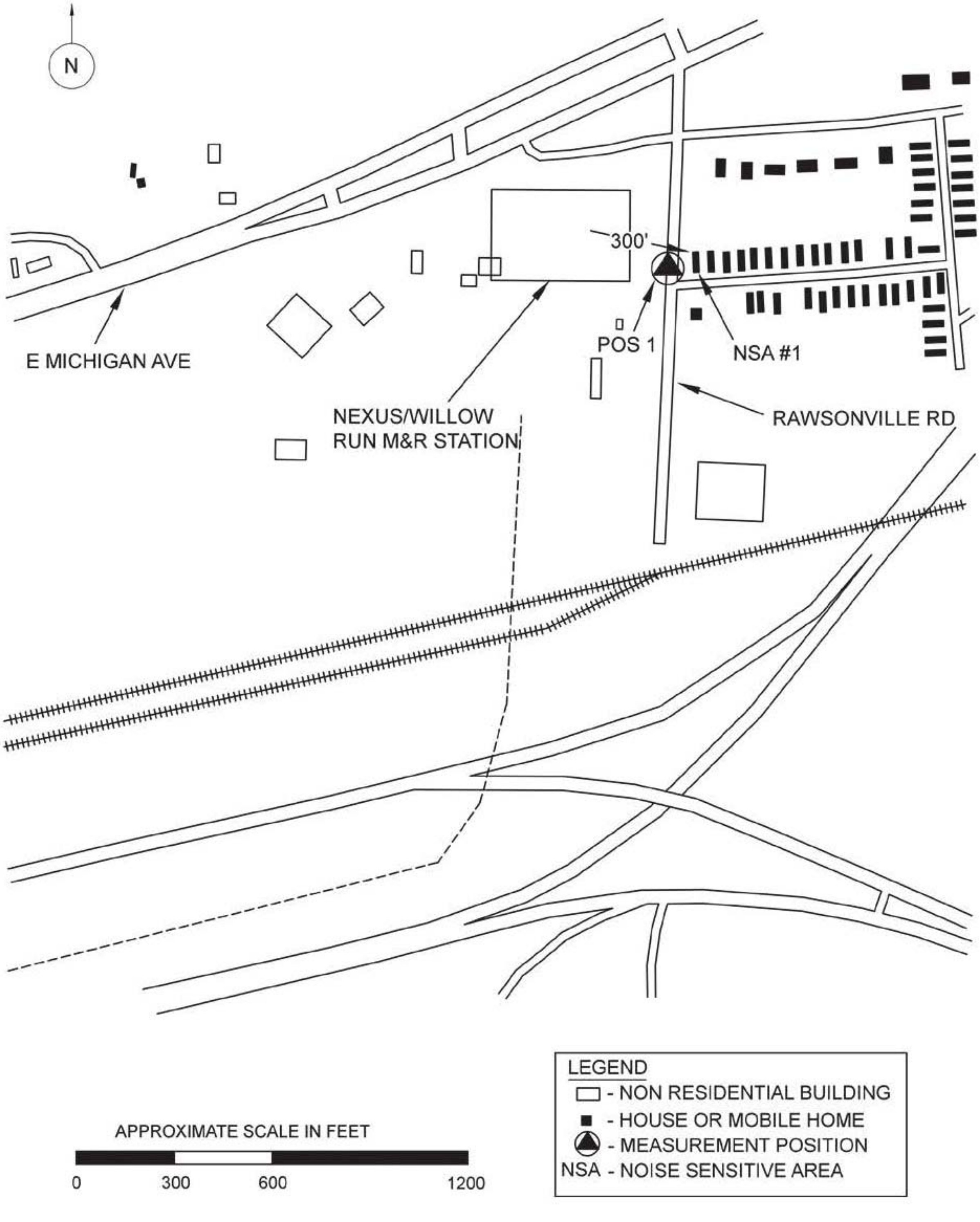

Figure 4.12.2-7
NGT and TEAL Projects
Noise-Sensitive Areas near the MR04 M and R Station

Date: (2/19/2016) Source: Z:\Clients\Q_T\SpectraNexus\ArcGIS\2016\01\DEIS\Noise\Figure_4.12.2-7.mxd

