NEXUS GAS TRANSMISSION PROJECT

RESOURCE REPORT 1
General Project Description

FERC Docket No. CP16-__-000

November 2015

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RESOURCE REPORT 1—GENERAL PROJECT DESCRIPTION

	Filing Requirement	Location in Environmental Report
☒	Provide a detailed description and location map of the project facilities (§ 380.12(c)(1)). • Include all pipeline and aboveground facilities. • Include support areas for construction or operation. • Identify facilities to be abandoned.	Sections 1.1, 1.4, 1.5 Figures 1.1-1, 1.1-2 Appendix 1A, Volume IV- CEII
☒	Describe any non-jurisdictional facilities that would be built in association with the project. (§ 380.12(c)(2)). • Include auxiliary facilities (See § 2.55(a)). • Describe the relationship to the jurisdictional facilities. • Include ownership, land requirements, gas consumption, megawatt size, construction status, and an update of the latest status of Federal, state, and local permits/approvals. • Include the length and diameter of any interconnecting pipeline. • Apply the four-factor test to each facility (see § 380.12(c)(2)(ii)).	Section 1.15, Tables 1.15-1 - 1.15-3
☒	Provide current, original United States Geological Survey (USGS) 7.5-minute series topographic maps with mileposts showing the project facilities (§ 380.12(c)(3)). • Maps of equivalent details are acceptable if legible (check with staff). • Show locations of all linear project elements, and label them. • Show locations of all significant aboveground facilities, and label them.	Appendix 1A for 8.5 x 11-inch maps and full sized maps in Volume II-B)
☒	Provide aerial images or photographs or alignment sheets based on these sources with mileposts showing the project facilities. (§ 380.12(c)(3)). • No more than 1-year old • Scale no smaller than 1:6,000	Appendix 1A Volume II-B
☒	Provide plot/site plans of compressor stations showing the location of the nearest noise-sensitive areas (NSA) within 1 mile. (§ 380.12(c)(3,4)). • Scale no smaller than 1:3,600 • Show reference to topographic maps and aerial alignments provided above.	Volume IV - CEII
☒	Describe construction and restoration methods. (§ 380.12(c)(6)).	Section 1.7
☒	Identify the permits required for construction across surface waters. (§ 380.12(c)(9)). • Include the status of all permits. • For construction in the Federal offshore area be sure to include consultation with the MMS. File with the MMS for rights-of-way grants at the same time or before you file with the FERC.	Section 1.13, Appendix 1C, Table 1.13-1
☒	Provide the names and addresses of all affected landowners as required and certify that all affected landowners will be notified; • Affected landowners are defined in § 157.6(d)(2) • Provide an electronic copy directly to the environmental staff.	To be provided within 30 days

RESOURCE REPORT 1—GENERAL PROJECT DESCRIPTION	
Filing Requirement	**Location in Environmental Report**
Additional Information	
☒ Describe all authorizations required to complete the proposed action and the status of applications for such authorizations	Section 1.13 and Table 1.13-1
☒ Provide plot/site plans of all other aboveground facilities that are not completely within the right-of-way.	Appendix 1A Volume II-B, Volume IV - CEII
☒ Provide detailed typical construction cross-section diagrams showing information such as widths and relative locations of existing rights-of-way, new permanent rights-of-way, and temporary construction rights-of-way. See Resource Report 8 – Land Use, Recreation, and Aesthetics.	Section 1.7, Table 1.7-1 and Appendix 1A
☒ Summarize the total acreage of land affected by construction and operation of the project.	Section 1.6, Tables 1.6-1 - 1.6-4.
☒ If Resource Report 5 - Socioeconomics is not provided, provide the start and end dates of construction, the number of pipeline spreads that would be used, and the workforce per spread.	Resource Report 5, Table 1.7-3
☒ Send two (2) additional copies of topographic maps and aerial images/photographs directly to the environmental staff of the Office of Energy Projects (OEP).	Appendix 1A Volume II-B

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NEXUS RESOURCE REPORT 1 – GENERAL PROJECT DESCRIPTION

FERC COMMENTS ON DRAFT RESOURCE REPORT 1	LOCATION OR RESPONSE TO COMMENT
1. Various sections in draft RR 1 indicate that information is “not included in this filing” or “will be included in the next filing of Resource Report 1.” Include copies of all missing information with the application, or prior to the application, as available. Update all section, table, and figure numbers and cross-references as appropriate.	Information identified as “to be filed with the Certificate Application” is included in this version of the Resource Reports and may be found by referring to the Table of Contents of each of the 12 Resource Reports in NEXUS’ Environmental Report. In addition, Resource Report text, tables, figures, and cross references have been updated, as appropriate, to reflect the current proposed Project design.
2. Section 1.1 states that the Project would involve expansion of the Vector Pipeline system. Provide tables similar to tables 1.15-1 and 1.15-2 that list the status of the regulatory notifications, permits, and approvals for this expansion.	Table 1.15-3, summarizing the status of regulatory notifications, permits, and approvals anticipated for expansion of Vector facilities is included in the Tables Section of this Resource Report 1.
3. Section 1.1.2 discusses communication towers. Identify the maximum height of each of the communication towers, provide an update on potential locations, and reference the appropriate RR where an analysis of visual impacts associated with the towers can be found.	Details summarizing proposed communications towers for the NEXUS Project are provided in Section 1.1.2 under the heading “Other Aboveground Facilities” and Table 1.1-3 located in the Tables Section of this Resource Report 1. Visual Impact Assessments for proposed communications towers are included as Appendix 8F of Resource Report 8.
4. Provide a table in RR 1 that identifies contracted volumes of natural gas for the Project. The table should include shipper names, volumes, gas use (i.e., power generation, industrial use, and local distribution), contract durations, and proposed in-service dates.	As discussed in Section 1.2, NEXUS has entered into precedent agreements with multiple utilities and producers, including Enbridge Gas Distribution Inc., DTE Gas Company, DTE Electric Company, Union Gas Limited, Chesapeake Energy Marketing Inc., CNX Gas Company LLC, Noble Energy Inc., which together combine for a commitment of firm capacity of 835,000 dekatherms per day for contract terms of 15 – 20 years. The proposed in-service date for the Project is November 1, 2017. In addition, NEXUS is in on-going confidential negotiations with interested parties, including those that responded to NEXUS’ open seasons and those located in key market areas as shown in Figure 1.2-1 in the Figures section of Resource Report 1. It is NEXUS’ understanding that the shippers who have entered into precedent agreements will be serving power generation, industrial loads and local distribution loads either directly or indirectly (i.e., loads behind city gates). The shippers also will have transportation service rights to use their capacity to serve secondary markets within the zones of the shippers’ primary path, including the markets in Ohio as shown in Figure 1.2-1, as well as to release their capacity to third parties in order to serve secondary markets.

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5. Section 1.6.1 indicates that the Project is co-located with (i.e., routed adjacent to) existing pipelines, electric transmission lines, and railroads; however, the section only provides a detailed discussion about co-location with pipelines and electric transmission lines and does not provide a detailed discussion about co-location with railroads. Further, table 8.2-3 identifies areas where the Project is also co-located with roads. Update the text and table to provide the same level of information for each type of co-location.	Section 1.6.1 has been updated to include more detail regarding proposed co-location with railroads. Table 8.3-3 (located in the Tables Section of Resource Report 8) and text in Resource Report 8 have been updated to provide the same level of detail for each type of co-location proposed.
6. Include a discussion in section 1.6.1.1 that summarizes the results of communications with the existing utility, road, and railroad owners where the Project is co-located with existing pipelines, electric transmission lines, roads, and railroads. Provide information about necessary safety offsets between the proposed pipeline and existing pipelines, electric transmission lines, roads, and railroads. This discussion may be included in RRs 8 or 11 and cross-referenced to RR 1.	Section 1.6.1.1 has been updated to include a summary of the current status of ongoing communications with existing utility, road, and railroad owners.
7. Section 1.7.1.1 includes a discussion of standard construction and restoration techniques that appears to focus mostly on upland construction, and section 1.7.1.3 includes a discussion of special construction and restoration techniques for wetland construction. Clarify the text in section 1.7.1.1 to refer to only upland construction and restoration, and revise the text in section 1.7.1.3 to discuss how wetland construction and restoration differs from upland construction.	Section1.7.1.1 has been updated to refer only to upland construction and restoration and Section 1.7.1.3 was revised to discuss wetland construction and restoration procedures and how and why they are different from upland construction procedures.
8. Section 1.7.1.2 indicates that trench spoil will be stored at least 10 feet from waterbody banks where topographic conditions allow. Identify those waterbody crossings where trench spoil cannot be stored at least 10 feet from the water's edge and provide site-specific justification for each. This discussion may include a table with milepost locations and be included in RR 2 and cross-referenced to RR 1.	NEXUS has confirmed that there are currently no locations where trench spoil cannot be stored at least 10 feet from the water's edge.
9. Section 1.7.1.2 indicates that additional temporary workspace (ATWS) will be at least 100 feet away from waterbody banks in forest areas where topographic conditions allow, while section 2.3.9.2 indicated a 50-foot setback from the water's edge. If NEXUS is in fact proposing a 100-foot setback, identify those areas where topographic conditions do not allow this setback and clarify if NEXUS would still maintain the 50-foot setback distance specified in Federal Energy	Section 1.7.1.2 has been updated to clarify that ATWS will be sited to maintain a minimum 50-foot setback from waterbodies in accordance with the FERC Procedures.

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Regulatory Commission's (FERC's) Wetland and Waterbody Construction and Mitigation Procedures (Procedures).	
10. Section 1.7.1.3 discusses NEXUS's request for permission to use normal cross-country construction practices in wetlands where conditions, such as unsaturated conditions, allow. Provide a cross reference to Section 2.4.3 where the proposed deviation from FERC's Procedures is discussed in greater detail.	Section 1.7.1.3 of Resource Report 1 has been updated to include a cross reference to Section 2.4.3 of Resource Report 2 and Table 2.3-12 in the Tables Section of Resource Report 2, which provides a summary of all wetlands where this variance has been requested.
11. Section 1.7.1.5 indicates that site-specific construction plans will be developed where residential dwellings are within 25 feet of construction workspace. Section 8.3.3 in RR 8 indicates that site-specific construction plans will be developed where residential dwellings are within 50 feet of the construction workspace. Rectify this discrepancy.	Section 1.7.1.5 of Resource Report 1 has been updated to indicate that Site Specific Residential Crossing Plans were developed where residential dwellings are located within 50 feet of the proposed construction workspace. These Site Specific Residential Crossing Plans are included as Appendix 8A of Resource Report 8 – Land Use, Recreation and Aesthetics.
12. Section 1.7.1.7 discusses road crossings. Identify the general criteria that NEXUS would use to determine when a road would not be open cut. If necessary, explain that exceptions to these criteria may be necessary based on site-specific conditions or individual road crossing permits.	Section 1.7.1.7 has been updated to include criteria NEXUS would use to determine when a road would not be open cut and explains exceptions to these criteria based on site specific conditions or individual road crossing permit conditions.
13. Section 1.7.1.8 states that NEXUS is evaluating the need for specifying blast rock disposal areas in the Project vicinity. Provide the results of this evaluation, including the identification of specific disposal areas and permits or approvals, if needed.	Section 1.7.1.8 has been updated to include a status update on investigations for blast rock disposal areas.
14. Revise section 1.10 to include a discussion of right-of-way mowing and maintenance activities for the pipeline, as well as typical operational activities conducted at aboveground facilities, including the need for and frequency of noisy activities such as blowdowns. Provide information on how NEXUS plans to coordinate these types of activities with nearby landowners, local officials, and emergency responders.	Section 1.10 has been updated to include a description of typical ROW maintenance activities for the pipeline as well as typical operational activities at aboveground facilities. Section 1.10.5 explains how scheduled activities will be coordinated with nearby landowners, local officials, and emergency responders.
15. Update table 1-13.1 to reflect the current status of NEXUS's permitting and consultation effort on the Project. In Appendix 1C2, provide copies of any agency consultations and correspondences, including relevant emails and phone logs.	Table 1.13-1 has been updated to reflect the current status of agency consultations and anticipated regulatory permitting for the NEXUS Project. Appendix 1C2 has also been updated to include agency correspondence received and other communications since the June pre-filing submittal to the FERC.
16. Section 1.15 should identify non-jurisdictional facilities, if any, that are associated with proposed customer	Section 1.15 has been updated to include currently available information regarding potential non-

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delivery locations.	jurisdictional facilities proposed at customer delivery locations.
17. Update table 1.16-1 to include projects from table 8.3-1 as reasonably foreseeable future actions, as appropriate.	Table 1.16-1 has been updated to include projects listed in Table 8.3-1, for the purpose of analyzing cumulative impacts.

ACRONYMS AND ABBREVIATIONS

AOI	Areas of Impact
API	American Petroleum Institute
ATWS	additional temporary workspace
Bcf/d	billion cubic feet per day
CEII	Critical Energy Infrastructure Information
Certificate	Certificate of Public Convenience and Necessity
CFR	Code of Federal Regulations
Dawn Hub	Dawn Hub in Ontario, Canada
DTE	DTE Energy Company
DTE Electric	DTE Electric Company
DTE Gas	DTE Gas Company
DTMP	Drain Tile Mitigation Plan
E&SCP	Erosion and Sediment Control Plan
EPA	U.S. Environmental Protection Agency
FERC or Commission	Federal Energy Regulatory Commission
FERC Plan	*Upland Erosion Control, Revegetation, and Maintenance Plan*
FERC Procedures	*Wetland and Waterbody Construction and Mitigation Procedures*
GHGs	greenhouse gases
HCAs	High Consequence Areas
HDD	horizontal directional drill
hp	horsepower
M&R	metering and regulation station
MLV	mainline valve
MP	milepost
MPSC	Michigan Public Service Commission
MW	megawatts
NEPA	National Environmental Policy Act
NEXUS Project or Project	NEXUS Gas Transmission Project
NEXUS	NEXUS Gas Transmission, LLC
NGA	Natural Gas Act
ROW	right-of-way
SPCC Plan	Spill Prevention, Control and Countermeasure Plan
Tcf	trillion cubic feet
Texas Eastern	Texas Eastern Transmission, LP
TGP	Tennessee Gas Pipeline Company, L.L.C.
U.S.	United States
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USGCRP	U.S. Global Change Research Program
Vector U.S.	Vector Pipeline L.P.

1.0 RESOURCE REPORT 1 - GENERAL PROJECT DESCRIPTION

1.1 Introduction

NEXUS Gas Transmission, LLC ("NEXUS") is seeking a Certificate of Public Convenience and Necessity ("Certificate") from the Federal Energy Regulatory Commission ("FERC or Commission") pursuant to Section 7(c) of the Natural Gas Act ("NGA") authorizing the construction and operation of the NEXUS Gas Transmission Project ("NEXUS Project" or "Project"). NEXUS is owned by affiliates of Spectra Energy Partners, LP ("Spectra" or "Spectra Energy") and DTE Energy Company ("DTE" or "DTE Energy"). The NEXUS Project will utilize greenfield pipeline construction and capacity of third party pipelines to provide for the seamless transportation of 1.5 million dekatherms per day of Appalachian Basin shale gas, including Utica and Marcellus shale gas production, directly to consuming markets in northern Ohio and southeastern Michigan, and to the Dawn Hub in Ontario, Canada (the "Dawn Hub"). Through interconnections with existing pipelines, supply from the NEXUS Project will also be able to reach the Chicago Hub in Illinois and other Midwestern markets. The United States ("U.S.") portion of the NEXUS Project includes new greenfield pipeline in Ohio and Michigan and capacity leased from others in Pennsylvania, West Virginia, Ohio and Michigan, terminating at the U.S./Canada international boundary between Michigan and Ontario. The Canadian portion of the Project will extend from the U.S./Canada international boundary to the Dawn Hub.

By combining greenfield pipeline construction with the use of capacity on other pipeline systems, NEXUS will be able to minimize environmental disruption, optimize project efficiencies, and serve more end-use markets. The greenfield portion of the NEXUS Project will be constructed, owned and operated by NEXUS and will extend from Utica East Ohio Midstream, LLC's Kensington Processing Plant located in Hanover Township, Ohio, to a new interconnection with the DTE Gas Company ("DTE Gas") system west of Detroit in Ypsilanti Township, Michigan. See Figure 1.1-1 in the Figures Section of this report. The remainder of the NEXUS Project, which NEXUS will contract from third-party pipelines, will be comprised of the following:

(1) Expansion capacity on the Texas Eastern Transmission, LP ("Texas Eastern") system in Pennsylvania, West Virginia, and Ohio;

(2) Existing and expansion capacity on the DTE Gas system in southeastern Michigan and extending to the U.S./Canada international boundary; and

(3) Existing capacity on the Vector Pipeline, L.P. ("Vector U.S.") system in southeastern Michigan and extending to the U.S./Canada international boundary.

Outside of the U.S., NEXUS will use existing capacity on the Vector Pipeline Limited Partnership system in western Ontario to access the Dawn Hub. See Figure 1.1-2 for a Systems Overview Map.

The NEXUS Project will consist of the following proposed facilities:

1.1.1 Pipeline Facilities

The Project includes construction of approximately 255 miles of new, 36-inch diameter natural gas transmission mainline pipeline originating in Columbiana County, Ohio and extending through Ohio and Michigan and connecting with DTE Gas in Ypsilanti Township, Michigan; and approximately 0.9 mile of new 36-inch interconnecting pipeline to Tennessee Gas Pipeline Company L.L.C. ("TGP"), as described below and shown in Figure 1.1-1 (*see* Figures section) and summarized in Table 1.1-1 (*see* Tables Section of this Resource Report). Approximately 45 percent of the proposed pipeline route is co-located with existing overhead electric transmission line, pipeline, or railroad utility corridors; with an additional 42 percent of the route (that is not co-located with existing utilities), crossing agricultural land uses. A resulting 87 percent of the proposed pipeline route is sited to avoid conversion of existing land uses. The following sections more specifically describe the proposed pipeline facilities:

- Greenfield Mainline Route – Originates at the Kensington Processing Plant in Columbiana County, Ohio and extends through Ohio and Michigan to connect with DTE Gas 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.
- Interconnecting Pipeline to TGP – approximately 0.9 mile of new 36-inch diameter pipeline connecting the proposed metering and regulating ("M&R") station at the TGP mainline to the NEXUS mainline near the Utica East Ohio Midstream, LLC's Kensington Processing Plant (Hanover Township, Ohio).

1.1.2 Aboveground Facilities

The Project includes the installation of four (4) new gas turbine compressor stations; five (5) new M&R stations; four (4) new launcher and receiver facilities; eleven new customer connections in Ohio, and other aboveground facilities described in detail in Sections 1.5 and 1.6 below.