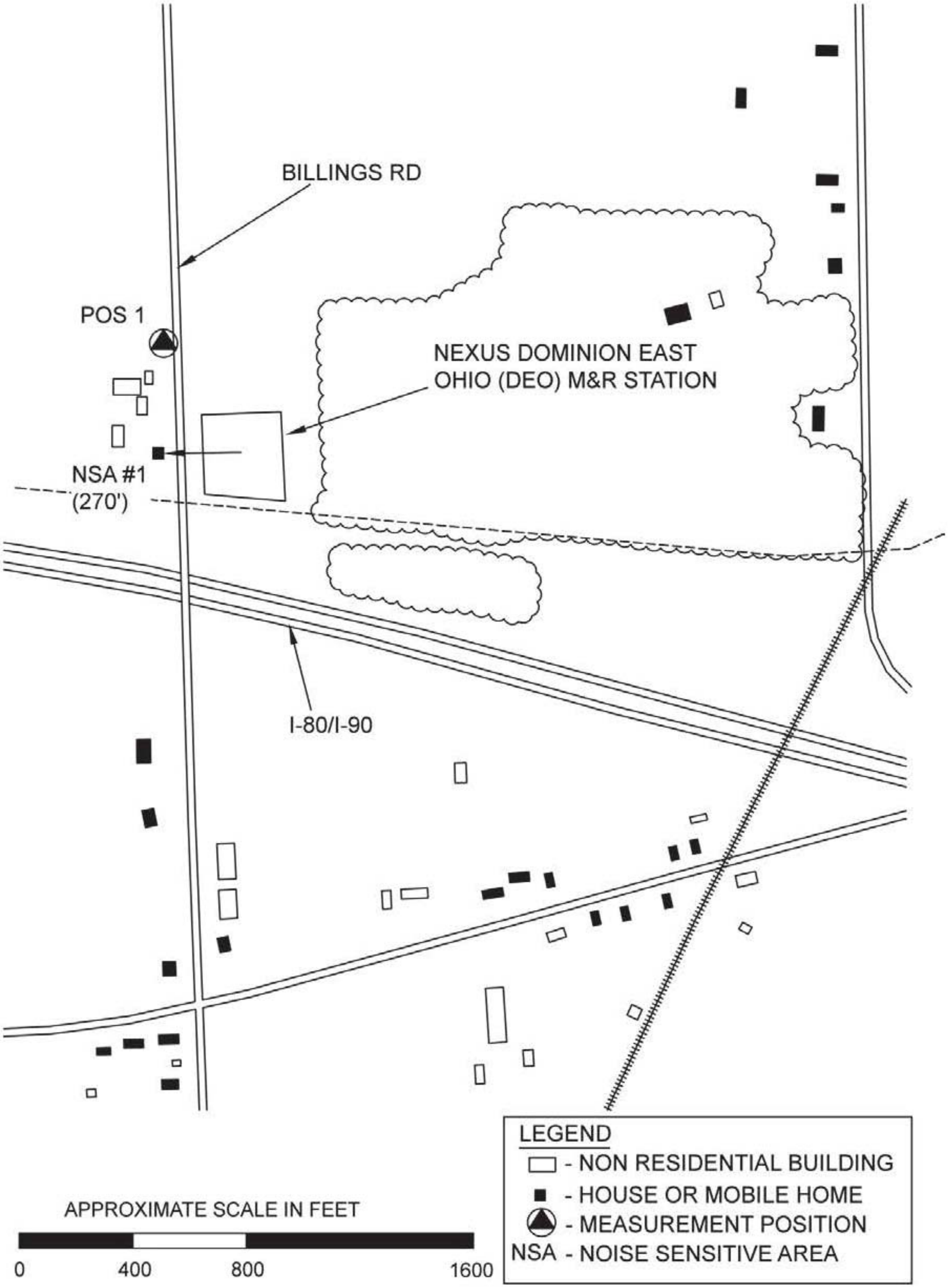

Figure 4.12.2-8
NGT and TEAL Projects
Noise-Sensitive Areas near the MR05 M and R Station

Date: (2/19/2016) Source: Z:\Clients\Q_T\Spectra\Nexus\ArcGIS\2016\01\DEIS\Noise\Figure_4.12.2-8.mxd