1.1.3 Leased Capacity

In addition to the greenfield pipeline and related facilities, the Project also comprises firm capacity on existing facilities including:

- Leased Texas Eastern Capacity. Capacity on the Texas Eastern system from certain receipt points located between Berne, Ohio and Uniontown, Pennsylvania to a delivery point at a new interconnection between Texas Eastern and the greenfield NEXUS facilities located in Hanover Township, Columbiana County, Ohio. The facilities associated with this capacity are part of the Texas Eastern Appalachian Lease Project. The Texas Eastern Appalachian Lease Project is expected to file its Certificate Application contemporaneous with the filing of this Application.
- Leased DTE Gas Capacity. Capacity on the DTE Gas system from a new interconnection between NEXUS and DTE Gas in Ypsilanti Township, Washtenaw County, Michigan to (a) the Vector Milford Junction Station interconnect between DTE Gas and Vector U.S. in Milford Township, Oakland County, Michigan, (b) Belle River Mills interconnect between DTE Gas and Vector U.S. in St. Clair County, Michigan, and (c) the St. Clair interconnect between DTE Gas and Union. The construction of the associated DTE Gas expansion project will be subject to the jurisdiction of the Michigan Public Service Commission ("MPSC"), as DTE Gas is a state-regulated gas utility providing limited interstate transportation service pursuant to 18 Code of Federal Regulations ("CFR") § 284.224.
- Leased Vector U.S. Capacity. Capacity on the Vector U.S. system from the Vector Milford Junction Station located in Milford Township, Oakland County, Michigan and from the Belle River Mills station in St. Clair County, Michigan to the U.S/Canada border.[1] Vector U.S. has advised NEXUS that it will perform the facilities work under its blanket Certificate (issued by FERC in Docket No. CP98-135-000 on May 27, 1999).

1.1.4 Resource Report 1 Organization

This Resource Report 1 identifies the Purpose and Need for the proposed Project (Section 1.2), the organization of the Environmental Report (Section 1.3), the locations and descriptions of Project facilities

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1 Outside of the U.S., NEXUS has subscribed for existing capacity on the Vector Pipeline Limited Partnership system in western Ontario to access the Dawn Hub.

(Section 1.4 and 1.5), and the land requirements associated with facility construction and operation (Section 1.6). Resource Report 1 also discusses the proposed construction procedures (Section 1.7 and 1.8), construction schedule and work force (Section 1.9), operation and maintenance procedures (Section 1.10), potential plans for future expansion or abandonment of proposed facilities (Section 1.11), agency consultation and landowner notification (Section 1.12), permits and approvals required to construct and operate the Project (Section 1.13), status of field surveys (Section 1.14), anticipated non-jurisdictional facilities (Section 1.15), and cumulative impacts (Section 1.16). A checklist showing the status of the FERC filing requirements for Resource Report 1 is included as front matter to this Resource Report following the Table of Contents. A table showing the location of responses to the FERC's July 30, 2015 comments on draft Resource Report 1 follows the FERC filing requirements checklist.

1.2 Purpose and Need

The NEXUS Project will provide a seamless path to transport Appalachian Basin shale gas, including Utica and Marcellus shale gas, directly to consuming markets in northern Ohio, southeastern Michigan and the Dawn Hub in Ontario. The region to be served by the NEXUS Project is in the midst of a significant change in natural gas supply and demand dynamics. Due to recent environmental policies and a focus on greater reliability, the region is experiencing significant pressure to invest in natural gas fired electric generation. At the same time, the traditional flow of natural gas to the region from the Gulf Coast and Western Canada is declining as exports from Canada have decreased and a number of pipelines that have served the area have been repurposed from gas to oil. In addition, natural gas production in Michigan has been declining, and as a result Michigan production is serving less regional demand than in the past. For these reasons, the region to be served by the NEXUS Project is uniquely positioned to benefit from the abundance of clean burning and affordable Marcellus and Utica shale gas. The NEXUS Project is the pathway to restore the balance between natural gas supply and demand dynamics in the region.

NEXUS has entered into precedent agreements with multiple utilities and producers, including Enbridge Gas Distribution Inc., DTE Gas, DTE Electric Company, Union Gas Limited, Chesapeake Energy Marketing Inc., CNX Gas Company LLC, and Noble Energy Inc., which together combine for a commitment of firm capacity of 835,000 dekatherms per day. The Project proposed in-service date is November 1, 2017. The NEXUS Project is both a market pull and a supply push pipeline project, meaning the Project targets and has been tailored to meet the transportation needs of both end-users and producers, respectively. The NEXUS Project design is based on contractual commitments with customers, market connections, and other parties that expressed interest during the NEXUS open season processes. In order to provide interested bidders an opportunity to obtain capacity on NEXUS, an open season was held from October 15, 2012 to November 30, 2012. A supplemental open season was held from July 23, 2014 to August 21, 2014, and a second supplemental open season was held from January 14 to February 12, 2015. As a result of these open seasons, NEXUS is proposing to construct facilities to provide 1.5 billion cubic feet per day ("Bcf/d") of capacity by November 1, 2017. NEXUS has signed precedent agreements for the majority of the capacity to be created by the Project and has included these agreements in its Certification Application (see Volume I). Placing the Project facilities in service by the target in-service date of November 1, 2017 is required to meet the firm transportation service requirements of the Project shippers.

The NEXUS Project Will Relieve Infrastructure Constraints That Are Significantly Impeding Access By Demand Centers to Natural Gas from the Marcellus/Utica Region

Natural gas from the Marcellus/Utica region is bottlenecked by insufficient pipeline capacity linking produced natural gas to market areas with substantial and growing demand. Existing pipeline infrastructure has historically been designed to link market areas with producing regions far removed from the Marcellus/Utica region. As a result, the infrastructure is not optimized for current and projected development from this region, thereby limiting access to the natural gas and contributing to market inefficiency. As IHS Energy has explained:

"… although producers need to understand the geology and do their best to produce at the lowest possible unit cost, what limits production is not a lack of geologic potential but rather the ability to export the gas out of the region. The latter is a function of pipeline capacity. As production continually sets new records, it also continually bumps up against pipeline capacity constraints."

The pace of natural gas pipeline capacity expansions in the Marcellus/Utica region will be the main determinant of Appalachian gas production over the next few years. The Marcellus and Utica shale plays have large production and generally strong economics, but access to markets remains constrained by insufficient pipeline takeaway capacity to downstream markets. As a result, Marcellus/Utica production pricing points remain at large basis discounts to Henry Hub, despite the capacity expansions that have come online in the past few years, and Appalachian producers are keen to move supply to higher-priced markets.[2]

The NEXUS Project provides customers an important opportunity to link their natural gas production to growing market areas inadequately served by existing systems. The strong interest shown in the NEXUS Project by producers during Project open seasons reflects both the need for additional pipeline infrastructure and the expectation that the NEXUS Project can and will meet this need.

The NEXUS Project Will Supply Abundant And Affordable Natural Gas Supplies To A Region Where Traditional Natural Gas Supply Sources Are Declining

One of the key gas supply sources for northern Ohio, southeastern Michigan, and Dawn Hub in Ontario has been Western Canadian supply. However, since 2006, the amount of gas supply exported from Alberta to these markets has declined, largely due to increased consumption in Western Canada. According to a report by the Alberta Energy Regulator titled *Alberta's Energy Reserves 2014 and Supply/Demand Outlook 2015-2024*[3] a 4 Bcf/d decline in natural gas exports occurred in Alberta from 2006-2014, with an additional ~1.5 Bcf/d decline forecasted through 2024. In addition, recent proposals to convert existing natural gas pipelines to crude oil pipelines, including Energy Transfer's Trunkline and TransCanada's Energy East Project, will impact natural gas supply to the Project area. Specifically, the impact of these conversion projects is that a combined 1.9 Bcf/d of natural gas pipeline capacity (Trunkline 0.6 Bcf/d in 2015 and TCPL 1.3 Bcf/d in 2018) from the Gulf Coast and Western Canada will be unavailable to serve markets in northern Ohio, southeastern Michigan and the Dawn Hub in Ontario. At the same time, per the ICF International Forecast: Natural Gas – Strategic Q3 Base Case ("ICF International Q3 2015 Forecast"), Marcellus and Utica shale gas production will average approximately 38 Bcf/d by 2025.

In the East North Central region (defined by ICF International as Illinois, Indiana, Michigan, Ohio and Wisconsin), it is anticipated that production will increase by approximately 1.7 trillion cubic feet ("Tcf"), for the period 2015 to 2035, as a result of growth in Marcellus and Utica shale gas production. According to ICF International Q3 2015 Forecast, "The Marcellus Shale accounts for roughly 36 percent of the 19 Tcf of incremental production growth from shale formations." By connecting northern Ohio, southeastern Michigan, and Dawn Hub in Ontario to Marcellus and Utica shale gas production, the NEXUS Project serves to mitigate the reduction in supply from traditional Western Canadian sources and from the conversion of natural gas pipelines serving the region to oil service.

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2 *IHS Energy – North American Natural Gas*, October 30, 2015, provided as part of standard advisory service offering.

3 *Alberta's Energy Reserves 2014 and Supply/Demand Outlook 2015-2024.* Published by the Alberta Energy Regulator, Calgary, Alberta, Canada. AER ST98-2015. June 2015.

The NEXUS Project Will Supply Abundant And Affordable Natural Gas Supplies To A Region Where Demand For Such Supplies Is Increasing

Per the ICF International Q3 2015 Forecast, gas demand will increase by approximately 0.6 Tcf in the East North Central and Ontario regions, for the period 2015 to 2035. Significant demand growth in the East North Central region is a result of coal plant retirements, gas-fired generation competitiveness and overall electricity demand growth driving increased gas use for electric generation. According to IHS Energy's Fall 2014 reference case (IHS North American Gas and Power Scenarios Rivalry; Fall 2014[4]), overall gas demand growth in Ohio, Michigan, Illinois, Indiana, Ontario and Wisconsin from the power generation sector is projected at approximately 3.2 Bcf/d for the period 2014 through 2030. Of this amount, approximately 1.1 Bcf/d is attributable to projected gas demand growth in Ohio and Michigan.

The state of Michigan is in the process of undergoing an energy infrastructure transition, driven by environmental policy, fleet modernization efforts, and the low price of natural gas. In a November 2013 report from the MPSC titled, *Readying Michigan to Make Good Energy Decisions*[5] the MPSC described this transition as follows:

> "Michigan, like the rest of the nation, is currently experiencing a compliance push to either upgrade, or retire and replace coal-fired electric power plants in order to comply with U.S. Environmental Protection Agency ("EPA") regulations. The EPA regulations coupled with the current, relatively low price of natural gas, may lead to the development of new natural gas-fired electric generating plants in Michigan." [p.42]

The MPSC Report notes the importance of natural gas in this transition:

> "Currently, the relatively low price of gas and the increase in shale production provides increased incentive to use gas for applications other than heating…. Natural gas-fired electric generating plants are considered to be economically and operationally viable." [p.7]

For example, both DTE Electric Company and Consumers Energy have announced plans to retire coal-fired generating capacity in Michigan, which will result in an approximately 6,000 megawatt ("MW") gap for new generation that will likely need to be filled by generation fueled by natural gas (along with renewables). Between 2011 and 2012, Michigan experienced a 10 percent increase in the use of gas-fired electric generation. Consumers Energy recently acquired the natural gas-fired 564 MW Jackson plant and in 2015 DTE Electric Company acquired the 732 MW Renaissance gas-fired electric generation plant in Carson City, Michigan, the 320 MW East China gas-fired plant in St. Clair County, Michigan.

The growing demand for natural gas in Ohio is no different. According to the Ohio Natural Gas Market Study conducted by the Analysis Group (*see* Appendix 1C4), the gas demand in Northern Ohio from residential, commercial and industrial sectors could require an additional 12 Bcf/year of natural gas. The increase is driven by home heating conversions from oil and propane to gas, industrial growth, and greater usage in these sectors of the low-cost fuel. In addition, the study projects incremental gas demand from the electric power sector in Northern Ohio at approximately 0.5 Bcf/day. According to the study, "Given both resource adequacy needs and the location of known retirements … most of the new natural gas-fired resources (i.e., approximately 3,050 MW) are located in Northern Ohio. These Northern Ohio plants are also the farthest along in their respective development and will be in-service before 2018."

There are 16 coal-fired power plants in Ohio that have been announced for retirement with over 4,000 MW of capacity that will need to be replaced (SourceWatch.gov website, 2013). Some of these

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4 *IHS Energy – North American Gas and Power Scenarios Rivalries,* Fall 2014, provided as part of standard advisory service offering.

5 *Readying Michigan to Make Good Energy Decisions: Additional Areas.* Published by the MPSC and Michigan Economic Development Corporation, Michigan Energy Office. November 15, 2013.

generators may be converted to natural gas, which would increase further the demand for natural gas in the region. Plans are also underway to construct at least seven new natural gas-fired generation facilities in Ohio, totaling nearly 4,800 MW in incremental capacity (*see* below *Planned Generating Units: Ohio, table* from the AGI's Ohio Natural Gas Market Study).

The proposed NEXUS route is located in general proximity to these planned gas-fired generators, specifically Oregon Clean Energy Center, Carroll County Energy Center, Lordstown Generating Station and the Avon Lake Coal-to-Gas Repowering, all of which are located between the current pipeline route and Lake Erie.

NEXUS is in various stages of discussions and negotiations with potential customers in Ohio such as power generators, local distribution companies and industrial parks. Figure 1.2-1 shows both NEXUS market connections with signed agreements in Ohio and other key market areas in Ohio that would be served by the NEXUS Project. Each Prospective Market Area identified in Figure 1.2-1 includes multiple market sectors (i.e., power generators, local distribution companies, and/or industrial parks.) NEXUS is designed to meet the diverse natural gas delivery requirements of each of these market areas. These include: Dominion East Ohio in Columbiana, Erie and Wayne Counties, Ohio; Columbia Gas of Ohio, Inc., in Sandusky and Medina Counties, Ohio; NRG Power Midwest, LP in Lorain County, Ohio; Brickyard and Rittman Industrial Parks in Medina County, Ohio; Board of Commissioners of Erie County Industrial Park in Erie County, Ohio; and The Waterville Gas & Oil Company and Ohio Gas Company in Wood County, Ohio. NEXUS designed the proposed pipeline route in order to serve the growing gas needs of these Northern Ohio markets economically while minimizing environmental impact.

Planned Generating Units: Ohio

Plant Name	Capacity (MW, Nameplate)	Technology	County	In-Service Date	PJM Status	OPSB Status
New Natural Gas Plants						
Rolling Hills	610 uprate (1,460 Net)	Combined Cycle	Vinton	Q1 2017	Feasibility	Approved
Oregon Clean Energy Center	799	Combined Cycle	Lucas	Q2 2017	FSA/ISA	Approved
Carroll County Energy Center	742	Combined Cycle	Carroll	Q3 2017	FSA/ISA	Approved
Middletown Energy Center	513	Combined Cycle	Butler	Q2 2018	ISA	Approved
Meigs County	652	Combined Cycle	Meigs	*-Delayed*	*Feasibility*	*Approved*
Lordstown Generating Station	800	Combined Cycle	Trumbull	Q2 2019	Feasibility	Pending
Coal to Gas Conversions						
Avon Lake	710	Steam Turbine	Lorain			Pending

Notes:
[1] PJM estimates that the commercial likelihood of units with completed Facility Study Agreements (FSA) and Interconnection Services Agreements (ISA) is 50 percent and 70 percent, respectively.

Sources:
[1] Ohio Power Siting Board, Accessed April 2015, available: http://www.opsb.ohio.gov/opsb/
[2] PJM Interconnection Queue, Accessed April 2015, available: http://www.pjm.com/planning/generation-interconnection/generation-queue-active.aspx

Source: Ohio Natural Gas Market Study by Analysis Group, Inc., June 2015

As with Michigan and Ohio, the demand for natural gas in Ontario is also growing. Per the *ICF International Q2 2015 Forecast:*

> In 2014, Ontario retired the last of its coal-fired power plants. Future growth in gas demand comes from recovery of industrial demand and incremental growth in power demand (due to both load growth and nuclear plant retirements). Eastern Canada's demand is likely to grow robustly, due to incremental gas-fired generation that replaces declines in nuclear generation that result from nuclear plant maintenance, refurbishment, and retirements.

The NEXUS Project is designed to deliver abundant and affordable natural gas to a region with diverse and growing natural gas needs.

The NEXUS Project Will Advance Federal and Regional Environmental Objectives

Ohio's Alternative Energy Portfolio Standard encourages the use of natural gas, which requires electric distribution utilities and electric services companies to secure a portion of their electricity supplies from alternative energy resources. By the year 2025, electric service companies may generate as much as 12.5 percent of their energy from "any new, retrofitted, refueled, or repowered generating facility located in Ohio, including a simple or combined-cycle natural gas generating facility…" to compensate for shortfalls in energy required to be generated from renewable sources (Ohio Revised Code Section 4928.01(A)(34)(h)). However, Ohio's Governor Kasich signed Senate Bill 310 in June of 2014, temporarily freezing Ohio's Renewable Portfolio Standard and energy efficiency mandates for two years and permanently removing the requirement that Ohio utilities procure renewable energy from resources located in Ohio (Ohio Revised Code, 2013).

On October 23, 2015, the U.S. Environmental Protection Agency's final rule on *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Generating Units* (40 CFR Part 60), also referred to as the Clean Power Plan, was published in the Federal Register. In the final rule, the EPA established emission guidelines for states to follow in developing plans to reduce greenhouse gas emissions from existing electric generating units. The rule sets a unique emission reductions target for each state to hit by 2030. To develop each state's goal, the EPA first developed CO2 emission performance rates for fossil fuel-fired electric generating units and natural gas-fired combined cycle generating units. The Agency determined the emission performance rates for the two categories of electric generating units through application of three "building blocks," described the by EPA as:

- Heat rate improvements at affected coal-fired steam electric generating units;
- Shifting electricity generation from high emitting fossil fuel-fired steam power plants to lower emitting natural gas-fired power plants; and
- Increasing electricity generation from zero-emitting renewable sources of energy.

The emission performance rates were applied to all affected sources within each state to come up with a statewide goal. Based on current EPA proposed guidelines, Ohio would be required to reduce baseline (based on 2012 data) power sector emission rates 21 percent for the 2020-2029 interim compliance period goal and 28 percent by 2030; Michigan would be required to reduce baseline (based on 2012 data) power sector emission rates 27 percent for the 2020-2029 interim compliance period goal and 31 percent by 2030. These proposed targets increase the need for timely additions of new generation as coal plants are either retired or face significant curtailments in operations. If authorized, the NEXUS Project is scheduled to be in-service by November 2017 and would provide the needed infrastructure to support increased natural gas generation by the early 2020s, thereby supporting Ohio and Michigan in meeting the EPA's proposed target emission rates (EPA, 2014).

1.3 Environmental Report Organization

The Environmental Report that is filed with NEXUS' Certificate Application is comprised of 12 separate Resource Reports prepared in accordance with FERC Order No. 603 and 18 CFR 380.12, which govern the filing of Applications for Certificates of Public Convenience and Necessity authorizing the construction and operation of facilities to provide service under Section 7 of the NGA.

NEXUS' Certificate Application and accompanying Environmental Report are organized into separate volumes, in compliance with FERC's document control requirements for Public and Privileged & Confidential, and Critical Energy Infrastructure Information ("CEII") classes of information. Information that is being filed as Privileged & Confidential or CEII is summarized in the Table of Contents provided as front matter to each Resource Report in the Environmental Report.

1.3.1 Project Maps and Drawings

Appendix 1A includes drawings and maps for proposed NEXUS Project facilities including typical right-of-way ("ROW") configurations, 8.5 x 11-inch U.S. Geological Survey ("USGS") quadrangle map excerpts; and plot plans for other aboveground facilities (e.g., mainline valves ("MLVs") and launcher/receiver facilities). Bound separately in Volume II-B are full sized (24- x 36-inch) Aerial-photo Based Project Alignment Sheets, USGS quadrangle maps, and NWI maps. Detailed plot plans for the compressor stations are included in Appendix 1A (bound separately in Volume IV) and filed as CEII.