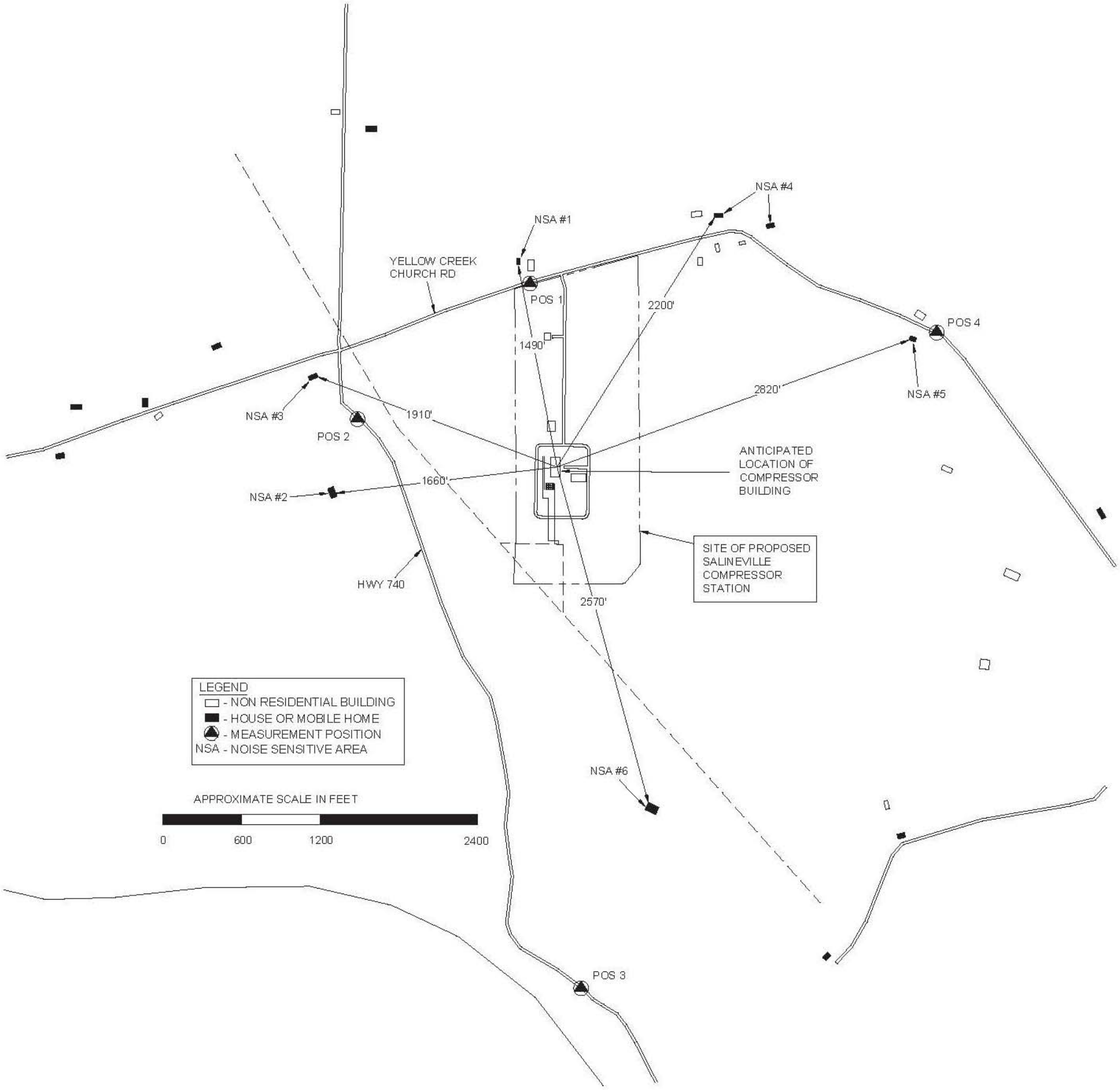

Figure 4.12.2-9

NGT and TEAL Projects

Noise-Sensitive Areas near the Salineville Compressor Station

Date: (2/19/2016) Source: Z:\Clients\Q_T\SpectraNexus\ArcGIS\2016\01\DEIS\Noise\Figure_4.12.2-9.mxd

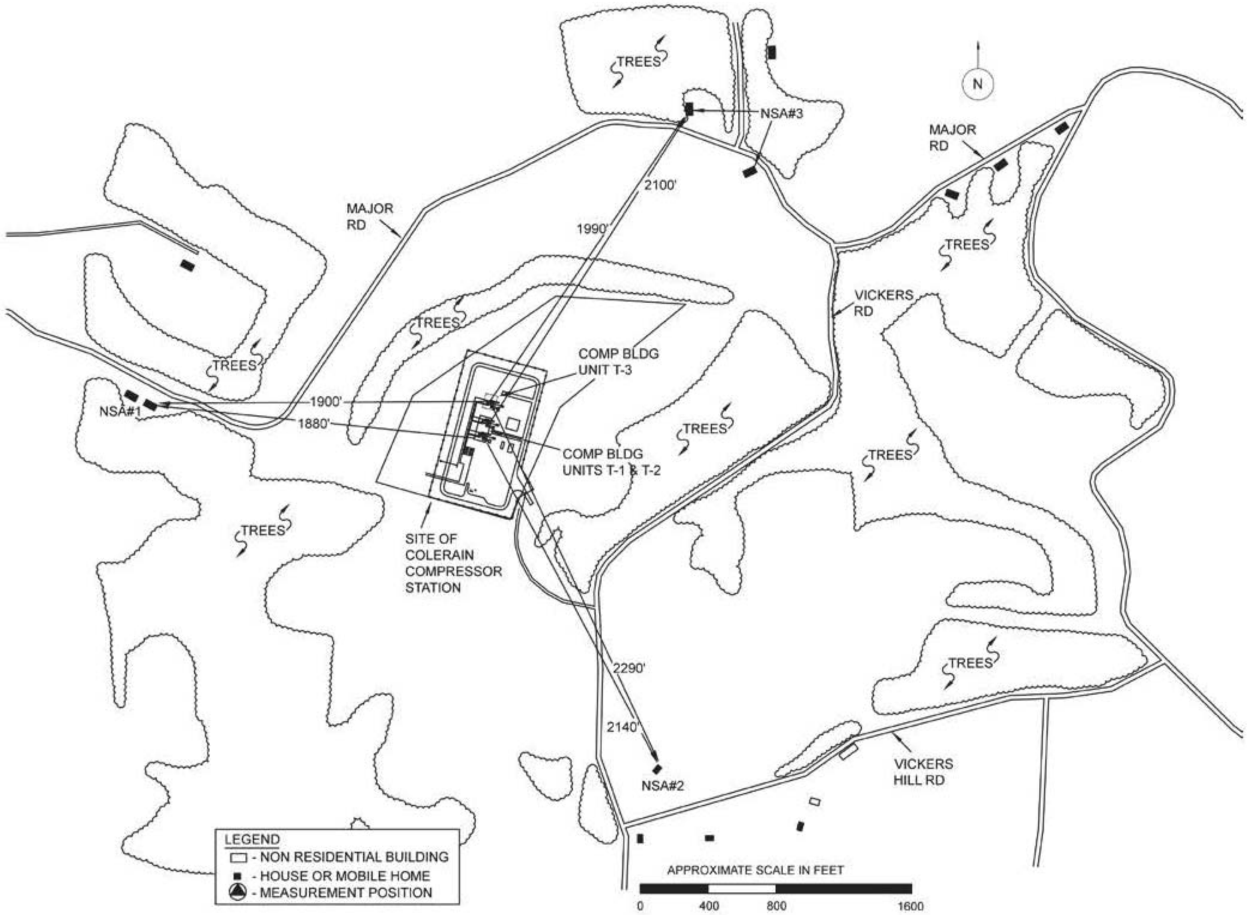

Figure 4.12.2-10

NGT and TEAL Projects

Noise-Sensitive Areas near the Colerain Compressor Station

Date: (2/19/2016) **Source:** Z:\Clients\Q_T\SpectraNexus\ArcGIS\2016\01\DEIS\Noise\Figure_4.12.2-10.mxd

APPENDIX N

RECENTLY COMPLETED, CURRENT, AND POTENTIAL FUTURE PROJECTS NEAR THE NGT AND TEAL PROJECTS

APPENDIX N (cont'd)

Recently Completed, Current, and Potential Future Projects near the NGT and TEAL Projects

Company, Project, County, State	Approximate Distance from Project Facilities (mi)	Project Description	Project Status
NGT PROJECT			
Texas Eastern Transmission LP Ohio Pipeline Energy Network Project Columbiana County, OH	0.3	Approximately 76 miles of new 30-inch mainline pipeline and ancillary facilities in Ohio, including a new compressor station in Colerain Township and reverse flow modifications at existing compressor stations along Texas Eastern's existing mainline in Ohio, Kentucky, Mississippi, and Louisiana.	Under construction with a planned in-service date of November 2015. FERC Docket No. CP14-68-000
State Route (SR) 14F Columbiana County, OH	10	Construct new four-lane limited access highway from US Route 62 in Columbiana County to SR 11 in Mahoning County.	Ongoing 2005 to 2025.
US Route 62 (Hubbard Arterial) Highway Work Columbiana County, OH	10	Construct new four-lane arterial from US Route 62F to Interstate 80.	Ongoing 2014-2030.
US Route 30 Highway Work Columbiana and Stark Counties, OH	0	Construct new four-lane limited access highway from SR 44 to SR 9.	Ongoing 2011-2030.
Columbia Pipeline Group Pipeline Improvement Project Stark County, OH	6.5 to 12	Replacement of more than 20,000 feet of gas pipeline in North Lawrence and Navarre.	Work is ongoing and will continue into 2017.
Energy Transfer Rover Pipeline Project Carroll, Stark, Wayne, Wood, Fulton, Lucas Counties, OH	25	Project consists of 711 miles of 24-inch, 30-inch, 36-inch and 42-inch pipelines with 10 supply laterals, 3 mainlines, 9 compressor stations, and associated meter stations and other aboveground facilities in parts of West Virginia, Pennsylvania, and Ohio.	Construction is requested to begin summer 2016 with an in-service date of Q1/Q2 2017. FERC Docket No. CP15-93-000
FirstEnergy Transmission Glenwillow-Bruce Mansfield Project Columbiana County, OH	8	Project involves building 114.5 miles of new 345-kV transmission line through Trumbull, Columbiana, Mahoning, Portage, Summit and Cuyahoga Counties in Ohio and Beaver County in Pennsylvania. A new substation will be constructed in Glenwillow, Ohio.	In service June 2015.
CAK International Business Park Development Summit County, OH	--	Project involves future development of existing commercial industrial park. Lots have not been developed but are available for sale.	Construction schedule unknown.
Kinder Morgan Utopia East Project Stark, Wayne, Huron, Sandusky, Wood, Henry, Lucas, and Fulton Counties, OH	MP 0 to 195	Involves construction of 240-mile, 12-inch diameter pipeline from Harrison County, Ohio to Kinder Morgan's existing pipeline and facilities in Fulton County, Ohio, where the company would then move product eastward to Windsor, Ontario, Canada. The Utopia East system would transport previously refined or fractionated natural gas liquids, including ethane and ethane-propane mixtures.	Construction is planned to begin in November 2016 with an in-service date of January 2018.
Woods at Silver Creek Ltd. Residential Subdivision Wayne County, OH	0.1	Tract OH-WA-026.0000. Woods at Silver Creek Ltd. – Township approved 65 allotments for future development.	Approved by Township since 2003. Construction schedule unknown.
A R Lockhart Development Co. Shopping Center, Apartment Complex, Residential Development Project Wayne and Medina Counties, OH	0	Tracts OH-WA-030.0000, OH-ME-030.0000-TAR-3-53.6, OH-ME-030.0100, OH-WA-000.0001-SA-2-SPRD-2. Project contingent upon developer installing sewage line. Plans have been filed with the county, but zoning has not been approved.	Plans filed with the county.