1.3.2 Changes to the Environmental Report and Project Maps

As part of the NGA 7(c) Certificate Application process, NEXUS is using the FERC's National Environmental Policy Act ("NEPA") Pre-filing Process, which provides all stakeholders (including federal, state and local agencies, landowners and local citizens) the opportunity for early cooperation and involvement to identify, evaluate and attempt to resolve issues and concerns prior to NEXUS' submission of a formal Application to the FERC. NEXUS filed its initial draft Resource Report 1 with the FERC under the Pre-filing Process in January of 2015, and a second updated draft in June of 2015. This third filing of Resource Report 1 is filed as part of the Environmental Report included in NEXUS' Certificate Application and reflects numerous changes to the Project based on progress in the engineering design, assessment of environmental constraints and efforts to avoid and minimize potential impacts, and comments from agency and public stakeholders throughout the pre-filing process. Changes to aboveground facilities since the June draft filing include the addition of one new M&R station in Erie County, Ohio (MR05) to accommodate gas delivery to Dominion East Ohio Gas; and reduction from 20 MLVs to 17 proposed MLVs based on refinement of the engineering design. The numerous changes to the proposed pipeline route are detailed in Resource Reports 1 through 12, and alternatives considered to the proposed route are summarized in Resource Report 10 - Alternatives. Details describing the proposed Project are provided in the following text of Resource Report 1; are summarized in the tables provided in the Tables Section of this Resource Report; and are depicted on the Project alignment sheets included as Appendix 1A.

1.4 Location and Description of Pipeline Facilities

The proposed NEXUS pipeline facilities consist of approximately 255 miles of new 36-inch diameter mainline pipeline from Hanover Township, Ohio, to Ypsilanti Township, Michigan, and one new 0.9 mile, 36-inch diameter, interconnecting pipeline to connect certain NEXUS facilities to TGP. NEXUS' primary goal in siting the pipeline was to align, as much as practicable, the new pipeline parallel to existing ROWs and to use already disturbed and cleared ROWs. Deviations from these alignments were made where potential residential impacts, screening, environmental or construction issues warrant. A summary of the NEXUS pipeline facilities is provided in Table 1.1-1. For greenfield segments of new pipeline, NEXUS has sited the route to avoid environmental and stakeholder impacts where feasible, and where impacts are unavoidable, impacts have been minimized to the extent practicable.

1.5 Location and Description of Aboveground Facilities

The proposed NEXUS Project includes aboveground facilities located in Ohio and Michigan including four new compressor stations in Hanover, Guilford, Townsend, and Waterville Townships, Ohio; and five new M&R stations: three in Columbiana County, Ohio; one in Erie County, Ohio; and one in Washtenaw County, Michigan.

A summary of proposed NEXUS aboveground facilities is provided in Table 1.1-2. Site plans of the new compressor stations with an aerial photo background and other proposed aboveground facilities are included in Appendix 1A (Volume IV – Critical Energy Infrastructure Information). Drawings of proposed compressor stations showing the location of the nearest noise sensitive areas within 1-mile of each facility are included in Resource Report 9, Appendix 9F.

NEXUS continues working with individual landowners, local communities and state agency representatives where aboveground facilities are proposed in order to assess the need for visual screening. Outdoor lighting for aboveground facilities will be minimal and limited to what is necessary for safety and security. Section 8.6 of Resource Report 8 provides an assessment of potential visual impacts associated with the Project. Compressor stations will be designed to meet applicable FERC and state noise regulations. Individual station layouts were configured to help reduce the noise levels beyond the site boundaries as further described in Resource Report 9.

Descriptions of proposed NEXUS aboveground facilities area provided in the following sections.

1.5.1 New Compressor Stations

The NEXUS Project includes construction and operation of four (4) new compressor stations in Ohio, as shown on Figure 1.1-1. Compressor Station Site Plans are filed a CEII and are included in Appendix 1A – Volume IV of this Resource Report. A summary of land requirements for both construction and operations of the four proposed compressor stations can be found in Table 1.5-2. Below is a summary of proposed compressor station sites.

1.5.1.1 Hanoverton Compressor Station

The proposed Hanoverton Compressor Station (Compressor Station 1) is located in Hanover Township, Columbiana County, Ohio and will be comprised of two gas turbine-driven compressor packages totaling 52,000 horsepower ("hp").

1.5.1.2 Wadsworth Compressor Station

The proposed Wadsworth Compressor Station (Compressor Station 2) is located in Guilford Township, Medina County, Ohio and will be comprised of a single gas turbine-driven compressor package totaling 26,000 hp.

1.5.1.3 Clyde Compressor Station

The proposed Clyde Compressor Station (Compressor Station 3) is located in Townsend Township, Sandusky County, Ohio and will be comprised of a single gas turbine-driven compressor package totaling 26,000 hp.

1.5.1.4 Waterville Compressor Station

The proposed Waterville Compressor Station (Compressor Station 4) is located at in Waterville Township, Lucas County, Ohio and will be comprised of a single gas turbine-driven compressor package totaling 26,000 hp.

1.5.2 New Meter Stations

NEXUS will construct five (5) new M&R stations (*see* Table 1.1-2). Three of the new M&R stations will be located in Columbiana County, Ohio (MR01, MR02, and MR03); one is proposed in Erie County Ohio to accommodate deliveries to Dominion East Ohio Gas (MR05); and one is proposed in Washtenaw County, Michigan (MR04). Proposed locations of M&R stations are shown on the USGS Quadrangle map excerpts and Project alignment sheets included in Appendix 1A, Volume II-B and are summarized as follows:

- TGP M&R Receipt Station (MR01) is proposed at the tie-in with the TGP mainline in Columbiana County, Ohio and is located at the southern end of the TGP Interconnecting Pipeline;
- Kensington M&R Receipt Station (MR02) is located east of the Kensington Processing Plant in Columbiana County, at the southern end of the proposed NEXUS mainline pipeline;
- Texas Eastern M&R Receipt Station (MR03) is located at the tie-in with the Texas Eastern mainline extension in Columbiana County, Ohio and is located directly adjacent to and east of NEXUS M&R Station 2 at the northern end of the proposed TGP Interconnecting Pipeline;
- Dominion East Ohio M&R Delivery Station (MR05) is located on the NEXUS mainline at the delivery point with Dominion East Ohio Gas, in Groton Township, Erie County, Ohio; and

- Willow Run M&R Delivery Station (MR04) is located at the terminus of the NEXUS greenfield mainline pipeline in Ypsilanti Township, Washtenaw County, Michigan.

1.5.3 Additional Aboveground Facilities

Additional aboveground facilities are summarized in Table 1.1-2 and include pig launcher and receivers, mainline valves, communications towers, and customer connections and are described as follows:

- Launcher/Receivers

  Pig launcher and receiver facilities are proposed at Wadsworth Compressor Station in Medina County, Ohio; and at Waterville Compressor Station in Lucas County, Ohio. One (1) launcher facility is proposed at the TGP Interconnecting Pipeline at the tie-in to the TGP mainline; one (1) launcher facility is proposed at the Kensington M&R Station; one (1) receiver is proposed at the NES/Texas Eastern M&R Station; and one (1) receiver facility is proposed at Willow Run M&R Station. A pipeline "pig" is an inline inspection device used to clean or inspect the pipeline. A pig launcher/receiver is an aboveground facility where pipeline pigs are inserted or retrieved from the pipeline.

- Mainline Valves

  NEXUS is proposing construction and operation of 17 remote controlled MLVs as part of the Project (*see* Table 1.1-2). These MLVs will be installed within areas already disturbed by pipeline construction and will be primarily located within the permanent operational ROW. Locations of proposed MLVs are depicted on the Project alignment sheets included as Appendix 1A to this Resource Report.

- Communications Towers

  The Project will include construction and operation of five (5) communications towers located along the Project route. The towers will support licensed Very High Frequency Mobile Radio transmission equipment for voice communications. NEXUS has evaluated the Department of the Interior, Fish and Wildlife Service's ("USFWS"), *Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation, and Decommissioning* (USFWS, 2014). These Guidelines are used in the evaluation and development of the engineering designs and siting for NEXUS communications towers. Table 1.1-3 provides a summary of the communications towers proposed for the Project including milepost location along the pipeline route, type of telecommunications equipment, type of support structure/tower, and proximity to NEXUS aboveground facilities.

- Confirmed Market Connections

  NEXUS has signed agreements that require installation of multiple connection points located along the proposed Project route (*see* Figure 1.2-1). Below is a summary of the confirmed market connections included in the signed agreements:

  - Dominion East Ohio, Columbiana County, Ohio – Tee-tap at approximate milepost ("MP") 2.3;
  - Dominion East Ohio, Wayne County, Ohio – Tee-tap at approximate MP 52.4;
  - Brickyard Industrial Park; Urban Renewables II LLC (Brickyard and Rittman Industrial Parks), Medina County, Ohio – Tee-tap at approximate MP 56.7;
  - Columbia Gas of Ohio, Inc., Medina County, Ohio – Tee-tap at approximate MP 65.8;
  - Columbia Gas of Ohio, Inc., Medina County, Ohio – Tee-tap at approximate MP 75.0;

- NRG Power Midwest LP (NRG Power), Lorain County, Ohio – Tee-tap at approximate MP 88.0;
- The Board of Commissioners of Erie County, Ohio (Erie County Industrial Park), Erie County – Tee-tap at approximate MP 120.3;
- Dominion East Ohio, Erie County, Ohio – Proposed M&R Station at approximate MP 128.8 (see Section 1.5.2 above);
- Columbia Gas of Ohio, Inc., Sandusky County, Ohio – Tee-tap at approximate MP 159.4
- The Waterville Gas & Oil Company (Waterville Gas), Lucas County, Ohio – Tee-tap at approximate MP 182.1; and
- Ohio Gas Company (Ohio Gas), Fulton County, Ohio – Tee-tap at approximate MP 199.3.

1.6 Land Requirements

The proposed NEXUS Project will result in temporary disturbance to existing land uses during construction of proposed facilities and, to a lesser degree, in the future during operations and maintenance of the facilities. Pipeline land requirements are discussed in Section 1.6.1 and are summarized in Table 1.6-1; land requirements for the aboveground facilities are discussed in Section 1.6.2 and are summarized in Table 1.6-2. Access roads and contractor ware yards are discussed in Sections 1.6.3 and 1.6.4, respectively. Land requirements for proposed access roads can be found in Table 1.6-3 and Table 1.6-4 provides a summary of land requirements for proposed contractor ware yards. Current land uses of all areas affected by the Project are described in Resource Report 8 – Land Use, Recreation and Aesthetics.

1.6.1 Pipeline Construction ROW

NEXUS will require a 100-foot wide nominal construction ROW. The proposed 100-foot wide construction ROW is consistent with the Interstate Natural Gas Association of America baseline width based on a pipeline diameter of 36 inches. The Interstate Natural Gas Association of America recommends use of these baseline widths while recognizing the need to increase or decrease baseline widths for special conditions (Gulf Interstate Engineering, 1999). In addition, the size of the equipment necessary to safely install a 36-inch diameter pipeline, with concrete coating where required, the trench width required and room needed for temporary trench spoil storage, and associated pipeline support facilities were factors used to determine the nominal 100-foot-wide construction ROW width. An exception to the 100-foot-wide nominal construction ROW width is within wetlands where the construction ROW is reduced to 75 feet wide, in accordance with the FERC *Wetland and Waterbody Construction and Mitigation Procedures*, May 2013 version ("FERC Procedures").

Many other conditions must be taken into consideration when determining the amount of construction workspace needed to build the pipeline including agricultural land, drain tiles, proximity to existing residences, roads, railroads, transmission line structures and wires, existing pipeline crossings, topography, soils, bedrock and wetlands and waterbodies. As a result, in many locations additional temporary workspace ("ATWS") will be needed outside the nominal 100-foot corridor to manage these conditions (*see* Table 8.2-4 in the Tables Section of Resource Report 8). To accommodate this varying workspace width, a typical survey corridor of 300 feet in width was employed for biological and cultural resource field surveys, with the study area expanded in site-specific locations and as needed to evaluate potential visual impacts on historic structures.

New ROW

The creation of new ROW is required for segments of the Project pipeline route that cannot be located adjacent or parallel to existing ROWs. In these areas, the nominal construction ROW width will be 100 feet wide, which includes the 50-foot wide permanent easement. The construction working side of the

ROW will be 60 feet wide (35 feet in wetlands) from the center of the ditch to accommodate trench excavation, trench bank sloping, topsoil segregation and safe equipment mobility. The non-working or trench spoil side of the construction ROW will be 40 feet wide from the center of the ditch and will be used to store spoil and rock generated from trench excavation. This does not include ATWS necessary for site-specific construction needs. The Typical ROW Configurations for the NEXUS Project are included in Appendix 1A of this Resource Report.

Pipeline Adjacent to Powerline ROWs

In areas where the proposed pipeline is parallel and adjacent to an existing electric transmission line, the NEXUS pipeline permanent easement generally abuts the transmission line easement/ROW, where practical, so as to not create a "dead strip" of land between the NEXUS permanent easement and the electrical transmission line easement/ROW. By doing so, part of the NEXUS pipeline temporary workspace will overlap the electrical line easement/ROW. As a result, when parallel to a transmission line, the Project takes advantage of any existing clearing beyond the offset from the nearest conductor but in any case does not create an additional ROW edge. In these areas, the construction ROW width will be the nominal 100 feet, which includes the permanent easement. Generally, the construction working side of the ROW will be 60 feet wide (35 feet in wetlands) from the center of the ditch and the side used for spoil storage will be 40 feet wide from the center of the ditch. In general, the 50-foot-wide permanent easement will be 35 feet from the center of the pipe on what was the working side of the construction ROW and 15 feet from the center of the pipeline on the spoil side. This does not include possible ATWS needed for site-specific circumstances.

1.6.1.1 Co-location with Existing Utility Corridors

As previously noted, approximately 45 percent of the proposed pipeline is co-located with existing overhead electric transmission lines, pipeline, or railroad utility corridors (*see* Section 8.4.4 of Resource Report 8). An additional 42 percent of the route crosses agricultural land uses. As a result, 87 percent of the proposed pipeline route is sited to avoid conversion of existing land uses. Table 8.2-3 of Resource Report 8 provides a summary of utilities co-located with the NEXUS Project and Table 8.2-4 provides a summary of the utilities crossed by the NEXUS Project. In summary, the length of the proposed pipeline that deviates from existing ROWs and is not located within agricultural land uses is approximately 13 percent.

NEXUS has and continues to meet with existing pipeline, electric utility, road, and railroad owners to obtain information on their requirements for construction activities in the vicinity of their facilities. NEXUS has conducted surveys and collected information on the location and size of existing pipeline and powerline structures within the proposed construction corridor, including tower footing locations and dimensions, and wire heights (lowest point between towers) from utility operators. Based on its consultations, and construction experience within and adjacent to existing pipeline and overhead electric transmission line easements, NEXUS has designed and will modify its construction techniques on the Project to maintain sufficient offsets from these existing facilities to eliminate the risk of heavy construction equipment interfering with existing utilities during construction and operation of the Project.

NEXUS has been in communications with and continues the process of communicating with existing utility, road, and railroad owners where the Project is co-located and/or crossed. The crossing standards and the safety requirements of the utility or railroad involved are being thoroughly documented and taken into consideration during the siting of the Project facilities. In the event that NEXUS' facilities do not meet the subject utilities' standards and/or requirements, alignment changes have been developed until mutually satisfactory siting and co-location agreements are established. NEXUS will continue to keep an open dialogue with utilities crossed and co-located to make sure their questions and concerns are addressed throughout all stages of the Project.

NEXUS has identified ATWS and staging areas that are required to construct the pipeline in a safe and environmentally responsible manner. Locations of proposed ATWS is depicted on Project Alignment Sheets in Appendix 1A – Volume II-B and are summarized in Table 8.2-5 of Resource Report 8. Table 8.2-4 lists required ATWS by milepost along with a justification for the need of the listed ATWS at that specific location. The ATWS is typically required when any of the following conditions are encountered:

- Agricultural land/drain tiles;
- Power line crossovers and existing pipeline crossovers;
- Wetland crossings;
- River/Stream crossings;
- Topsoil segregation;
- Side slope;
- Extra depth trench required;
- Shallow bedrock along location of trench;
- Road crossings;
- Parking areas;
- Storage and burning of tree stumps;
- Spread move-arounds; and
- Other site-specific constraints.

The extent of ATWS is determined on a site-specific basis. The additional work area is restricted to the minimum size necessary to safely construct the pipeline. In the case of wetlands and waterbodies, NEXUS will attempt to locate ATWS in accordance with the setback requirements contained in the FERC Procedures. In certain instances, the setbacks cannot be maintained due to construction limitations, such as slope and road crossing requirements. In those cases, NEXUS will request a variance from the FERC Procedures. Table 2.3-12 in Resource Report 2 identifies the locations where these variances are required as well as the justification for such variances.

1.6.2 Aboveground Facilities

Table 1.6-2 summarizes the land requirements for new aboveground facilities both during construction and operations of the Project.

1.6.3 Access Roads

Existing public and private road crossings along the proposed Project route are summarized in Table 8.2-10 of Resource Report 8. To the extent feasible, existing public and private road crossings along the proposed pipeline facilities will be used as the primary means of accessing the construction ROW. NEXUS will also use existing public roads near proposed compressor and regulator stations where practicable. Table 1.6-3 summarizes access roads currently proposed for temporary use during construction and permanent use during operations of the Project. Table 1.6-3 also includes the location of proposed access roads by milepost along the pipeline route, the state and municipality within which the road is located, whether or not the road is proposed as temporary or permanent, the existing surface substrate, current ownership status, approximate distance from closest public way, and whether or not improvements would be required. Access roads currently proposed as part of the NEXUS Project are also shown on USGS Quadrangle Map Excerpts included in Appendix 1A.

1.6.4 Contractor Ware Yards

Table 1.6-4 presents the land requirements for currently identified contractor ware yards proposed for temporary use during construction of the NEXUS Project. Proposed contractor ware yards are also shown on Project alignment sheets included in Appendix 1A – Volume II-B.

1.7 Construction Procedures

1.7.1 Pipeline Facilities

Typical ROW configurations depicting construction methods proposed for installation of the NEXUS Project are provided in Appendix 1A and a summary of construction methods to be used along the NEXUS Pipeline Project is provided in Table 1.7-1.

1.7.1.1 Standard Construction and Restoration Techniques

The NEXUS Project will be constructed in compliance with applicable federal regulations and guidelines, and the specific requirements of necessary permits (*see* Section 1.13, Permits and Approvals). Key federal requirements and guidelines include:

- 18 CFR Part 380.15 – Siting and Maintenance Requirements;
- 18 CFR Part 380 – Guidelines to be Followed by Natural Gas Pipeline Companies in the Planning, Clearing and Maintenance of ROW and the Construction of Aboveground Facilities;
- 49 CFR Part 192 – Transportation of Natural Gas and Other Gas by Pipeline: Minimum Federal Safety Standards;
- The Federal Energy Regulatory Commission *Upland Erosion Control, Revegetation, and Maintenance Plan* ("FERC Plan", May 2013 version) and FERC Procedures);
- The NEXUS Erosion and Sediment Control Plan ("E&SCP"), provided in Appendix 1B1;
- The NEXUS Spill Prevention Control and Countermeasure ("SPCC") Plan, provided in Appendix 1B2;
- The NEXUS Blasting Plan, provided in Appendix 1B3;
- The NEXUS Drain Tile Mitigation Plan, provided in Appendix 1B4 ;
- The NEXUS Fugitive Dust Plan, provided in Appendix 1B5;
- The NEXUS Winter Construction Plan, provided in Appendix 1B6; and
- The NEXUS Invasive Plant Species Management Plan, provided in Appendix 1B7.