APPENDIX N (cont'd)

Recently Completed, Current, and Potential Future Projects near the NGT and TEAL Projects

Company, Project, County, State	Approximate Distance from Project Facilities (mi)	Project Description	Project Status
NGT PROJECT (cont'd)			
Wadsworth Airport Expansion Medina County, OH	0	South of property. Tract OH-ME-007.0000. Airport expansion plans are from 2008. The airport master plan (February 2009) essentially rebuilds the north-south runway to a distance of 5,000 feet.	Unknown. According to the City, the project will begin in the next 4-5 years.
Damar Valley LLC **Residential Subdivision Project** Medina County, OH	0	Tract OH-ME-016.0000. Project proposed on 68-acre property.	Potential future project; however, no plans have been filed by the landowner.
Private Landowner **Residential Subdivision Project** Medina County, OH	0	Tracts OH-ME-060.0000, OH-ME-062.0000, OH-ME-063.0000. Plans to subdivide property along road frontage on Blake and Guilford roads.	Potential future project; however, no plans have been filed by the landowner.
Private Landowner **Residential Subdivision Project** Medina County, OH	0	Tract OH-ME-077.0000. Plans to subdivide 40-acre lot.	Potential future project; however, no plans have been filed by the landowner.
VGL Properties LLC **Property Development** Medina County, OH	0	Tracts OH-ME-116.0000, OH-ME-117.0000. Stone driveways and paths to be created for outdoor public attractions.	In process of obtaining permits.
TransCanada **ANR East Pipeline Project** Wayne County, OH	23.7	Pipeline would consist of approximately 320 miles of large diameter, 1,440 pounds per square inch gauge maximum allowable operating pressure pipeline with up to 140,000 horsepower of compression and a daily capacity between 1.2 and 2.0 billion cubic feet.	TransCanada has not entered the FERC's pre-filing process.
Columbia Pipeline Group **Pipeline Improvement Project** Medina County, OH	4	Columbia Gas is replacing more than 10,000 feet of gas pipeline.	Completed in October 2015.
Columbia Pipeline Group **Pipeline Improvement Project** Lorain County, OH	1	Columbia Gas is replacing more than 16,000 feet of gas pipeline.	Completed in 2014.
Widen and rehab SR 57 between Ohio Turnpike and I-90 in City of Elyria Lorain County, OH	5	Widening and rehabilitation of SR 57 to occur between the Ohio Turnpike and I-90 in the city of Elyria. Project will also include reconfiguration of the SR 57 and I-90 interchange and removal of the 49th St. bridge. Two lanes will be maintained on SR 57 during construction; however, 49th Street will be closed indefinitely. Midway Mall Boulevard and Griswold Road will be closed during construction.	Construction started in May 2014 and is expected to be completed in summer 2016.
West Park, LLC **Commercial Park Project** Lorain County, OH	0	Tracts OH-LO-094.0000, OH-LO-095.0000. Plans for 35-acre commercial park to be updated and/or renovated.	Potential future project; no plans filed. Recently sold to Western Land Conservancy.
Columbia Pipeline Group **Pipeline Improvement Project** Lorain County, OH	1	Replacing more than 16,000 feet of gas pipeline in two locations.	Completed in 2014.
Columbia Pipeline Group **Pipeline Improvement Project** Huron County, OH	6.5	Replacing more than 10,000 feet of gas pipeline in Willard.	Completed in 2015.