The Project facilities will be constructed and maintained in accordance with the FERC Plan and FERC Procedures. The following sections identify the general construction procedures for routine pipeline construction, as well as the specific construction techniques that will be utilized in environmentally sensitive areas for the NEXUS Project.

- Clearing operations;
- ROW and temporary construction workspace grading;
- Trench excavation;
- Blasting (where required);
- Stringing;
- Bending;
- Welding;
- Nondestructive weld inspection;
- Weld repair;
- Coating, including inspection and repair;
- Lowering-in;
- Tie-ins;
- Backfilling;
- Cleaning;
- Hydrostatic testing, dewatering and drying; and
- Restoration and revegetation.

Clearing Operations

Vegetation clearing will be required to support construction of the NEXUS Project. The limits of clearing will be identified and flagged in the field prior to clearing operations. Initial clearing operations will include the removal of vegetation adjacent to the existing powerline ROWs, within the pipeline ROW, and the temporary construction workspace either by mechanical equipment or hand cutting.

In wetlands, trees and brush will either be cut with rubber-tired and/or tracked equipment, or hand-cut. Unless grading is required for safety reasons, wetland vegetation will be cut off at ground level, leaving existing root systems intact, and the aboveground vegetation removed from the wetlands for chipping or disposal. In uplands, tree stumps and rootstock will be left in the temporary workspace wherever possible to encourage natural revegetation. Stumps will be removed from the ROW to approved disposal locations or made available to landowners upon request. Timber will be made available to land owners on request or removed from the ROW to approved locations and sold for lumber or pulp, or chipped on the ROW. Brush and tree limbs will be chipped and removed from the ROW for approved disposal. Wood chips will be sold as fuel or other marketable products, spread in approved locations and used as mulch, or hauled off site for disposal.

The cleared width within the ROW and temporary construction workspace will be kept to the minimum that will allow for spoil storage, staging, assembly of materials, and all other activities required to safely construct the pipeline. Closely following clearing and before grading activities, erosion controls will be installed at the required locations as outlined in the NEXUS E&SCP (Appendix 1B1).

ROW and Temporary Construction Workspace Grading

The entire width of the construction ROW, including the temporary construction workspace, will be rough graded as necessary to allow for safe passage of equipment and to prepare a work surface for pipeline installation activities. However, as stated above, tree stumps and rootstock in upland areas will be left in the temporary workspace wherever possible to encourage natural revegetation and, unless grading is required for safety reasons, wetland vegetation will be cut off at ground level, leaving existing root systems intact. Typically, the grading of the ROW will be completed with bulldozers. Backhoes will be used in conjunction with bulldozers in areas where boulders and tree stumps require removal. A travel lane or traffic control will be maintained to allow for the passage of daily traffic.

In agricultural and residential areas, topsoil will be stripped and stockpiled separately from the subsoil during grading. There may be some areas where the construction ROW is limited and topsoil will need to be stockpiled offsite. Topsoil will be replaced with appropriate imported material as required. The mixing of topsoil with subsoil will be minimized by using topsoil segregation construction methods in wetlands (except when standing water or saturated soils are present). Rock will be removed from all actively cultivated or rotated agricultural land. The size, density and distribution of rock left in construction work areas should be similar to adjacent areas not disturbed by construction, unless otherwise approved in writing by the landowner.

Trench Excavation

A trench will be excavated to the proper depth to allow for the burial of the pipe. In general, the trench will be deep enough (approximately seven feet) to provide a minimum of three feet of cover over the pipelines and comply with the requirements of 49 CFR Part 192 of the U.S. Department of Transportation (“USDOT”) regulations. Deeper burial is required in specific areas. The excavated material will be placed next to the trench so as to avoid unnecessary movement of machinery across the terrain. Should it become necessary to remove water from the trench, it will be pumped to an off-ROW, stable, vegetated upland area (where practicable) and/or filtered through a filter bag or siltation barrier. The trench will be dug by a backhoe or ditching machine.

Blasting

Geological and soils information contained in Resource Reports 6 and 7, respectively, identify the areas where shallow bedrock may be encountered at anticipated trench depths in the Project area. NEXUS anticipates that blasting may be required along segments of the proposed pipeline and has developed a NEXUS Project Blasting Plan, which is included as Appendix 1B3. In the event that un-rippable subsurface rock is encountered, blasting for ditch excavation will be necessary. In these areas, care will be taken to prevent damage to underground structures (e.g., cables, conduits, septic systems, and electric transmission tower foundations *etc.*) or to aboveground structures (e.g., homes, electric transmission towers, *etc.*) springs, water wells, or other water sources.

Blasting mats or soil cover will be used as necessary to prevent the scattering of loose rock. NEXUS will comply with all federal, state, and local regulations applying to blasting and blast vibration limits with regard to structures and underground utilities.

Stringing

Once the trench is excavated, the next process in constructing a pipeline is stringing the pipe along the trench. Stringing involves initially hauling the pipe by tractor-trailer, generally in 40 to 80 foot lengths from the pipe storage yard, onto the ROW. The pipe will be off-loaded from trucks and placed next to the trench using a specialized excavator or sideboom tractor. The pipe joints are lined up end-to-end to allow for welding into continuous lengths known as strings.

Bending

Once the sections of pipe have been placed on the ROW, the pipe is bent as necessary so the pipe fits the horizontal and vertical contours of the excavated trench. The Bending Engineer will survey the trench to determine the location and amount of each field bend. This information is marked on each segment of pipe so the Bending Foreman can make the appropriate pipe bends. Pipe is usually bent with a hydraulic pipe-bending machine. Pipe bends will be relatively long and gradual, which must be considered when the trench is dug.

Welding

All welding is performed in accordance with American Petroleum Institute ("API") Standard No. 1104, 20th Edition and NEXUS specifications. Welders performing work on the NEXUS Project must meet the stringent welder qualifications and testing requirements specified in API Standard No. 1104 20th Edition. The individual joints of pipe are welded together in two steps. The front-end welding crew, or pipe gang, will perform the first step. This crew will clean and align the pipe bevels in preparation for welding and place at least the first two passes in the welding process. The firing line, or back-end welders, perform the second step, completing the welds started by the front-end welders. The pipe is welded into long strings to minimize the number of welds that have to be made in the trench (tie-in welds). Gaps in the pipe welding process are often left by the welding crews at water/wetland crossings, road crossings, and other locations where access across the work area is required or when the pipe will be installed later in the construction process.

Nondestructive Weld Inspection

After welding, each weld is inspected to confirm its structural integrity is consistent with 49 CFR Part 192 of the USDOT's regulations. Radiographs or ultrasonic images are taken and processed on site for virtually instantaneous results. Those welds that do not meet the requirements established by the API Standard 1104 and NEXUS' specifications are marked for repair or replacement.

Weld Repair

The contractor may establish a weld repair crew, usually one welder and helper working independently, to follow the radiography crew to make any weld repairs that are required. All repaired and replaced welds are inspected to confirm proper repair and integrity.

Coating Inspection and Repair

The pipeline is coated to prevent corrosion. The pipe lengths will be coated (usually with a heat-applied epoxy) at a coating mill prior to being delivered to the Project. The ends of each piece are left bare to allow for welding. Once welds have been inspected and accepted, the weld area is field coated by the coating crew. Because pipeline coatings are electrically insulating, the coating is inspected using equipment that emits an electric charge to confirm there are no locations on the pipeline where there is a defect/void in the coating.

Lowering-In

After a pipe string has been coated and inspected, the trench is prepared for the installation of the pipeline. The trench is cleared of loose rock and debris. If water exists in the trench, the water is pumped out into a well-vegetated upland area and/or into an approved filter with the exception of wetland areas where the "push pull" installation may be required. In sandy soils, the trench is shaped to support the pipe. In areas where the trench contains bedrock, a sand bedding is placed on the bottom of the trench, and/or pads made of sandbags and/or clay are placed at regular intervals along the trench bottom to support the pipe. The lowering-in crew places the pipeline in the trench. Lowering-in is usually done with sideboom tractors.

Tie-Ins

Once the sections of pipe are lowered-in, the tie-in crew makes the final welds in the trench. Additional excavations as needed, lowering in, lining up, welding, weld nondestructive inspection and coating the final welds are accomplished by this crew.

Backfilling

All suitable material excavated during trenching will be replaced in the trench. In areas where excavated material is unsuitable for backfilling, additional select fill may be required. If the soil is rocky, the pipe is padded with relatively rock-free material placed immediately around the pipe. This material may be obtained from commercial borrow areas in the region. Where suitable, the subsoil may be mechanically screened to produce suitable padding material. Padding of the pipe is usually performed with backhoes. If padding is obtained from an offsite source, it is normally placed in the trench by front-end loaders. In no case will topsoil be used as padding material. Once the pipe is padded, the trench is then backfilled with suitable excavated subsoil material. The top of the trench may be slightly crowned to compensate for settling except for paved areas, where standard compaction methods will be employed. The topsoil is then spread across the graded construction ROW when applicable. The soil will be inspected for compaction, and scarified as necessary.

Cleaning

Once the pipeline tie-ins are completed, it is internally cleaned with pipeline "pigs." A manifold is installed on one end of the long pipeline section and a pig is propelled by compressed air through the pipeline into an open pig receiver. The purpose is to remove any dirt, water or debris that was inadvertently collected within the pipeline during installation.

Hydrostatic Testing

After cleaning, the pipeline will be pressure tested in accordance with 49 CFR part 192 subpart J and NEXUS' requirements to confirm its integrity for the intended service and operating pressures. The pipeline is hydrostatically tested with water. The water is normally obtained from water sources crossed by the pipeline, including available municipal supply lines. It is pumped from the water source into the pipeline. The water propels a pig through the pipeline in a manner that displaces the air from the line and completely fills the pipeline with water. Test pressure is obtained by adding water to the test section with a high-pressure pump. At the completion of the hydrostatic test, the pressure is removed from the section and the water is released from the test section, via approved methods, by propelling the pig with air, which forces the water from the pipeline. All water will be discharged in accordance with state and federal requirements. Additional "drying" pig runs are made, if necessary, to remove any residual water from the pipeline.

Restoration and Revegetation

The cleanup crew completes restoration and revegetation of the ROW and temporary construction workspace. In general, every effort will be made, weather and soil conditions permitting, to complete final cleanup (including final grading) and installation of permanent erosion control measures within 20 days after the trench is backfilled. These restoration activities will be completed in residential areas within 10 days of backfilling. Specific restoration requirements defined by regulatory agencies will be utilized within 100 feet of waterbodies. In conjunction with backfilling operations, any woody material and construction debris will be removed from the ROW. The ROW will be fine-graded to prepare for restoration. Permanent slope breakers or diversion berms will be constructed and maintained in accordance with the FERC Plan. Fences and stone walls will be restored or repaired as necessary.

Revegetation will be completed in accordance with permit requirements and written recommendations on seeding mixes, rates, and dates obtained from the local soil conservation authority or other duly authorized agency and in accordance with the NEXUS Project E&SCP. The ROW will be seeded within six (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 will be mulched in accordance with the FERC Plan and the NEXUS E&SCP.

1.7.1.2 Waterbody Construction Methods

To minimize potential impacts, waterbodies, streams and rivers will be crossed as quickly and as safely as possible. Adherence to the FERC Procedures will make sure that stream flow will be maintained throughout construction. Most stream crossings will be completed using conventional backhoe type equipment using either an open cut (wet) or dry crossing technique. Proposed waterbody crossing methods for each waterbody crossed by the proposed pipeline will be provided in Resource Report 2 and is described in more detail in NEXUS' E&SCP.

Unless dry at the time of crossing, minor streams (those less than 10 feet wide) containing cold water or significant warmwater fisheries will be crossed using a dry crossing method. The dry crossing method will involve installation of a flume pipe(s) and/or dam and pump prior to trenching to divert the stream flow over the construction area and allow trenching of the stream crossing in drier conditions isolated from the stream flow. Spoil removed during the trenching will be stored away from the water's edge and protected by sediment containment structures. Pipe strings will be fabricated 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. Where these methods are employed, ATWS areas will be required for assembly of the pipe strings and spoil storage areas. Fisheries resources along the route are discussed in Resource Report 3.

The open-cut crossing method will involve excavation of the pipeline trench across the waterbody, installation of the pipeline, and backfilling of the trench with no effort to isolate flow from construction activities. Excavation and backfilling of the trench will be accomplished using backhoes or other excavation equipment working from the banks of the waterbody. Trench spoil will be stored at least 10 feet from the banks (topographic conditions permitting). A section of pipe long enough to span the entire crossing will be fabricated on one bank and either pulled across the bottom to the opposite bank, floated across the stream, or carried into place and submerged into the trench. The trench will then be backfilled and the bottom of the watercourse and banks restored and stabilized. Sediment barriers, such as silt fencing, staked straw bales, or trench plugs will be installed to prevent spoil and sediment-laden water from entering the waterbody from adjacent upland areas.

Except where reasonable alternative access is available, temporary construction equipment crossings will be installed across all waterbodies to gain access along the ROW for construction operations. Equipment crossings will be carefully installed after clearing to minimize streambed disturbance and downstream siltation. Where culverts are used, devices will also be placed at the outlet to prevent scouring of the stream bottom. After such equipment crossings are established, construction equipment will not be permitted to drive through the waterbody for access, and the equipment crossings will be removed once access in the area is no longer needed. Only the equipment necessary to construct the crossing and install the pipe will be allowed to work in the waterbody. After clearing activities, construction equipment must cross waterbodies on bridges consisting of one of the following devices:

- Clean rock fill and culverts;
- Equipment pads, wooden mats, and/or culverts; or
- Flexi-float or portable bridge.

To facilitate pipeline construction across waterbodies, ATWS may be needed adjacent to the waterbody to assemble and fabricate the length of pipe necessary to complete the crossing in addition to the standard construction ROW. NEXUS will maintain a 50-foot setback distance except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land as specified in the FERC Procedures. If topographic conditions do not permit a 50-foot setback, or when the ATWS is located in active agricultural land or other disturbed land, then these ATWS areas will be located at least 10 feet away from the water's edge. Table 2.3-12 in Resource Report 2 identifies the locations where variances from the FERC Procedures are required and provides site specific justifications for each of these locations.

Vegetation will not be cleared between the ATWS area and the waterbody. The work area will be limited in size to the minimum area necessary to safely construct the waterbody crossing and accommodate any stockpile of excavated material from the trench and the prefabricated pipeline crossing section.

Typically, for minor and intermediate stream crossings, ATWS will be located on both sides of the waterbody and both sides of the ROW, starting at the edge of the 50-foot setback. The size of ATWS vary based on site-specific conditions and length of the pipe section for the crossing.

Horizontal Directional Drill

NEXUS is conducting geotechnical investigations to support the engineering design of potential horizontal directional drill ("HDD") crossings of certain sensitive resources located along the proposed pipeline route. Table 1.7-2 provides a summary of proposed HDD's for the NEXUS Project, including the state and county, milepost location for the HDD enter and exit locations, resources and features at the surface avoided by use of the HDD, and the estimated total crossing length.

The HDD method involves boring a pilot hole beneath the resource i.e., waterbodies or wetlands to the opposite side of the resource and then enlarging the hole with one or more passes of a reamer until the hole is the necessary diameter. A prefabricated pre-tested, pipe segment is then pulled through the hole to complete the crossing. A successful drill generally results in no impact on the resource being crossed.

NEXUS prepared site-specific HDD crossing plans for each HDD proposed for the Project, which incorporate data from the geotechnical investigations. Table 1.7-2 provides summary of each of the proposed HDD's by milepost and site-specific HDD crossing plans can be found in Appendix 2A.

1.7.1.3 Wetland Construction Methods

Construction across wetlands will be performed in accordance with the FERC Procedures and the NEXUS Project E&SCP, unless a variance is obtained. Construction methods will minimize the extent and time that construction equipment operates in wetlands. The width of the construction ROW will be limited to no greater than 75 feet in wetlands. Clearing of trees and brush in wetlands will be performed using rubber-tired and/or tracked equipment, or hand-cut. Unless grading is required for safety reasons, vegetation will be cut at ground level, leaving existing root systems intact, and cut vegetation will be removed from the wetlands for chipping or disposal in uplands.

Where wetland soils are inundated or saturated at the surface the pipeline trench will be excavated across the wetland by equipment supported on timber mats to minimize the disturbance to wetland soils, and it may not be possible to stockpile segregated topsoil. In these situations the pipe strings will be fabricated on one bank and either pulled across the excavated trench in the wetland, floated across the wetland, or carried into place and submerged into the trench. This method will minimize the amount of equipment and travel in wetland areas.

After the pipeline is lowered into the trench, wide track bulldozers or backhoes supported on swamp mats will be used for backfill, grading, and final cleanup. The segregated top 12 inches of excavated wetland soils will be placed on top of backfilled subsoil to serve as a natural seedbed for restoration of wetland vegetation. A complete description of construction methods can be found in the NEXUS Project E&SCP, included as Appendix 1B.

ATWS will be needed adjacent to specific wetlands to facilitate the pipeline crossing. The ATWS is in addition to the nominal construction ROW and may be used for the assembly and fabrication of the pipe section that will cross the wetland area. These work areas will be located at least 50 feet away from the wetland edge, except where adjacent upland consists of cultivated or rotated agricultural lands and other disturbed areas, topographic and other site specific conditions permitting. If construction limitations, such as topographic conditions (steep slopes) and road crossing requirements do not permit a 50-foot setback, these areas will be located at least 10 feet away from the wetland. In these cases, NEXUS is requesting variances from the FERC Procedures. Table 2.3-12 in the Tables Section of Resource Report 2 identifies the locations where NEXUS has requested authorizations for variances to the FERC Procedures.

The size of ATWS required at wetland crossings is based on the wetland size, water content of wetland soils (or presence of standing water), and other construction constraints. Under no circumstances will vegetation be cleared between the ATWS and the wetland. The construction workspace will be limited to the minimum size necessary to safely construct the wetland crossing. Restricting the work area in this manner will minimize wetland impacts associated with pipeline construction.

NEXUS has prepared a Spill Prevention, Control and Countermeasure Plan ("SPCC Plan") to address the handling of construction fuel and other materials. The SPCC Plan provides a set of minimum requirements to be used by the contractor in developing their own Project-specific SPCC Plan. NEXUS' SPCC Plan is included with the NEXUS Project E&SCP (*see* Appendix 1B1). Except in circumstances specified in the SPCC Plan, potential impacts to water quality will be avoided while work is being performed in wetlands and other waterbodies by implementing the following measures:

- Construction materials, fuels, *etc.* will not be stored within wetlands or within 100 feet of any stream or wetland system, except under limited, highly controlled circumstances;
- Construction equipment will not be refueled within wetlands or within 100 feet of any stream or wetland system, except under limited, highly controlled circumstances and under direct supervision of the Environmental Inspector;
- Construction equipment will not be washed in any wetland or watercourse; and
- Equipment will be well maintained and checked daily for leaks.