Recently Completed, Current, and Potential Future Projects near the NGT and TEAL Projects

Company, Project, County, State	Approximate Distance from Project Facilities (mi)	Project Description	Project Status
NGT PROJECT (cont'd)			
Columbia Pipeline Group Pipeline Improvement Project Huron County, OH	20	Replacing more than 10,000 feet of gas pipeline in Norwalk.	Completed in 2015.
2015 Road Construction Project Huron County, OH	5	Construct bridge replacement by Lovers Lane.	Completion expected on October 31, 2015.
Avery Commerce Park, LLC Commercial Park Project Erie County, OH	0.2	Tract OH-ER-106.0020-TAR-7. Plans for 67-acre commercial park to be updated and/or renovated.	Potential future project; however, no plans have been filed by the landowner.
Columbia Pipeline Group Pipeline Improvement Project Erie County, OH	6.2	Replacing more than 25,000 feet of gas pipeline in the vicinity of Hayes Avenue.	Completed in 2015.
FirstEnergy Transmission Hayes-West Fremont Project Erie County, OH	0.5	Approximately 30 miles of new 138-kV transmission line extending from a new substation (Hayes Substation) in Erie County to an existing West Fremont Substation in Sandusky County.	Construction is proposed to start in May 2017 with an in-service date of August 31, 2018.
2014 Construction Projects on I-90 Sandusky County, OH	0	Projects will involve base pavement replacement from Milepost 101.2 to 107.3. Resurfacing will occur in both east and westbound lanes.	Estimated completion date is November 2015.
State of Ohio and Sandusky County creating new intersection/road Sandusky County, OH	0.1	Involves construction of a new intersection at 53 and Ohio Turnpike about 800 feet south of proposed pipeline. New intersection at turnpike would intersect the proposed pipeline route.	Construction planned for 2016.
Ohio DOT **Anthony Wayne Bridge (SR 2) Widening Project** Lucas County, OH	11	The Anthony Wayne Bridge (SR 2) over the Maumee River in downtown Toledo is closed through September 2015 for bridge reconstruction. Work includes re-decking the bridge, replacing existing truss spans, improving substructures, installing new street lighting, and rebuilding sidewalks, railings, and fencing.	Started in July 2014 and proposed to be completed by December 2015.
Ohio DOT **I-75 Reconstruction Project** Lucas County, OH	11	Involves reconstructing over 3 miles of pavement from Dorr Street to Central Avenue in downtown Toledo. Will also add a third lane to 32 miles of I-75.	Started in summer 2014 and proposed to be completed by summer 2016.
Columbia Pipeline Group Pipeline Improvement Project Lucas County, OH	10.6	Replacing more than 95,000 feet of gas pipeline in the Toledo area.	Completed 2015.
Jefferson Street Widening and Improvement Project Wood County, OH	5	Widen and reconstruct 1,848 feet of pavement and construct 492 feet of new pavement on Jefferson Street, install curbs and gutters, major drainage improvements, culvert crossing of Kohl Ditch, sidewalks, extend waterline and sanitary sewer, extend left turn lane on SR 25, widen corner radii at Waters Edge Drive/Williams Road intersection.	Phase A completed in 2014. Phase B to be performed and completed in 2015.
FirstEnergy Transmission Dowling Substation and Transmission Line Project Wood County, OH	5	Includes extending an existing transmission line by 150 feet and constructing a new substation in Wood County.	In-service in June 2015.

APPENDIX N (cont'd)

Recently Completed, Current, and Potential Future Projects near the NGT and TEAL Projects

Company, Project, County, State	Approximate Distance from Project Facilities (mi)	Project Description	Project Status
NGT PROJECT (cont'd)			
Columbia Pipeline Group **Pipeline Improvement Project** Wood County, OH	6.7	Replacing more than 25,000 feet of gas pipeline in Bowling Green area.	Completed in 2015.
Browning Masonic Community, Inc. **Retirement Home Build Out** Lucas County, OH	0	Tracts OH-LC-016.0000, OH-LC-017.0000, OH-LC-017.0000-TAR-1-182.1, OH-LC-019.0000, OH-LC-000.0001-SA-1-SPRD3, OH-LC-019.0000-VS. Plans to build a retirement community with housing and other facilities on the property.	Plans filed.
Noward Road Rebuild Project Lucas County, OH	1	Rebuilding Waterville Township RD 137 (Noward) between Highway 64 and Neopolis Waterville Rd.	Construction planned for spring 2017.
2014 Lucas Culvert Projects Lucas County, OH	1	Lucas County will replace culverts in the following locations: 935 Jeffers Road, 989 Perry Road, and 1038 Manore Road.	Completed in 2014.
Ohio DOT **I-475 Bridge Widening Project** Lucas County, OH	4	Replace and widen three bridges on I-475. Bridges are located over Wolf Creek, Norfolk Southern Railroad tracks, and Angola Road.	Proposed to be completed in August 2016.
Ohio DOT **McCord Rd Railroad Grade Separation Project** Lucas County, OH	5	Involves building an underpass at the Norfolk Southern railroad and constructing a roundabout at the intersection of McCord Road and North Mall Drive/Hill Street.	Started in June 2014 and proposed to be completed by November 2016.
Ohio DOT **I-475/US23 Improvement Project** Lucas County, OH	5	Involves improving movements at the I-475/U.S. 23 systems interchange, including adding through-lanes from southbound U.S. 23 to I-475 and correcting weave movement from eastbound I-475 to southbound U.S. 23 and Central Avenue.	Two-year construction project began in August 2015.
2015 Monroe County Road Construction Projects Monroe County, MI	Varies	Monroe 2015 Road Construction.	Completed 2015.
Crescent Hills Associates, LLC **Residential Subdivision Project** Monroe County, MI	0	Tract MI-MR-049.0000-SC. Planned subdivision expansion would take up entire parcel. There are two existing lines.	Potential future project; however, no plans have been filed by the landowner.
2015 and 2016 Road Construction Projects Washtenaw County, MI	1	Washtenaw County Road Construction.	Ongoing 2016.
2015 Washtenaw County Road Construction Projects Washtenaw County, MI	Varies	Washtenaw 2015 Road Construction.	Completed.
Bridge Replacement and Construction Project Washtenaw County, MI	3.4	Small bridge along Arkona Road in Saline is being replaced.	Completed 2015.
Subdivision Expansion Washtenaw County, MI	0	Tract MI-WA-048.0000. Easterly expansion of the subdivision is proposed on the property to the west of the parcel.	Tentatively breaking ground on road construction in spring 2016.