1.7.1.4 Residential Areas

Residences within 50 feet of the outer limits of the construction work areas are identified in Resource Report 8. Special care will be taken in residential areas to minimize neighborhood and traffic disruption and to control noise and dust to the extent practicable.

In general, the following measures will be taken in residential areas:

- Fence the boundary of the construction work area to help construction equipment, materials and spoil remain within the construction ROW;

- Preserve mature trees and landscaping where practical, consistent with construction safety and landowner requests;
- Confirm pipe is welded and installed as quickly as reasonably possible consistent with prudent pipeline construction practices to minimize construction time affecting land owners;
- Backfill the trench as soon as the pipeline is installed or temporarily cover the trench with a steel plate; and
- Complete final cleanup (including final grading) and installation of permanent erosion control measures within 10 days after the trench is backfilled, weather conditions permitting.

Site-specific construction plans were developed where residential dwellings are within 50 feet of construction workspace. Site specific residential crossing plans for the Project are included in Appendix 8A to Resource Report 8. These plans show the construction area to be disturbed and safety measures that will be implemented, such as construction fencing and access provisions. These measures are designed to facilitate the safety and convenience of residences in the Project area. Additional details regarding the construction techniques to be used in residential areas are provided in Resource Report 8.

1.7.1.5 Rugged Topography

Permanent trench breakers consisting of sandbags, gravel, cement, or cement-filled or bentonite-filled sacks will be installed in the trench over and around the pipe in areas where sloping terrain presents erosion potential. Temporary trench plugs, usually composed of compacted earth or other suitable material with low permeability, will be used to protect waterbodies and wetlands and to minimize channeling of groundwater along the ditch line during construction.

If side slopes requiring special construction are encountered, the following techniques will be used. During grading, the upslope side of the pipeline ROW will be cut. The material removed from the cut will be used to fill the downslope edge of the ROW in order to provide a safe and level surface from which to operate the heavy equipment (two-tone construction). Side hills may require additional temporary workspace downslope in order to accommodate the fill material. During grade restoration, the spoil will be placed back in the cut and compacted. Springs or seeps encountered during excavations along sidehills will be carried downslope through appropriately sized conduits (i.e., PVC pipe and/or gravel French drains). These conduits will be installed as part of restoration. Table 1.7-3 provides a summary of areas requiring sidehill construction along the NEXUS Project pipeline route.

1.7.1.6 Agricultural Land

Topsoil will be segregated in agriculturally cultivated or rotated agricultural lands and pasturelands. In areas where agricultural activities are active, topsoil will be stripped and placed separate from subsoil when excavating the trench. Excess rock will be removed from at least the top 12 inches of soil to the extent practical. The size, density and distribution of rock left in construction work areas should be similar to adjacent areas not disturbed by construction, unless otherwise approved in writing by the landowner. Additional temporary workspace may be required when topsoil segregation is required. After the pipe has been lowered into the ditch, subsoil is used for backfilling and topsoil is then spread across the graded ROW. Equipment traffic will be strictly controlled within agricultural land to minimize rutting or compaction. Soil compaction will be treated, as necessary, in accordance with the FERC Plan.

In addition, NEXUS understands the proposed Project will cross agricultural land that contains 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 a Drain Tile Mitigation Plan ("DTMP") included as Appendix 1B4 to Resource Report 1. As indicated in the DTMP, NEXUS will individually review and analyze agricultural parcels crossed by the Project to determine the potential for drain tile impacts. This will be accomplished through communications with landowners and subject matter experts. The attached DTMP also provides a general overview of the types of drain tile systems potentially encountered during construction and describes NEXUS' drain tile mitigation strategy during the pre-construction (i.e., landowner communications, preliminary drain tile assessments, and mitigation planning); construction (i.e., drain tile identification, repair procedures); and post-construction (i.e., monitoring and restoration) phases of the Project. In addition, please see Section 7.5 of Resource Report 7 for further discussion on impact avoidance and minimization for activities involving agricultural soils.

1.7.1.7 Road Crossings

Constructing the NEXUS Project across public and private roadways, using either conventional open cut or road bore methods, will be based on site conditions and road crossing permit conditions. Public road crossings associated with the Project are identified in Resource Report 8. Roadway crossing permits will be obtained from applicable state and local agencies. Permit conditions will ultimately dictate the day-to-day construction activities at road crossings.

Prior to construction, the Ohio Oil & Gas Producers Underground Protection Services and the Ohio Utilities Protection Service and the MISS DIG system, in Michigan, will be contacted. In addition, state and/or local utility operators will be contacted so they can mark existing facilities that may intersect, or be in close proximity to, the proposed pipeline. The contractor may elect to excavate the ground above the utilities to confirm their location.

Construction will be scheduled for work within roadways and specific road crossings to minimize conflicts with existing commuter traffic and school bus schedules to the extent practical. Appropriate traffic management and signage will be set up and necessary safety measures will be developed in compliance with applicable permits for work in the public roadway. Arrangements will be made with local officials to have traffic safety personnel on hand during periods of construction. Provisions will be made for detours or otherwise to permit traffic flow.

Roadway crossing construction will generally occur using one of the following methods:

- Open Cut – This method is used on driveways and roads with low traffic densities where pipeline installation activities will not adversely impact the general public. The first step is to install the proper traffic control devices. Traffic may have to be detoured around the open trench during the installation process. For driveways and small roads, steel road plates may be utilized or a temporary bypass roadway may be constructed. Multi-lane roads may require the closure of one lane at a time with traffic diverted to the other lane(s). The pipeline crossing is installed one lane at a time. As the pipe is installed, successive lanes are alternately taken out of service for pipe installation until the crossing is completed. Another option is to detour traffic around the work area through the use of adjacent roadways.

  If the roadway surface is paved, pavement over the proposed trench is cut, removed, and properly disposed of. The trench is excavated using a backhoe and the pipe is installed (welded, radiographed and coated). The trench is then backfilled and compacted to reduce stresses on the pipeline and to confirm the roadway will support the traffic load without settling. The existing trench subsoil may be used in the backfill if it can be compacted properly and is authorized by the permitting agency. In most cases, backfill material will be obtained from an outside source and hauled in. The material used and methods of placement will comply with the requirements of the permitting agency. If the roadway surface was paved, the paving will be properly restored in accordance with the permit requirements.

  NEXUS will submit a road crossing permit application to the applicable permitting agency for approval prior to construction.

  Private road crossings will be negotiated with the property owners as part of the easement process and typically be “Open Cut” to minimize the construction period affecting disruption of the road. Construction will be coordinated with the property owners.

- Bored – On roads with higher traffic densities and for railroads where service must be maintained, the pipeline may be installed by boring a hole under the road or railway. Specialized boring equipment is used. The soil and or rock are bored by a drill that contains a cutting head which cuts through the soil. Dummy casing which is slightly larger in diameter than the pipeline, is installed immediately behind the cutting head. An auger is placed inside the pipe to remove the cuttings. When completed, the bored hole is slightly larger than the outside diameter of the pipeline to be installed. Once the bore is completed, the pipeline section is welded to the boring pipe and pulled into place and the boring pipe is removed. Any voids between the pipeline and the subsoil are filled with grout (a sand-cement mix) to prevent settlement of the roadway surface or railroad track. This method allows the road or railroad to remain in service while the installation process takes place and eliminates the potential for trench settlement.
- Cased – The procedure for a cased crossing is similar to a bored crossing with one exception. A section of steel casing pipe, which is several inches in diameter greater than the pipeline, is bored into place. Casing sections are welded together to make sure water does not enter the casing. Once the casing pipe has been installed, the pipeline is pulled through the casing. To prevent potential corrosion of the pipeline due to contact between the pipeline and the casing, the pipeline is insulated from the casing pipe, either through the use of plastic insulators spaced along the pipeline or the pipeline is coated with a layer of concrete. To prevent water from entering the casing, the ends of the casing are sealed with rubber or polyethylene seals. The space between the casing and the pipeline is vented to the atmosphere through the use of sections of small diameter pipe (vent pipe), which are welded to the casing ends and run from the casing to several feet above the surface of the ground. Casing pipe is installed when required by permit or when there is a likelihood of encountering rock during the boring.
- Hammer technique – In addition to the boring techniques described above, pipeline contractors may employ another technique to complete road crossings. This technique consists of driving casing pipe that is slightly larger in diameter than the proposed pipeline under the roadway with a horizontal air operated reciprocating hammer. The casing pipe is placed against the end of the trench near the edge of the roadway and driven under the paved road. Once in place, the material inside the casing is augured out and the pipe is installed through the casing. The casing pipe is then removed while grout is placed around the pipeline. Where required, the casing pipe may be left in place as casing.

The size of the construction workspace or ATWS at road crossings will be based on the size of the road crossing and other construction constraints.

Crossings of private roadways will be coordinated with residents to minimize access impacts. In those areas where the excavation of a longer length of trench will not pose a safety problem, the pipeline will be installed using the standard open trench method. Open trenches will either be fenced or covered with steel plates during all non-working hours. Steel plates will be kept on site at each crossing so that a temporary platform can be made across the trench as required (e.g., emergency vehicles).

All roadway surfaces will be quickly restored to the specifications of the local Department of Public Works or the Ohio and Michigan Departments of Transportation as outlined in the permit requirements. Roadway markings and striping will be restored, as necessary.

1.7.1.8 Rock Removal and Blasting

Based on NEXUS' experience, field reconnaissance and review of soils and geologic maps of the Project area, shallow bedrock (less than 5 feet from the surface) may be encountered at various locations along the Project alignment.

Rock encountered during trenching will be removed using one of the following techniques. The technique selected is dependent on the relative hardness, fracture susceptibility, and expected volume of the material. Techniques include:

- Conventional excavation with a backhoe;
- Ripping with a dozer followed by backhoe excavation;
- Hammering with a pointed backhoe attachment followed by backhoe excavation;
- Blasting followed by backhoe excavation; or
- Blasting surface rock prior to excavation.

The NEXUS Project Blasting Plan (*see* Appendix 1B3) identifies the impact avoidance and minimization measures employed by NEXUS if blasting is determined necessary and will contain special provisions that will be taken to monitor and assess blasting within 150 feet of private or public water supply wells, should that situation arise.

Large rock not suitable for use as backfill material will either be windrowed along the edge of the ROW with permission from the landowner, used to construct All-Terrain Vehicle barriers across the ROW, or buried on the ROW. Remaining rock will be used to backfill the trench to the top of the existing bedrock profiles, if feasible. NEXUS will negotiate with landowners and will obtain permission to permanently store rock along, over, through or across the ROW. Otherwise the excess rock will be hauled off-site and disposed of in an appropriate manner.

NEXUS has identified several areas along the alignment where shallow rock is anticipated to be within 10 feet of the ground surface (*see* Table 1.7-4) and may result in the need for disposal of rock off-site. The areas anticipated to have the highest concentration of excavated rock are from MP 0 to 5, MP 50 to 55, MP 80 to 90, and MP 110 to 175. Excess rock will be disposed of in upland areas in accordance with applicable local regulations and landowner requirements.

1.7.2 Aboveground Facilities

The Project aboveground facilities will be constructed in compliance with the same federal regulations and guidelines as the pipeline facilities, and in accordance with the specific requirements of applicable federal and state approvals. The construction and restoration methods described in the FERC Plan and FERC Procedures and the Project E&SCP will be followed, as applicable, for the aboveground facilities as well. Generally, aboveground facilities are sited to avoid cultural and natural resource impacts to the extent practicable. Following is a brief description of the typical construction sequence for the new compressor stations.

1.7.2.1 Compressor Stations

A natural gas compressor station is similar to a pump station on a water line or other liquid system in that it provides the pressure in the pipeline to move the gas. The general construction sequence consists of clearing and grading the site, installation of foundations, installation of the piping, installation of the structures and machinery, start-up, testing and final clean up and stabilization and restoration of the site. Construction of the compressor stations is expected to begin in the first quarter of 2017 and extend into the fourth quarter of 2017.

<u>Clearing and Grading</u>

The first activities to take place at a new compressor station site is to clear the existing vegetation, install the necessary erosion and sedimentation controls, and establish a rough access road to the site. Only those areas required to install the structures, piping and roads, including sufficient workspaces, will be cleared. Some clearing will also be needed to install the perimeter security fencing. Stumps will be removed and either disposed of appropriately on site or hauled to an approved off-site disposal location. Commercial power and telephone will be established at the site as soon as possible. The cleared areas of the site will then be graded, if necessary, to provide level surfaces for the building foundations and work areas. The permanent site roadways and parking areas will be graded at this time as well. Large rocks dislodged during grading or other excavation will be properly disposed of on site or hauled off site for disposal in an approved area. Installation of various erosion and sedimentation controls will begin during the initial clearing of the site. These may take many forms and will be installed and maintained in accordance with the FERC Plan and FERC Procedures and the NEXUS Project E&SCP.

Foundations

Once the building sites have been cleared and graded, excavation will begin for the installation of building foundations and pipe supports. Generally, the foundation for the compressor building requires a significant mass of reinforced concrete to provide a stable support for the operating machinery. The area for the foundations must be excavated below the prevalent frost line for the site, adequate forms and reinforcing bars are installed and high strength concrete is poured to the appropriate levels. Rigid controls on concrete quality and installation procedures confirm that a suitable foundation is obtained. Blasting may be required at some compressor station locations to install foundations and underground piping.

Piping

Installation of the various piping systems will begin at about the same time as the foundation work. Trenches will be dug for the underground portions of the piping. The pipe will be welded, radiographed or x-rayed, coated, and placed in the trench and backfilled. Some portions of the station piping will occur aboveground. Any aboveground piping will be installed on concrete or metal pipe supports and painted. Acoustic insulation may be installed on some of the piping for noise control. Some of the piping, valves and fittings are typically fabricated off-site at a fabrication shop and then transported to the site. As major parts of the piping are completed, each will be pressure tested to confirm its integrity. Test water is usually trucked to the site for the testing and will be discharged to the stormwater management system at each site or to a well vegetated upland area. Dewatering is performed with proper erosion and sedimentation controls as set forth in the FERC Plan and FERC Procedures and the NEXUS Project E&SCP. Electrical conduit systems will be installed during this period as well as domestic water and septic systems.

Structures and Machinery

Once the foundations have been completed and cured sufficiently, installation of the buildings and machinery for the station may begin. This is a highly coordinated activity as the machinery, buildings and piping are all installed during the same time period. Various piping and electrical conduit systems are connected once the machinery is set. Electrical wiring is installed for power and instrumentation. Domestic water and septic systems will be connected to the buildings as they are completed.

Start-up and Testing

As the various systems and subsystems are completed, they will be tested and calibrated for proper operation. Use of new computerized systems will allow much of the testing to proceed before gas is received at the site. Actual start-up of the compressor units will commence once the new facilities are tested and tied into the existing pipeline.

Final Clean up and Stabilization

Clean up and stabilization of the station yards will be an ongoing process throughout construction. Sections of the compressor station yards will be final graded, fertilized, seeded and mulched as work is completed and as provided in the FERC Plan and FERC Procedures and the Project E&SCP. Permanent erosion controls will be installed on a similar basis. It is anticipated that most of final stabilization will be complete prior to final testing and start-up of the compressors.

1.8 Environmental Training for Construction

Consistent with FERC guidelines, environmental training will be given to NEXUS' personnel and to contractor personnel whose activities may impact the environment during pipeline and aboveground facility construction (training protocol and content are outlined in the Project E&SCP, Appendix 1B1). The level of training will be commensurate with the type of duties of the personnel. All construction personnel from the chief inspector, environmental inspector, craft inspectors, and contractor job superintendent to loggers, welders, equipment operators, and laborers will be given the appropriate level of environmental training. The training will be given prior to the start of construction and throughout the construction process, as needed. The training program will cover the FERC Plan and FERC Procedures, Project-specific permit conditions, company policies, cultural resource procedures, threatened and endangered species restrictions, the Project E&SCP, the SPCC Plan, and any other pertinent information related to the Project. In addition to the environmental inspectors, all other construction personnel are expected to play an important role in maintaining strict compliance with all permit conditions to protect the environment during construction.

1.9 Construction Schedule and Work Force

The projected in-service date for the NEXUS Project is November 1, 2017. Construction of Project facilities is expected to start in the first quarter of 2017 with tree clearing and will be completed in November of 2017. Table 1.9-1 provides a preliminary construction schedule.

1.10 Operations and Maintenance

NEXUS will operate and maintain newly constructed pipeline and aboveground facilities in the same manner used on existing Spectra Energy Partners, LP and DTE systems. The following sections provide details on standard operations and maintenance procedures for erosion controls, periodic pipeline and ROW patrols, typical vegetation maintenance, and typical operations and maintenance at aboveground facilities.

1.10.1 Erosion Control

Evidence of post-construction soil erosion or sedimentation on the pipeline ROW or at aboveground facilities will be reported to the local operations supervisor. These reports may originate from NEXUS personnel performing routine patrols or from landowners. Prompt corrective measures will be performed as needed in accordance with NEXUS operations and maintenance procedures.

1.10.2 Pipeline and ROW Patrols

During periodic pipeline and ROW patrols, permanent erosion control devices installed during construction will be inspected to confirm that they are functioning properly. In addition, attention will be given to:

- Erosion and wash-outs along the ROW;
- Settling, undermining or degradation of repaired ditch line in streets or parking lots;
- Performance of water control devices such as diversions;
- Condition of banks at stream and river crossings;
- Third-party activity along the pipeline ROW; and
- Any other conditions that could threaten the integrity of the pipeline.

The applicable local operations supervisors will be notified of any conditions that need attention. Significant conditions will be reported to the pipeline owners. Corrective measures will be performed in accordance with applicable regulations and standards.

1.10.3 Typical Right of Way Vegetation Maintenance

NEXUS will perform regular ROW vegetation maintenance to facilitate sufficient ground visibility for proper inspection of the ROW by aerial and ground patrols and to ensure the integrity of the pipeline coating is not affected by roots of large trees. NEXUS will also maintain an environmental permits database that tracks required environmental permit conditions or notifications that are required for ROW maintenance activities. In wetlands, maintenance of woody vegetation over the full width of the permanent easement is prohibited pursuant to the FERC Procedures. An area ten feet wide centered over the pipeline will be maintained in an early successional stage of vegetation in accordance with the FERC Procedures. In forested wetlands, tree clearing will be limited to selectively clearing trees within 15 feet of the pipeline with roots that could compromise the integrity of the pipeline coating. Trees and shrubs that become reestablished beyond 15 feet (on both sides of the pipeline) will not be cut unless they present a safety hazard. Typically mowing and vegetation maintenance is performed once every three years, however this varies due to local conditions and ROW needs.

1.10.4 Pipeline Integrity Inspections and Cleaning

In-line pipeline inspections are performed by inspection devices referred to as “smart pigs”. These inspection devices are inserted into the pipeline using pig launchers and they are removed from the pipeline using pig receivers. In-line pipeline inspections are performed every 7 years in High Consequence Areas (“HCAs”) and ten years in non-HCAs. See Section 11.2.1.3 of Resource Report 11 for a detailed description of HCAs. Smart pigs collect detailed technical data on the integrity of the pipeline from the inside including identification and quantification of pipeline anomalies such as dents, ovalities (places where the pipeline is not round), and wall thickness changes. These data will be used by NEXUS to monitor the integrity of the pipeline. Cleaning pigs are operated similarly only they function to clean the interior of the pipeline.

1.10.5 Aboveground Facilities Operational Maintenance

NEXUS will also perform operations and maintenance activities at new aboveground facilities including the following:

- Planned Blowdowns are the venting of natural gas from pipeline and related facilities usually in preparation for pipeline maintenance activities. NEXUS will notify local officials and landowners 48 hours in advance of planned gas releases and then again within one hour of the event. Planned blowdowns for a scheduled maintenance activity at a compressor station are usually scheduled for the morning. Planned maintenance blowdowns average around eight to ten per year and pass through an on-site silencer.

- Unplanned Blowdowns occur at a compressor stations when an automated station operating system detects an abnormal condition and engages the designed safety features of the facility. Unplanned blowdowns are rare. In either case, the process includes evacuating the pressurized gas within the piping being isolated, normally in less than three minutes.

- Painting of aboveground facilities is performed on a periodic basis, as needed, based on site specific conditions and the effect of the elements on the paint condition. Painting of aboveground facilities is typically performed about every 15-years.

- Valve maintenance: Valve Maintenance is typically performed at least once a year, which consists of lubrication and ensuring the valves are operating property.

1.11 Future Plans and Abandonment

At this time, NEXUS has not identified any specific plans for future expansion or abandonment of the facilities proposed in this docket. If additional demand for natural gas requires future expansion, NEXUS will seek the appropriate authorizations from FERC. When and if an Application is filed, the environmental impact of the new proposed facilities would be examined.

1.12 Public-Landowner/Agency Consultation

NEXUS began advising potential stakeholders, government officials, and other interested persons about the Project in August of 2014 through letters and individual meetings. NEXUS has contacted officials at the federal, state, and local governments, including congressional delegations, state legislators, county commissioners, and local elected officials. As further described in the following sections, NEXUS has also met with members of the public through voluntary public outreach efforts. A list of the other potential stakeholders that NEXUS has identified and a list of government officials contacted are included as Appendix E of the Project's Public and Agency Participation Plan (Appendix 1C3). NEXUS will continue its ongoing efforts to identify and contact other potential stakeholders and interested persons, and updates to Appendix 1C1 will be submitted to Commission Staff, accordingly.

1.12.1 Public Officials Contacts

NEXUS representatives initially contacted federal, state and local public officials in September 2014. Additionally, NEXUS has held numerous face to face meetings with public officials along the route and attended various county commission and township trustee meetings to provide Project updates. As the Project continued through FERC's pre-filing process, meetings held with public officials were reported in the Project's monthly report submitted to FERC and posted to the docket under docket number PF15-10-000.

1.12.2 Landowner Contacts

Proposed new Project facilities will affect portions of thirteen (13) counties in Ohio and four (4) counties in Michigan. The proposed Project's footprint will have approximately 1,730 total affected landowner tracts along the pipeline portion of the Project. To date, these landowners have been contacted or multiple attempts have been made at making contacts by NEXUS. These communications have included a Project introduction letter, letters requesting survey permission, individual discussions with NEXUS representatives, and site visits.

NEXUS began communicating with landowners within a 600-foot study corridor in August 2014, and landowner notification letters and survey permission letters were mailed to all identified affected landowners and those that are newly identified as Project route changes are developed. To date, NEXUS has been granted access to approximately 93 percent of the impacted tracts project wide.

Prior to commencing the pre-filing process, NEXUS hosted nine voluntary informational meetings for stakeholder in October and November 2014. Seven of these meetings were in the vicinity of the proposed Project in Ohio and two were in the vicinity of the proposed Project in Michigan. The voluntary informational meetings were set up similar to open house meetings, with subject matter experts available in the areas of surveying, construction, environmental impacts, regulatory affairs, state and federal relations, and ROW activities. Aerial imagery mapping identifying impacted tracts by landowner were available to allow for site specific discussion between the project team and interested stakeholders.

Attendees were encouraged to ask general questions about the Project scope, schedule, sound levels, and safety and tract-specific questions around Project impacts. All questions were addressed during the informational meetings to the extent possible and any follow-up actions were tracked. To maximize landowner participation, all landowner Informational Meetings were held from 5:00 p.m. to 7:30 p.m. The dates and locations of the Informational Meetings are summarized below:

- October 7, 2014 — Firelands Elementary School, Oberlin, Ohio (Lorain County)
- October 8, 2014 — Stark State College, North Canton, Ohio (Columbiana, Stark, Summit, & Carroll Counties)
- October 9, 2014 — Medina Community Rec. Center, Medina, Ohio (Medina & Wayne Counties)

- October 13, 2014 Swanton High School, Swanton, Ohio (Fulton & Lucas Counties)
- October 14, 2014 Margaretta Elementary School, Castalia, Ohio (Erie County)
- October 15, 2014 Terra Community College, Fremont, Ohio (Sandusky County)
- October 16, 2014 Owens Community College, Perrysburg, Ohio (Wood County)
- November 12, 2014 Lincoln High School, Ypsilanti, Michigan (Washtenaw County)
- November 13, 2014 Adrian High School, Adrian, Michigan (Lenawee County)

In addition, NEXUS held ten Open Houses along the pipeline route in Ohio and Michigan during February of 2015. The dates and locations of the Open House Meetings are summarized below:

- February 2, 2015 The Galaxy Banquet Center, Wadsworth, Ohio
- February 3, 2015 Lorain County Community College, Elyria, Ohio
- February 4, 2015 Margaretta Elementary School, Castalia, Ohio
- February 5, 2015 Terra State Community College, Fremont, Ohio
- February 9, 2015 Stark State College, North Canton, Ohio
- February 10, 2015 United Local High School, Hanoverton, Ohio
- February 11, 2015 Swanton High School, Swanton, Ohio
- February 12, 2015 Central Park West, Toledo, Ohio
- February 17, 2015 Adrian College, Adrian Michigan
- February 18, 2015 Lincoln High School, Ypsilanti, Michigan

NEXUS representatives were also available to stakeholders for the purpose of answering Project related questions for approximately one hour immediately prior to each of the FERC Public Scoping Meetings held by FERC in April and May 2015. The dates and locations of these meetings are summarized below:

- April 28, 2015 Midview Middle School, Grafton, Ohio
- April 29, 2015 Wadsworth High School, Wadsworth, Ohio
- April 30, 2015 Louisville High School, Louisville, Ohio
- May 5, 2015 Tecumseh Center for the Arts, Tecumseh, Michigan
- May 6, 2015 Swanton High School, Swanton, Ohio
- May 7, 2015 Fremont Ross High School, Freemont, Ohio

1.12.3 Agency Consultations

In addition to its public outreach efforts with landowners and local officials, NEXUS has been conducting an extensive planning and consultation process with Federal, state and local regulatory agencies, resource agencies and other groups having a stake in the Project. The consultation process involved briefings, meetings, letter requests for resource information, and telephone discussions and emails. This section provides a brief description of the more substantive agency and stakeholder consultations that have occurred to date.

Threatened and Endangered Species Consultations

As required under Section 7 of the U.S. Endangered Species Act and Ohio and Michigan protected species regulations, NEXUS initiated informal consultations with Federal and state resource agencies to update the known locations of federal- or state-listed threatened or endangered species and species of special concern, if any, that could potentially be affected by construction or operation of the Project. In most cases, responses have been received and follow-up consultations, meetings and field visits have occurred. Copies of agency correspondence received to date are provided in Appendix 1C2. NEXUS has maintained communications with regulatory agencies throughout the planning process and shared with the agencies species-specific survey protocols for agency review and comments prior to implementation in the spring/summer/fall of 2015. NEXUS also held update meetings in the summer and fall of 2015 to discuss preliminary survey results and to keep agencies informed about Project activities. Copies of agency correspondence received to date are provided in Appendix 1C2, and a summary of Federal, state, and local agency contacts is provided in Appendix 1C1.

Interagency and Other Review/Resource Agency Meetings

NEXUS has conducted 18 agency meetings to date to introduce the Project to agency representatives and to initiate communications regarding upcoming field surveys. NEXUS also informed agencies of its intent to use the FERC's pre-filing process and discussed the anticipated timeline and filing requirements for various permit applications and how they relate to the FERC's NEPA compliance process. The following agency introductory meetings have been conducted to date:

- USFWS, Columbus Ohio Field Office — October 7, 2014
- Michigan State Historic Preservation Office — October 8, 2014
- Ohio Department of Natural Resources — October 14, 2014
- Ohio State Historic Preservation Office — October 16, 20 14
- Michigan Department of Natural Resources — November 3, 2014
- USFWS Michigan Field Office — November 12, 2014
- Ohio Environmental Protection Agency — December 17, 2014
- U.S. Army Corps of Engineers; Buffalo, Huntington, Pittsburg Districts and Michigan Department of Environmental Quality — January 14, 2015
- Ohio Environmental Protection Agency (project introduction to wetland and waterbody permitting staff) — February 12, 2015
- Michigan Department of Environmental Quality (project introduction to wetland and waterbody permitting staff) — February 17, 2015
- Ohio Environmental Protection Agency (Central Office –Air Quality Management District, Northeast District Office, Akron Regional Air Quality Management District, Northwest District Office, Ohio Environmental Protection Agency (project air permitting strategy overview) — April 14, 2015
- USFWS, Region 3 Office — June 26, 2015
- Update meeting with the U.S. Army Corps of Engineers, Buffalo District — August 13, 2015
- Update meeting with the Ohio Environmental Protection Agency — September 25, 2015
- Update meeting with the Ohio Department of Natural Resources — September 25, 2015
- Ohio Department of Agriculture, Project Introduction Conference Call — October 15, 2015

- Update meeting with the U.S. Army Corps of Engineers, Pittsburgh District — October 20, 2015
- Update meeting with the USFWS, Region 3 Office (Columbus and Lansing Field Office participation via phone) — October 29, 2015

NEXUS expects that agency coordination will be ongoing throughout the development process. NEXUS has also participated in the FERC's bi-weekly agency coordination meeting as a means to allow participating and cooperating regulatory agencies in Ohio and Michigan to keep up to date on NEXUS Project progress and to ask questions of NEXUS representatives. Representatives from the U.S. Army Corps of Engineers, the USFWS, the EPA, the Ohio and Michigan State Historic Preservation Offices, the National Park Service, the Ohio and Michigan Departments of Transportation, the Ohio and Michigan Departments of Natural Resources, and others have been invited to attend FERC's biweekly agency meetings.

1.13 Permits and Approvals

Construction contractor(s) engaged by NEXUS will be required to observe and comply with applicable federal, state and local laws, ordinances, and regulations that apply to the conduct of the work. During the performance of the work, contractors will be required to comply with the Minimum Federal Safety Standards adopted by the USDOT under the Natural Gas Pipeline Safety Act of 1968, as amended, Occupation Safety and Health Administration guidelines, and NEXUS' own standards.

Other safety construction codes and regulations may be enacted or adopted by duly constituted government agencies and bodies having jurisdiction over the locations where the work is to be performed. The contractor(s) will be required to observe and abide by all provisions that are applicable.

Notwithstanding anything to the contrary set forth in this section, nothing stated herein shall be construed to indicate that any state, regional, or local agency referred to has the power to impose any requirement inconsistent with federal law or to refuse to issue or to unreasonably delay the issuance or processing of any state, regional, or local permit, license, certificate, approval, review, or other requirement; nor shall this document be construed to limit NEXUS' legal rights under the NGA (15 United States Code § 717, *et seq.*), Pipeline Safety Improvement Act (49 United States Code §§ 60101, *et seq.*), or the United States Constitution, including, but not limited to, the Supremacy Clause and the Commerce Clause.

The construction, operation, and maintenance of the Project will require multiple permits and regulatory approvals from various federal, state, and local agencies, as well as consultations with Native American tribes and other interested parties. Consultations have been initiated with the several agencies as discussed in Section 1.12.3. Consultations with these and other agencies will continue throughout the Project review and permitting process. The applicable federal, state, and local permits and approvals, responsible agencies, filing status, and schedule for these permits and approvals are summarized in Table 1.13-1.

1.14 Status of Field Surveys

NEXUS has completed required wetlands and waterbody field surveys on approximately 90 percent of the proposed pipeline route and cultural resource surveys have been completed on approximately 89 percent of the proposed route. In addition, all four of the proposed compressor station sites have been field surveyed for cultural and biological resources. NEXUS will also continue to engage federal and state resource agencies to identify known locations of federal- or state-listed threatened or endangered species and species of special concern that could potentially be affected by construction or operation of the Project. A summary of the field survey status is presented below.

1.14.1 Biological Field Surveys

NEXUS is conducting wetland and waterbody field surveys within a 300-foot-wide survey corridor centered on the proposed pipeline centerline, along access roads, and within properties where aboveground facilities are proposed outside of the pipeline survey corridor. Approximately 90 percent of the total Project route has been surveyed for wetland and waterbodies. Results of the wetland and waterbody surveys for the NEXUS Project are provided in Resource Report 2. Currently, NEXUS is performing geotechnical investigations and is evaluating the engineering feasibility of implementing the HDD crossing method (*see* Table 1.7-1) for a number of the large waterbody crossings along the route, as described further in Resource Report 2, Section 2.3.

NEXUS has consulted with the USFWS, the Ohio Department of Natural Resources, the Michigan Department of Natural Resources and the Michigan Natural Features Inventory regarding potential rare species in the Project area and requested information on known federal or state species records within a one-mile wide corridor of the Project pipeline route (*see* Resource Report 1 Appendix 1C2). NEXUS evaluated the potential occurrence of protected species and their locations relative to the pipeline route. Further evaluation of habitat information collected from field surveys in the fall of 2014 and the spring of 2015 as well as publically available information was performed to determine the need for on-site species specific surveys. NEXUS has developed several proposed species survey protocols and is currently consulting with the USFWS, the Michigan Department of Natural Resources, and the Ohio Department of Natural Resources regarding proposed species-specific surveys. Surveys for several species were conducted through the summer and ended in the early fall for the 2015 field season. More detail regarding these survey protocols and field efforts are provided in Resource Report 3, Section 3.5.

1.14.2 Cultural Field Surveys

Preliminary cultural resources background research and literature file reviews were performed at the Ohio and Michigan State Historic Preservation Offices during the summer and fall of 2014, and approximately 227.1 miles (89 percent) of identification-level field investigations have been completed for the NEXUS Project.

Field surveys for archaeological resources have been completed within a 300-foot-wide study corridor along approximately 89 percent of the proposed pipeline route. Survey investigations have also been completed for the proposed compressor station sites, compressor station alternative sites, MLV stations, as well as available staging areas and access roads.

The architectural survey has been completed for all of the Ohio and Michigan segments of the proposed pipeline route, as well as for the proposed aboveground facilities and available access roads. Results of the cultural resource surveys for the NEXUS Project are provided in Resource Report 4.

1.15 Non-Jurisdictional Facilities

Non-jurisdictional facilities are those facilities related to the Project that are constructed, owned, and operated by others that are not subject to FERC jurisdiction. Non-jurisdictional facilities associated with the Project include the proposed construction and operation of new compressor units at two existing DTE Gas compressor station facilities in Michigan, as well as short connections to distribution lines to secure power to serve compressor stations, M&R stations and mainline valves proposed for the NEXUS Project. In addition, we note that Vector U.S. anticipates modifying the existing Milford Meter Station located in Oakland County Michigan, to receive natural gas. While these modifications to the Milford Meter Station and the construction of 0.6 mile of 30-inch pipeline are FERC jurisdictional, we understand that Vector U.S. will proceed under its existing blanket authorization from the FERC and that only limited environmental review is required.

1.15.1 DTE Gas Non-Jurisdictional Facilities

In order to support the NEXUS Project, DTE Gas proposes to modify existing facilities including the Willow Gate Station and Willow Run Compressor Station located in Ypsilanti Township, Washtenaw County, Michigan; and the Milford Compressor Station located in Milford Township, Oakland County, Michigan. See Figure 1.15-1 in the Figures Section for a USGS topographic map excerpt showing the DTE Gas Willow Run Gate Station, the Willow Run Compressor Station, and the Milford Compressor

Station. Figure 1.15-2 depicts proposed modifications to the Willow Run Gate Station and the Willow Run Compressor Station, and Figure 1.15-3 depicts the proposed modifications to DTE's existing Milford Compressor Station. Descriptions of proposed modifications at each facility are summarized below:

Existing Willow Gate Station Modifications

Modifications to the Willow Gate Station will be constructed entirely within property currently owned by DTE Gas and will 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.
- Three (3) new 10- MMBTU/hr (million British Thermal Units /hour) water bath line heaters to replace two (2) existing heaters.

Existing Willow Run Compressor Station Modifications

Modifications to the Willow Run Compressor Station will be constructed entirely within property currently owned by DTE Gas and will include:

- Addition of up to 17,700-hp of new gas compression including associated compressor buildings
- Miscellaneous station/unit piping.
- Approximately 2,500 linear feet of 30-inch station discharge piping to Willow Gate Station.

Existing Milford Compressor Station Modifications

Modifications to the Milford Compressor Station will be constructed entirely within property currently owned by DTE Gas and will include:

- Addition of up to 45,000 hp of new gas compression including associated compressor buildings
- Miscellaneous station/unit piping.
- Approximately 2,000 linear feet of 36-inch suction/discharge header piping to existing DTE Gas Company transmission pipeline(s) valve nest.

Construction Schedules for DTE Gas Facilities Modifications

- Willow Gate Station

  Due to the critical nature of the Willow Gate Station to support the DTE Gas distribution system, modifications to the Willow Gate Station will be performed in two phases to meet NEXUS' proposed in-service date:

  - Phase-1 Summer of 2016 – installation of water bath line heaters, relocation of storage tank and tie-in to existing DTE Gas transmission pipelines in preparation for NEXUS facilities construction in 2017.
  - Phase-2 Summer of 2017 – installation of pipeline to interconnect WGS to WRCS and installation of NEXUS related pipeline and meter station. The Willow Gate Station interconnect to NEXUS will be available for service by November 1, 2017.

- Willow Run Compressor Station

  Construction of the modifications to the Willow Run Compressor Station are planned to begin in the fall of 2016 with the completion of the facilities modifications and availability for service planned for November 1, 2017.

- Milford Compressor Station

  Construction is planned to begin in the fall of 2016 and the proposed facilities available for service by November 1, 2017.

DTE Gas Non-Jurisdictional Facility Regulatory Permitting Status

Table 1.15-1 and Table 1.15-2 provide a summary of the regulatory permits, approvals, and authorizations required for the proposed modifications to DTE Gas existing facilities.

1.15.2 Vector U.S. Ancillary Facilities

In order to support the NEXUS Project, Vector U.S. has advised NEXUS that it intends to modify the existing Milford Meter Station located in Oakland County, Michigan, to receive natural gas. Vector U.S. has advised NEXUS that the modification involves removing an existing 30-inch ultrasonic meter and replacing it with two 20-inch ultrasonic, bi-directional meters and adding various yard piping and valves. NEXUS also understands from Vector U.S. that it will construct approximately 0.6 miles of 30-inch pipeline to enable gas originating from NEXUS to move to the suction side of Vector U.S.'s existing Highland compressor station (*see* Figure 1.15-3 as provided by Vector U.S.).