Recently Completed, Current, and Potential Future Projects near the NGT and TEAL Projects

Company, Project, County, State	Approximate Distance from Project Facilities (mi)	Project Description	Project Status
NGT PROJECT (cont'd)			
2014 Monroe County Road Construction Projects Monroe County, MI	Varies	Monroe 2014 Road Construction.	Ongoing.
Planned Apartment Complex and Gas/Service Station Washtenaw County, MI	0	Tracts MI-WA-112.0000, MI-WA-112.0000-TAR-9.251.1, MI-WA-112.0000-HTAR-2. Apartment complex and restaurant construction proposed along southern portion of the lake. Gas station and retail space proposed in northeast corner of property.	Plans filed with Ypsilanti Township.
Utica/Point Pleasant Shale Horizontal Wells Stark, Wayne, Columbiana, and Medina Counties, OH	Varies	About 650 drilling permits have been issued. Wells are in various stages of production (permitted, drilling, or producing). (Data pulled March 2016.)	Ongoing.
TEAL PROJECT			
Energy Transfer Rover Pipeline Project Outside of TEAL counties	0.1	Consists of 711 miles of 24-inch, 30-inch, 36-inch and 42-inch pipelines consisting of 10 supply laterals, 3 mainlines, 9 compressor stations, and associated meter stations and other aboveground facilities in parts of West Virginia, Pennsylvania, and Ohio.	Construction is requested to begin summer 2016 with an in-service date of Q1/Q2 2017. FERC Docket No. CP15-93-000
Slope Maintenance and Slide Repair Monroe County, OH	9.9	Rock slope maintenance on SR 800 and slide repair on SR 255.	Completed in 2015.
Culvert Construction and Repair Monroe County, OH	9.2	Culvert construction, reconstruction, and repair on SR 78.	Construction scheduled for 2015.
Texas Eastern Transmission LP Access South Project, Adair Southwest Project, and Lebanon Extension Project Monroe, Noble, Meigs, and Athens Counties, OH	0.7	Includes proposed modifications to existing facilities along its pipeline system in Pennsylvania, Ohio, Kentucky, Tennessee, Alabama, and Mississippi. The facilities are expected to be located primarily within Texas Eastern's current footprint. They include 15.8 miles of 36-inch pipeline loop segments, most of which will be either within or adjacent to Texas Eastern's current right-of-way. Modifications to existing aboveground facilities at 12 compressor stations include installation of additional electric horsepower and other improvements.	Construction is planned to begin in March 2017. The projected in-service date is November 1, 2017.
Road Resurfacing Monroe County, OH	8.0	Road resurfacing on SR 724, and SR 26/800.	Construction scheduled for 2015.
Columbia Gas Transmission, LLC Leach XPress Project Monroe County, OH	0.1	Involves construction of approximately 157 miles of 30-inch and 36-inch natural gas pipelines, along with associated compression and other appurtenant facilities, in southeastern Ohio and West Virginia's northern panhandle.	Construction is planned to begin in late 2016, with a targeted in-service date during the second half of 2017. FERC Docket No. PF14-23.
Road resurfacing Belmont County, OH	2.2	Two-lane road resurfacing along SRs 7, 9, 145, 147, 148, 149, and US 40.	Completed in 2015.
Road and Historic Bridge Enhancement Belmont County, OH	6.8	County Road 7 streetscape in Shadyside and bike path tunnel under US 40.	Completed November 2015.