Regulatory Permitting Status for Vector U.S. Facilities

Environmental surveys will be completed for the proposed modifications at the Milford Meter Station to support environmental permits and demonstrate authorizations and compliance under Vector U.S.'s Blanket Certificate. The following summarizes environmental surveys performed to support construction of Vector's proposed facilities:

- Presence/absence surveys for protected tree roosting bats and/or any other required habitat or species surveys in compliance with the U.S. Endangered Species Act were completed with no captures of endangered bat species during mist net surveys. The final report documenting these surveys is on file with the USFWS.
- Phase I Cultural Resources Surveys, as required by Section 106 of the National Historic Preservation Act, were completed in June 2015 with no archeological or sensitive cultural resources identified within the area of potential effect. A copy of the Phase I Cultural Resources Survey Report was submitted to the Michigan State Historic Preservation Office in July 2015.
- Wetland and stream delineations were performed in June 2015 and results will be used to support preparation of the Joint Permit Application pursuant to Section 401/404 of the Clean Water Act.
- Erosion and Sediment control along with permanent storm water control design to comply with various federal and state regulations.

Vector U.S. has advised NEXUS that it will perform this work under its blanket Certificate, which was issued by the Commission in Docket No. CP98-135-000 on May 27, 1999, using the automatic authorization permitted by CFR §157.203(b). NEXUS understands that Vector U.S. will provide notice of such work after construction is complete and the facilities are placed in-service as part of its Annual Subpart F Blanket Report to FERC.

1.15.3 NEXUS Customer Ancillary Facilities

NEXUS is in various stages of discussions and negotiations with potential customers in Ohio such as power generators, local distribution companies and industrial parks. Figure 1.2-1 shows both NEXUS market connections with signed agreements in Ohio and other key market areas in Ohio that would be served by the NEXUS Project. Each Prospective Market Area identified in Figure 1.2-1 includes multiple market sectors (i.e., power generators, local distribution companies, and/or industrial parks.) NEXUS is designed to meet the diverse natural gas delivery requirements of each of these market areas. These include: Dominion East Ohio in Columbiana, Erie and Wayne Counties, Ohio; Columbia Gas of Ohio, Inc., in Sandusky and Medina Counties, Ohio; NRG Power Midwest, LP in Lorain County, Ohio; Brickyard and Rittman Industrial Parks in Medina County, Ohio; Board of Commissioners of Erie County Industrial Park in Erie County, Ohio; and The Waterville Gas & Oil Company and Ohio Gas Company in Wood County, Ohio.

The nature of the facilities to which NEXUS will eventually tie-in to are continually evolving as they are hinged on these discuss and negotiations. Although there are minimal, if any, non-jurisdictional facilities perceived, it is inherently difficult to strictly define these at this time.

1.15.4 Four Factor Test for Jurisdictional Determinations

In order to determine whether non-jurisdictional components or facilities associated with a proposed project require environmental review by FERC, a four factor test is applied using the criteria specified in 18 CFR. §380.12(c)(2)(ii).[6] In short, these criteria are intended to determine whether there is sufficient federal control and responsibility over the subject component or facility as a whole to warrant environmental analysis. These factors to be considered include:

i. Whether the regulated activity comprises “merely a link” in a corridor type project, e.g., a transportation or utility transmission project;

ii. Whether there are aspects of the non-jurisdictional facility in the immediate vicinity of the regulated activity that affect the location and configuration of the regulated activity;

iii. The extent to which the entire project would be within FERC’s jurisdiction; and

iv. The extent of cumulative federal control and responsibility.

NEXUS has evaluated the four factors to be considered by the FERC to determine whether an environmental analysis of the non-jurisdictional facilities by FERC is warranted. NEXUS has concluded that the proposed construction and operation of the new compressor units at two existing DTE Gas compressor station facilities in Michigan should not be included as part of the FERC’s environmental analysis solely on the basis of the four factor test. The regulated activity is merely a link in a corridor type project, and the new compressors do not determine the location and configuration of the NEXUS facilities, are not within FERC’s jurisdiction, and have no other federal control and responsibility to warrant federal review of an otherwise private action.

NEXUS has also concluded that the remaining non-jurisdictional facilities, namely the electrical connections for the compressor stations, M&R stations and mainline valves, while related to the Project, do not warrant FERC review because: (i) mere links in corridor-type projects (as in this case) do not justify review of non-jurisdictional facilities; (ii) the non-jurisdictional facilities in the immediate vicinity of the Project facilities did not affect the configuration and location of the Project; (iii) the non-jurisdictional electric distribution facilities are regulated by the Public Utility Commission of Ohio and MPSC and are not regulated by the FERC; and (iv) the non-jurisdictional facilities will not be federally controlled or regulated, nor are any federal permits required for construction of those facilities.

Given the geographic proximity between the NEXUS Project and the non-jurisdictional facilities (specifically, the expanded DTE Gas compression stations and the electrical connections for M&R stations and mainline valves), these non-jurisdictional facilities may be considered for potential cumulative impacts with the NEXUS Project as a whole.

1.16 Cumulative Impacts

Cumulative impacts may result when the environmental effects associated with a proposed project are added to temporary (construction-related) or permanent (operation-related) impacts associated with other past, present, or reasonably foreseeable future projects. Although the individual impact of each separate project may not be significant, the additive or synergistic effects of multiple projects could be significant. Further, impacts which are not causally-related to the Project nor which are not reasonably foreseeable do not warrant review under NEPA.

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6 See also Revisions to Regulations Governing Authorizations for Construction of Natural Gas Pipeline Facilities, 56 Fed. Reg. 52,330, 52,344 (Oct. 18, 1991).

In consideration of the potential for cumulative impacts, NEXUS has analyzed past, present and potential future projects that could reasonably be expected to impact regional resources that share Areas of Impact ("AOI") with the NEXUS Project (see Table 1.16-1). To identify such projects, NEXUS reviewed its Project alignment sheets, topographic maps and publically available data in conjunction with field reconnaissance and internet research and review of existing GIS data. Projects included in this cumulative impact analysis are those located within the same municipalities directly affected by construction of the Project. Table 1.16-1 lists the projects that NEXUS has considered in connection with potential cumulative impacts to resources that would be affected by the construction and operation of the NEXUS Project.

The resource Area of Impact ("AOI") used in these cumulative impact analyses were identified by the FERC in its March 24, 2015, comments on NEXUS' January 2015 pre-filing submittal of Resource Report 1 and are summarized below:

Environmental Resource	Area of Impact (AOI)
Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology	Hydrologic Unit Code 12 Watersheds
Cultural	Overlapping impacts on historic properties
Land Use (including visual and residential)	0.5 mile. For other projects requiring more than 10 acres of land, use 5 miles
Noise	Overlapping noise-sensitive areas (0.5-mile)
Air Quality	County (pipeline and stationary sources). For stationary sources near a county border the AOI is a 50-kilometer radius from the source.
Socioeconomics	Impacted counties

Notice that resource AOI differ based on the type of resource potentially impacted. These include use of Hydrologic Unit Code 12 Watersheds (HUC 12 Watersheds) for surface waters, wetlands, groundwater, vegetation, wildlife, fisheries, protected species, migratory birds, soils and geology; projects with overlapping impacts on historic properties; 0.5 mile for land use (including visual and residential); 5 miles for Projects having greater than 10 acres of land use alteration; 0.5 mile for overlapping noise sensitive areas; counties for socioeconomics and air quality impacts (pipeline and stationary sources); and a 50-kilometer radius from stationary sources near county borders.

1.16.1 Water Resources and Wetlands

Construction of the Project facilities will result in temporary impacts to water resources and wetlands. Each proponent for the projects listed in Table 1.16-1 will be required by the terms and conditions of their respective Clean Water Act Section 404 dredge/fill permits and Section 401 Water Quality Certification requirements to avoid and minimize potential wetland and waterbody impacts to the extent practicable and to provide compensatory mitigation for unavoidable impacts to waters of the U.S. The construction and operation of the NEXUS Project, along with the other potential projects, could result in a cumulative reduction in the amount and/or type of wetland within the respective municipalities and watersheds. NEXUS will work with regulatory agencies to identify appropriate mitigation should compensation for unavoidable impacts be deemed appropriate. In addition, NEXUS is proposing to utilize HDD crossing methods to avoid impacts to stream segments that have exceptional water quality, special ecological significance, or recreational value, including all of the Nationwide River Inventory-designated stream crossings and navigable waters crossed by the Project. Potential impacts to wetlands and waterbodies resulting from construction and operations of the proposed NEXUS Project are covered in detail in Resource Report 2.

1.16.2 Vegetation and Wildlife

When projects are constructed at or near the same time, the combination of construction activities could have a cumulative impact on vegetation and wildlife in the immediate area. Clearing and grading and other construction activities associated with the projects will result in the removal of vegetation, alteration of wildlife habitat, displacement of wildlife, and other secondary effects such as forest fragmentation and potential introduction of exotic invasive plant species.

It is expected that each project's permit conditions in addition to implementation of the FERC Plan and the FERC Procedures will require mitigation measures that will be implemented to minimize the potential for erosion, facilitate re-vegetation of disturbed areas, support stabilization of site conditions, and control the spread of invasive species, and therefore minimize the degree and duration of the cumulative impact on vegetation and terrestrial wildlife from these projects. Potential impacts to vegetation and wildlife resulting from construction and operations of the NEXUS Project are covered in detail in Resource Report 3.

1.16.3 Cultural Resources

Past disturbances to cultural resources in the Project area are typically related to accidental disturbances, intentional destruction or vandalism, lack of awareness of the historic value, and construction and maintenance operations associated with existing roads, railroads, utility lines, and electrical transmission line ROWs.

Federally regulated projects will include extensive research to identify cultural resources of potential historical significance in the vicinity of the projects, as well as mitigation measures designed to avoid or minimize additional direct impacts on these cultural resources. Typically these efforts are also coordinated with state historic preservation offices in Ohio and Michigan. Non-federal actions will need to comply with the procedures and mitigation measures required by the States of Ohio and Michigan. NEXUS is conducting a detailed review for cultural resources in the area of potential effect around the Project and has developed Project-specific plans to address unanticipated discoveries of cultural resources and human remains in the event they are discovered during construction. Potential impacts to cultural resources resulting from construction and operations of the proposed NEXUS Project are covered in detail in Resource Report 4.

1.16.4 Socioeconomics

The NEXUS Project and the projects listed in Table 1.16-1 will generate temporary construction jobs. The local supply of construction workers needed for these projects may be derived from workers employed in the area, which will provide a direct economic benefit to those individuals and the communities in which they reside. The non-local laborers could represent an increase in the percent of the total population in the Project area (assuming half the construction workers are non-local); however, the existing local infrastructure and housing availability in the Project area is expected to be sufficient to provide for the needs of non-local workers.

There will be positive cumulative economic benefits from these projects. For example, once completed, the projects to build or improve highways, roads and bridges will improve access necessary for commerce in the area. Taxes generated from such commerce and from operation of revenue-generating projects will result in an annual tax revenue increase. Permanent employment will also increase to support the operation of these projects, with the cumulative benefit of potentially lowering local unemployment rates. The anticipated sociologic effects of the proposed NEXUS Project area are covered in detail in Resource Report 5.

1.16.5 Geology, Soils and Sediments

The facilities associated with the Project are expected to have a direct but temporary impact on near-surface geology, soils, and sediments. Clearing and grading associated with construction of the NEXUS Project and the other projects listed in Table 1.16-1 and shown in Figure 1.16-1 could, without adequate protection, accelerate the soil erosion process and, without adequate protection, could result in discharge of sediment to adjacent waterbodies and wetlands. Because the direct effects will be localized and limited primarily to the period of construction, cumulative impacts on geology, soils, and sediments will only occur if other projects are constructed at the same time and place as the proposed NEXUS Project facilities. The construction schedules of some of the projects listed in Table 1.16-1 coincide with the schedule proposed for the NEXUS Project. NEXUS will implement the provisions of the FERC Plan and the Project E&SCP to establish a baseline for minimizing the potential for erosion as a result of water or wind action and to aid in reestablishing vegetation after construction. In addition, disturbance associated with construction activities will be minimized and mitigated through the application of Best Management Practices that are incorporated in the Project E&SCP. Should hazardous materials or contaminated soils and/or sediments be encountered during construction, they will be disposed of at fully licensed and permitted disposal facilities in accordance with applicable state and federal laws and regulations. As a result, the cumulative effects on geological resources, soils, and sediments are expected to be temporary and minor.

1.16.6 Land Use

The Project and several other projects listed in Table 1.16-1 will result in both temporary and permanent changes to current land uses. The current NEXUS pipeline route is co-located with existing utility rights of way for approximately 45 percent of the proposed route, with an additional 42 percent of the route, (that is not co-located with existing utilities) crossing agricultural land uses, resulting in a total of 87 percent of the proposed pipeline route sited to avoid conversion of existing land uses.

New permanent effects on land use will be relatively minor because only 27 percent of the total area disturbed during construction will remain in permanent easements during operations. Approximately 73 percent of the land temporarily affected during construction of the Project will be allowed to revert to prior land uses following construction.

Following construction, the 73 percent of land temporarily affected by construction activities will be restored, as near as possible, to pre-construction contours and revegetated in accordance with the FERC Plan and the FERC Procedures. Forested areas affected within the temporary construction workspace will be allowed to revert to forest habitats following construction. Most land uses, except forest habitat located over the permanent easement, will be allowed to revert to pre-construction uses following construction. NEXUS will maintain the area over the pipeline and within the permanent easement in herbaceous cover types to facilitate monitoring of the pipeline ROW as part of the integrity management program further described in Resource Report 11. In most locations, agricultural activities may resume within the permanent ROW following construction, however, some restrictions would apply such as prohibitions on constructing aboveground structures. Details regarding potential impacts to land use resulting from construction and operations of the proposed NEXUS Project are summarized in Resource Report 8.

1.16.7 Air Quality

Construction equipment and vehicles emit air pollutants in the immediate vicinity of construction, and fugitive dust emissions are generated by soil excavation and other construction activities. The cumulative impact on air quality from construction of the Project and projects listed in Table 1.16-1 will depend on the type of construction activities that are taking place at the same time and how close in proximity the construction activities are occurring. Construction of some of these projects is either i) already complete, ii) will occur in phases over many years (such as the highway projects) which reduces their impact at a given location during a given time period, or iii) will occur at varying distances from the Project such that construction of many of the other projects will result in a minimal, if any, cumulative impact with Project construction activities. Dust generated by the Project will be controlled by watering down the construction workspace or application of other dust control agents at regular intervals. Because construction activities for the Project, along with the other projects, will be localized, temporary and of short duration in a particular area, the cumulative effect of construction activities is not expected to result in significant adverse air quality impacts.

Operation of the projects listed in Table 1.16-1 will have air emissions associated with them; however, the other sources of air emissions from operation of these recent or planned projects are or will be controlled in accordance with state and federal air pollution laws and regulations. As described in Resource Report 9, the air emissions resulting from operation of proposed compressor stations will be subject to the limitations imposed by air emissions permits issued under state and federal laws and regulations. These limitations take into consideration ambient air quality, to prevent significant impact to or deterioration of air quality in the region. As a result, long term, permanent degradation of air quality from operation of the Project in conjunction with the other projects listed in Table 1.16-1 is not expected. To the extent that the new clean-burning natural gas supply provided by the Project is used to replace the burning of coal or other fossil fuels, the Project may result in an overall improvement in regional air quality. The additional natural gas brought to the region will assist utilities and industry in Ohio and Michigan and the Midwestern U.S. to utilize this clean fuel for continued or increasing use at existing natural gas-fired facilities and for fuel switching at existing facilities, which would minimize air emissions and support compliance with applicable emission-limiting standards. The use of natural gas results in lower emission rates of greenhouse gases and criteria air pollutants than all other fossil fuels (standardized to emissions per unit of energy consumed).

1.16.8 Noise Quality

Construction activities also have the potential to produce an increase in noise levels. Cumulative impacts from construction noise from the Project and the other projects listed in Table 1.16-1 depends on the type of construction activities that are taking place at the same time and how close in proximity the construction activities are occurring. Because the noise generated by construction activities will be temporary and localized, construction activities for the Project along with the other projects are not expected to result in significant adverse noise impacts.

The design of proposed compressor stations will include noise abatement measures, as applicable, to make sure that off-site impact of the noise generated by operation of the compressor station is in compliance with applicable noise standards, including the FERC sound level limits.

1.16.9 Climate Change

Climate change is the change in global climate over time. Natural variability and human activity can both contribute to climate change. The Intergovernmental Panel on Climate Change is a leading international scientific body charged by the United Nations with assessing the most recent scientific, technical and socio-economic information concerning climate change. The U.S. Global Change Research Program ("USGCRP") is a leading organization charged by the United States Congress with coordinating research in the United States concerning climate change. Both the Intergovernmental Panel on Climate Change and the USGCRP have recognized that greenhouse gases ("GHGs") have been accumulating in the atmosphere since the beginning of the industrial era (circa 1750) and that the combustion of fossil fuels contributes to this accumulation along with other factors.

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. For the Northeast U.S. region, the USGCRP's report notes past and projected increases in average temperature, precipitation, extreme precipitation events (and associated crop damage), sea level, and severe flooding; increases in the number of days that certain areas fail to meet the federal air quality standards; and increases in health risks and costs associated with projected additional heat stress, poor air quality, and exposure to vector-borne diseases (e.g. Lyme disease or West Nile).

The GHG emissions resulting from the construction and operation of the NEXUS Project are discussed in Resource Report 9. Emissions of GHGs from the Project are not expected to have any direct impacts on the environment in the Project area. Currently, there is no standard methodology to determine how the Project's relatively small incremental contribution to GHGs would translate into physical effects on the global environment. The GHG emissions from the construction and operation of the Project would be negligible compared to the global GHG emission inventory. Moreover, burning natural gas contributes less GHG emissions than the combustion of other fuel sources such as fuel oil or coal. By increasing the natural gas available in the market areas served by NEXUS, the Project is expected to contribute to the displacement of other fuels whose combustion contributes more GHGs to the environment.

1.16.10 Conclusion

The majority of cumulative impacts would be temporary and minor when considered in combination with past, present, and potential future activities. However, some long-term cumulative impacts would occur on wetland and upland vegetation and associated wildlife habitats. Some long-term cumulative benefits to the community would be realized from the increased tax revenues and regional conversion of coal fired power plants to natural gas. Short-term cumulative benefits would also be realized through jobs and wages and purchases of goods and materials.