Recently Completed, Current, and Potential Future Projects near the NGT and TEAL Projects

Company, Project, County, State	Approximate Distance from Project Facilities (mi)	Project Description	Project Status
TEAL PROJECT (cont'd)			
US 40 Road Enhancement Belmont County, OH	4.5	US 40 enhancement (sidewalks and resurfacing).	Completed October 2015.
I-70 Bridge Replacement Projects Belmont County, OH	6.0	Three structures to be replaced at Bridgeport interchange, including Marion St. Bridge over I-70 and the eastbound on- and off-ramp structures to I-70. Various Marion St. and ramp closures during construction.	Completed November 2015.
Various local bridge and culvert projects Belmont County, OH	3.9	Bridge repair, replacement, historic enhancement, and culvert replacement and repair.	Construction scheduled throughout 2015.
Slope Repair Belmont County, OH	9.5	Slope repair on SR 149.	Construction scheduled for March to July 2015.
SR 7 at I-470 Ramp Intersection Belmont County, OH	7.5	Safety improvement project, including signals at I-470 ramp intersection. Traffic will be maintained.	Completed October 2015.
Slope Repair Jefferson County, OH	8.7	Two projects within 5 miles from Rush Run to north of Brilliant. SR 7 has been reduced to one lane due to multiple rock slides on both sides of Brilliant since 2011.	Construction ongoing from April 2015 to June 2018.
Texas Eastern Transmission LP **Ohio Pipeline Energy Network Project** Columbiana, Jefferson, Belmont, and Monroe Counties, OH	0.0	Approximately 76 miles of new 30-inch mainline pipeline and ancillary facilities in Ohio, including a new compressor station in Colerain Township and reverse flow modifications at existing compressor stations along Texas Eastern's existing mainline in Ohio, Kentucky, Mississippi and Louisiana.	In-service in November 2015.
TransCanada **ANR East Pipeline Project** Outside of TEAL counties	0.5	Pipeline would consist of approximately 320 miles of large diameter, 1,440 pounds per square inch gauge maximum allowable operating pressure pipeline with up to 140,000 horsepower of compression and a daily capacity between 1.2 and 2.0 billion cubic feet.	TransCanada has not entered the FERC's pre-filing process.
SRs 164 and 644 Columbiana and Jefferson Counties, OH	2.3	SR 164 will be resurfaced from Bergholz's north corporation line through Salineville and SR 644 will be resurfaced north of Salinesville's corporation.	Completed in 2015.
FirstEnergy Transmission **Glenwillow-Bruce Mansfield Project** Columbiana County, OH	16.5	Project involves building 114.5 miles of new 345-kV transmission line through Trumbull, Columbiana, Mahoning, Portage, Summit, and Cuyahoga Counties in Ohio and Beaver County in Pennsylvania. A new substation will be constructed in Glenwillow, Ohio.	In-service June 2015.
Culvert Replacement Columbiana County, OH	3.7	Culvert Replacement on SR 164.	Completed in 2015.
US Route 30 Highway Work Columbiana County, OH	1.9	Construct new four-lane limited access highway from SR 44 to SR 9.	Ongoing from 2011-2030.
Columbia Gas Transmission, LLC **E. Chestnut Street Pipeline Relocation** Columbiana County, OH	8.3	Replacing 4,159 feet of pipe.	In progress – June 2015.

APPENDIX N (cont'd)

Recently Completed, Current, and Potential Future Projects near the NGT and TEAL Projects

Company, Project, County, State	Approximate Distance from Project Facilities (mi)	Project Description	Project Status
TEAL PROJECT (cont'd)			
Bridge Enhancement Columbiana County, OH	8.4	Historic bowstring bridge renovation and enhancement at County Fairgrounds.	Construction scheduled for March to August 2015.
Columbia Gas Transmission, LLC Sunset Drive Pipeline Replacement Columbiana County, OH	7.8	Replacing 1,232 feet of pipe.	Completed in June 2015.
Road Resurfacing Columbiana County, OH	3.7	Road resurfacing of SRs 164 and 45.	Construction scheduled for May to August 2015.
Utica/Point Pleasant Shale Horizontal Wells Columbiana, Jefferson, Belmont, and Monroe Counties, OH	Varies	About 650 drilling permits have been issued. Wells are in various stages of production (permitted, drilling, or producing). (Data pulled March 2016.)	Ongoing.
Marcellus Shale Horizontal Wells Jefferson, Belmont, and Monroe Counties, OH	Varies	At least 43 wells permitted, of which 22 have been drilled and 14 are producing.	Ongoing.

Sources: Columbia Pipeline Group, 2015; ODOT, 2015c; FirstEnergy Corporation, 2016b; Somerset Gas Transmission Company, LLC, 2013.

APPENDIX O

LIST OF REFERENCES

Appendix O
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Appendix O
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