1.17 References

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TABLES

TABLE 1.1-1

NEXUS Project Proposed Pipeline Facilities

State/Facility/County	Pipe Diameter (inches)	Milepost Begin a/	Milepost End a/	Length (miles) b/	Municipalities and Unincorporated Communities Crossed (miles) c/ d/
OHIO					
Mainline					
Columbiana	36	0	12.5	12.5	Hanover Township, 4.1
					West Township, 5.9
					Homeworth CDP, 0.5
					Knox Township, 2.0
Stark	36	12.5	34.2	21.7	Washington Township, 7.1
					Nimishillen Township, 2.1
					Marlboro Township, 5.3
					Lake Township, 6.0
					Greentown CDP, 1.2
Summit	36	34.2	50.4	16.2	City of Green, 7.9
					City of New Franklin, 8.3
Wayne	36	50.4	56.6	6.2	Chippewa Township, 5.2
					Village of Doylestown, 1.0
Medina	36	56.6	57.3	0.7	Wadsworth Township, 0.7
Wayne	36	57.3	57.7	0.4	City of Rittman, 0.4
Medina	36	57.7	80.5	22.8	Wadsworth Township, 2.0
					Guilford Township, 6.2
					Montville Township, 1.6
					Lafayette Township, 6.2
					York Township, 5.4
					Litchfield Township, 1.4
Lorain	36	80.5	101.3	20.8	Grafton Township, 6.0
					LaGrange Township, 5.3
					Pittsfield Township, 3.4
					City of Oberlin, 0.6
					New Russia Township, 1.5
					Camden Township, 4.0
Huron	36	101.3	104.7	3.4	Wakeman Township, 3.4

TABLE 1.1-1

NEXUS Project Proposed Pipeline Facilities

State/Facility/County	Pipe Diameter (inches)	Milepost Begin a/	Milepost End a/	Length (miles) b/	Municipalities and Unincorporated Communities Crossed (miles) c/ d/
Erie	36	104.7	131.5	26.8	Florence Township, 2.8
					Village of Berlin Heights, 0.7
					Berlin Township, 6.8
					Milan Township, 5.4
					Oxford Township, 5.5
					Groton Township, 5.6
Sandusky	36	131.5	163.7	32.2	Townsend Township, 5.9
					Riley Township, 6.5
					Sandusky Township, 6.1
					Rice Township, 0.7
					Washington Township, 5.3
					Hessville CDP, 1.1
					Woodville Township, 6.6
Wood	36	163.7	181.4	17.7	Troy Township, 6.7
					Webster Township, 3.0
					Middleton Township, 7.7
					Village of Haskins, 0.3
Lucas	36	181.4	189.3	7.9	Village of Waterville, 0.6
					Waterville Township, 4.3
					Providence Township, 3.0
Henry	36	189.3	190.2	0.9	Washington Township 0.9
Fulton	36	190.2	208.3	18.1	Swan Creek Township, 8.1
					Fulton Township, 5.5
					Amboy Township, 4.0
					Village of Metamora, 0.5
			Ohio Pipeline Facilities Subtotal:	**208.3**	
Michigan					
Mainline					
Lenawee	36	208.3	230.4	22.1	Ogden Township, 6.9
					Palmyra Township, 4.4

TABLE 1.1-1

NEXUS Project Proposed Pipeline Facilities

State/Facility/County	Pipe Diameter (inches)	Milepost Begin a/	Milepost End a/	Length (miles) b/	Municipalities and Unincorporated Communities Crossed (miles) c/ d/
					Blissfield Township, 3.5
					Deerfield Township, 1.3
					Ridgeway Township, 5.7
					Macon Township, 0.3
Monroe	36	230.4	236.9	6.5	Milan Township, 6.3
					City of Milan, 0.2
Washtenaw	36	236.9	254.5	17.6	York Township, 4.6
					Augusta Township, 6.0
					Ypsilanti Township, 7.0
Wayne	36	254.5	255.1	0.6	Van Buren Township, 0.6
Washtenaw	36	255.1	255.2	0.1	Ypsilanti Township, 0.1
		Michigan Pipeline Facilities Subtotal:		***46.9***	
		NEXUS MAINLINE PIPELINE TOTAL:		**255.2**	
Ohio					
TGP Interconnecting Pipeline					
Columbiana	36	TGP 0.0	TGP 0.9	0.9	Franklin Township, 0.1
					Hanover Township, 0.8
		TGP Interconnecting Pipeline Total:		***0.9***	

a/ Approximate milepost along the pipeline rounded to the nearest tenth mile.
b/ Crossing length within county.
c/ Crossing length within municipality or Census Designated Place (CDP).
d/ Census Designated Place is a concentration of population identified by the United States Census Bureau for statistical purposes. CDPs are delineated for each decennial census as the statistical counterparts of incorporated places, such as cities, towns, and villages.

TABLE 1.1-2

NEXUS Project Proposed Aboveground Facilities

Facility Name	NEMA Rated Horsepower a/	Milepost b/	Location
Ohio and Michigan			
New Compressor Stations			
Compressor Station 1 - Hanoverton	52,000	1.4	Hanover Township, Columbiana County, Ohio
Compressor Station 2 - Wadsworth	26,000	63.5	Guilford Township, Medina County, Ohio
Compressor Station 3 - Clyde	26,000	134.0	Townsend Township, Sandusky County, Ohio
Compressor Station 4 - Waterville	26,000	183.5	Waterville Township, Lucas County, Ohio
Total New Horsepower:	***130,000***		
New M&R Stations			
MR01	-	(TGP) 0.0	Franklin Township, Columbiana County, Ohio
MR02	-	0.0	Hanover Township, Columbiana County, Ohio
MR03	-	(TGP) 0.9	Hanover Township, Columbiana County, Ohio
MR04	-	255.2	Ypsilanti Township, Washtenaw County, Michigan
MR05	-	128.8	Groton Township, Erie County, Ohio
Over-pressure Regulation Installation (Mainline Valve Stations)			
MLV-1	-	16.8	Washington Township, Stark County, Ohio
MLV-2	-	32.6	Greentown CDP, Stark County, Ohio
MLV-3	-	39.8	Green City, Summit County, Ohio
MLV-4	-	50.4	Chippewa Township, Wayne County, Ohio
MLV-5	-	58.0	Wadsworth Township, Medina County, Ohio
MLV-6	-	71.9	La Fayette Township, Medina County, Ohio
MLV-7	-	89.3	La Grange Township, Lorain County, Ohio
MLV-8	-	96.7	Pittsfield Township, Lorain County, Ohio
MLV-9	-	116.3	Milan Township, Erie County, Ohio
MLV-10	-	124.8	Oxford Township, Erie County, Ohio
MLV-11	-	148.2	Sandusky Township, Sandusky County, Ohio
MLV-12	-	157.1	Washington Township, Sandusky County, Ohio
MLV-13	-	167.8	Troy Township, Wood County, Ohio
MLV-14	-	190.5	Swan Creek Township, Fulton County, Ohio
MLV-15	-	208.9	Ogden Township, Lenawee County, Michigan
MLV-16	-	228.3	Ridgeway Township, Lenawee County, Michigan
MLV-17	-	247.4	Augusta Township, Washtenaw County, Michigan

TABLE 1.1-2

NEXUS Project Proposed Aboveground Facilities

Facility Name	NEMA Rated Horsepower a/	Milepost b/	Location
Launcher/Receiver Stations			
Launcher at TGP Interconnection (MR01)	-	TGP 0.0	Franklin Township, Columbiana County, Ohio
Launcher at Kensington (MR02)	-	0.0	Hanover Township, Columbiana County, Ohio
Receiver at Texas Eastern M&R Station (MR03)	-	TGP 0.9	Hanover Township, Columbiana County, Ohio
Launcher/Receiver at Wadsworth (Compressor Station 2)	-	63.5	Guilford Township, Medina County, Ohio
Launcher/Receiver at Waterville (Compressor Station 4)	-	183.5	Waterville Township, Lucas County, Ohio
Receiver at DTE/Willow Run (MR04)	-	255.2	Ypsilanti Township, Washtenaw County, Michigan

a/ Horsepower information is not applicable to M&R, MLVs, or the launcher and receiver facilities. NEMA=National Electrical Manufacturers Association

b/ Approximate milepost along the pipeline rounded to the nearest tenth of a mile. Mileposts are presented for the mainline pipeline unless otherwise noted (TGP=TGP Interconnecting Pipeline).

TABLE 1.1-3

NEXUS Project Proposed Communications Towers

County, State	Location Description	Milepost	Structure	Height (feet) a/
Ohio				
Columbiana	Compressor Station 1 - Hanoverton	1.4	3-Sided Self-Supporting, Latticed Cross-Members	190
Medina	Compressor Station 2 - Wadsworth	63.5	3-Sided Self-Supporting, Latticed Cross-Members	140
Sandusky	Compressor Station 3 – Clyde	134.0	3-Sided Self-Supporting, Latticed Cross-Members	190
Lucas	Compressor Station 4 - Waterville	183.5	3-Sided Self-Supporting, Latticed Cross-Members	190
Michigan				
Lenawee	MLV-16	228.3	3-Sided Self-Supporting, Latticed Cross-Members	190

a/ The height listed is the maximum potential height.

TABLE 1.6-1

Land Requirements for NEXUS Pipeline Facilities

State/Facility Type/Facility	Construction Area (acres) a/	Operations Area (acres) b/
Ohio		
Pipeline Facilities		
Mainline		
Pipeline Right-of-Way	2,433.6	1,265.8
Additional Temporary Workspace	1073.4	0
Interconnecting Pipeline		
TGP Interconnecting Pipeline ROW	10.7	5.4
Additional Temporary Workspace	4.4	0
Aboveground Facilities		
Compressor Stations		
Compressor Station 1- Hanoverton	96.2	23.9
Compressor Station 2- Wadsworth	64.0	19.8
Compressor Station 3- Clyde	60.7	48.1
Compressor Station 4- Waterville	37.7	34.1
Meter Stations		
MR01	10.4	2
MR02 and MR03	10.4	4.3
MR05	8.8	1.9
Additional Aboveground Facilities		
Pipe and Contractor Yards	241.9	0
Staging Areas	39.0	0
Access Roads c/	55.3	1.8
Ohio Subtotal:	***4,146.5***	***1,407.1***
Michigan		
Pipeline Facility		
Mainline		
Pipeline Right-of-Way	557.6	285.3
Additional Temporary Workspace	266.0	0
Aboveground Facilities		
Meter Station		
MR04	1	0.7

TABLE 1.6-1

Land Requirements for NEXUS Pipeline Facilities

State/Facility Type/Facility	Construction Area (acres) a/	Operations Area (acres) b/
Additional Aboveground Facilities		
Ware Yards	62.0	0
Staging Areas	9.4	0
Access Roads	8.3	0.2
Michigan Subtotal:	***904.3***	***286.2***
PROJECT TOTALS:	**5,050.8**	**1,693.3**

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

a/ Construction Area includes all areas required for construction of the greenfield facilities including the permanent operational ROW and the temporary construction ROW. The construction ROW for the valve blowoff facilities and the cathodic protection anode beds are included within the construction ROW for the pipeline.

b/ Operations Area includes only the new permanent easement or ROW. Operation Areas include the new permanent ROW for pipeline and aboveground facilities, including all areas inside perimeter fencing or where vegetation is maintained. However; small aboveground facilities located within the operational ROW of the pipeline or within the operational ROW for the compressor station or M&R station footprint, and do not contribute additional operational acreage, are calculated as having 0 acres of impact to avoid double counting of total operational area added for the project. The operational ROW for the valve blowoff facilities and the cathodic protection anode beds are included within the operational ROW for the pipeline.

c/ The acreage for the portion of access roads that will be within operational ROW for either the pipeline or other facilities is not included within the totals presented in this table to avoid double counting.

TABLE 1.6-2

Land Requirements for NEXUS Aboveground Facilities

State/Facility Type/Facility	Milepost a/	Parcel Size (acres)	Approximate Site Dimensions b/		Construction Area (acres) c/	Operations Area (acres) d/
			Length (feet)	Width (feet)		
Ohio						
Compressor Stations						
Compressor Station 1 - Hanoverton	1.4	119.6	2,661	2,018	96.2	23.9
Compressor Station 2 - Wadsworth	63.5	76.5	2,483	1,332	64.0	19.8
Compressor Station 3 - Clyde	134.0	59.2	2,029	1,321	60.7	48.1
Compressor Station 4 - Waterville	183.5	49.6	1,638	1,310	37.7	34.1
M&R Stations						
MR01	TGP 0.0	35.3	300	300	10.4	2
MR02 and MR03	0.0/TGP 0.9	117.2	400	465	10.4	4.3
MR05	128.8	19	310	280	8.8	1.9
			Ohio Subtotal:		***288.2***	***134.1***
Michigan						
M&R Station						
MR04	255.2	3.7	243	163	1.0	0.7
			Michigan Subtotal:		***1.0***	***0.7***
			PROJECT TOTALS		***289.2***	***134.8***

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

a/ Approximate milepost along the pipeline rounded to the nearest tenth of a mile. Mileposts are presented for the mainline pipeline unless otherwise denoted (TGP= Interconnecting Pipeline to TGP).

b/ Site dimensions refers to the total area owned by the applicant at aboveground facility sites which may not be the total area used for construction or operations. For irregular shaped sites the longest width and length are provided.

c/ All areas required for construction of the facilities including the area used for operations and the temporary construction workspace.

d/ Land Affected During Operation includes only the new permanent area used for operation of the compressor stations. Operation Areas includes all areas inside perimeter fencing or where vegetation is maintained. However, smaller aboveground MLVs located within the operational permanent ROW of the pipeline and do not contribute additional operational acreage, are calculated as having 0 acres of impact to avoid double counting of total operational area added for the Project.

TABLE 1.6-3

Temporary and Permanent Access Roads along the NEXUS Project

State/Facility/ Road ID a/	Approx. MP of Intersect b/	Municipality, Township	Use (Permanent or Temporary)	Existing Surface c/	Approx. Length From Public Way to Project (feet) d/	Width (feet)	Proposed Improvements e/
Ohio							
Mainline							
TAR-0.3	0.3	Hanover	Temporary	Gr	1,194.4	25	G/S
TAR-2.6	2.6	Hanover	Temporary	Gr	655.1	25	G/S
TAR-3.7	3.7	Hanover	Temporary	Gr	230.4	25	G/S
TAR-4.3	4.3	West	Temporary	D/Gr	2,909.4	25	G/S
TAR-4.8	4.8	West	Temporary	Gr	128.7	25	G/S/W
TAR-7.3	7.3	West	Temporary	G	68.6	25	S
TAR-7.8	7.8	West	Temporary	Gr	523.1	25	G/S/W
TAR-8.2	8.2	West	Temporary	G/Gr	1,574.3	25	G/S/W
TAR-10.6	10.6	Knox	Temporary	D/Gr	545.0	25	G/S
TAR-13.5	13.5	Washington	Temporary	Gr	845.2	25	G/S
TAR-15.4	15.4	Washington	Temporary	D/G/Gr	2,666.9	25	G/S/W
TAR-18.6	18.6	Washington	Temporary	Gr	1,362.0	25	G/S
TAR-20.4	20.4	Nimishillen	Temporary	Gr	1,373.2	25	G/S
TAR-29.1	29.1	Lake	Temporary	G/Gr	1,594.0	25	G/S/W
TAR-33.5	33.5	Lake	Temporary	D	60.8	25	G/S/W
TAR-35.6	35.6	Green	Temporary	G/Gr	2,607.2	25	G/S
TAR-40.8	40.8	Green	Temporary	G/Gr	1,113.6	25	G/S/W
TAR-44.3	44.3	New Franklin	Temporary	G/Gr	150.1	25	G/S/W
TAR-47.4	47.4	New Franklin	Temporary	Gr	729.2	25	G/S/W
TAR-48.5	48.5	New Franklin	Temporary	G/Gr	2,235.1	25	G/S
TAR-52.6	52.6	Chippewa	Temporary	G	1,683.0	25	S/W
TAR-53.5	53.5	Doylestown	Temporary	C/G	421.7	25	S
TAR-53.6	53.6	Doylestown	Temporary	Gr	443.6	25	G/S/W
TAR-56.2	56.2	Chippewa	Temporary	Gr	837.2	25	G/S
TAR-57.2	57.2	Wadsworth	Temporary	Gr	207.2	25	G/S
TAR-57.5	57.5	Rittman	Temporary	Gr	233.9	25	G/S
TAR-63.1	63.1	Guilford	Temporary	D/Gr	1,963.4	25	G/S
TAR-63.8	63.8	Guilford	Temporary	G	540.8	25	G/S
TAR-64.9	64.9	Guilford	Temporary	Gr	1,044.6	25	G/S
TAR-66.4	66.4	Montville	Temporary	D/Gr	1,079.8	25	G/S
TAR-68.3	68.3	Lafayette	Temporary	Gr	669.5	25	G/S/W
TAR-68.6	68.6	Lafayette	Temporary	Gr	1,275.9	25	G/S
TAR-69.1	69.1	Lafayette	Temporary	G/Gr	1,307.2	25	G/S/W
TAR-69.5	69.5	Lafayette	Temporary	G	1,085.2	25	G/S
TAR-70.1	70.1	Lafayette	Temporary	C	2,249.9	25	P

TABLE 1.6-3

Temporary and Permanent Access Roads along the NEXUS Project

State/Facility/ Road ID a/	Approx. MP of Intersect b/	Municipality, Township	Use (Permanent or Temporary)	Existing Surface c/	Approx. Length From Public Way to Project (feet) d/	Width (feet)	Proposed Improvements e/
TAR-70.8a	70.8	Lafayette	Temporary	Gr	278.1	25	G/S
TAR-70.8b	70.8	Lafayette	Temporary	G	303.5	25	G/S
TAR-70.9	70.9	Lafayette	Temporary	Gr	492.3	25	G/S
TAR-72.8	72.8	Lafayette	Temporary	Gr	599.5	25	G/S
TAR-73.1	73.1	Lafayette	Temporary	G/Gr	1,520.6	25	G/S/W
TAR-73.6	73.6	Lafayette	Temporary	C	44.5	25	P
TAR 75.8	75.8	York	Temporary	C/G/Gr	1,907.7	25	G/S/W
TAR-76.1	76.1	York	Temporary	G	1,019.3	25	G/S/W
TAR-85.5	85.5	Grafton	Temporary	Gr	1,235.0	25	G/S
TAR-85.9a	85.9	Grafton	Temporary	Gr	51.4	25	G/S
TAR-85.9b	85.9	Grafton	Temporary	Gr	283.2	25	G/S
TAR-87.0	87.0	La Grange	Temporary	Gr	242.8	25	G/S
TAR-91.4	91.4	La Grange	Temporary	Gr	1,421.3	25	G/S/W
TAR-92.1	92.1	Pittsfield	Temporary	Gr	707.7	25	G/S
TAR-92.5	92.5	Pittsfield	Temporary	Gr	462.5	25	G/S
TAR-95.7	95.7	Oberlin	Temporary	G	2,058.5	25	S
TAR-110.2	110.2	Berlin	Temporary	A/Gr	1,156.1	25	P/G/S
TAR-111.6	111.6	Berlin Heights	Temporary	G	525.6	25	G/S/W
TAR-115.8	115.8	Milan	Temporary	G/Gr	3,806.3	25	G/S
TAR-115.9	115.9	Milan	Temporary	Gr	1,475.4	25	G/S
TAR-116.5	116.5	Milan	Temporary	G	686.9	25	G/S/W
TAR-116.8	116.8	Milan	Temporary	G	167.2	25	G/S/W
TAR-117.6	117.6	Milan	Temporary	D/Gr	485.2	25	G/S
TAR-117.8	117.8	Milan	Temporary	D	1,365.0	25	G/S
TAR-119.4	119.4	Milan	Temporary	C/G	305.1	25	P/S
TAR-119.8	119.8	Milan	Temporary	C/Gr	1,868.0	25	P/G/S
TAR-124.0	124.0	Oxford	Temporary	G	4,140.6	25	G/S
TAR-128.3	128.3	Groton	Temporary	Gr	385.0	25	G/S
TAR-128.8	128.8	Groton	Temporary	Gr	296.2	25	G/S
TAR-128.9	128.9	Groton	Temporary	Gr	823.6	25	G/S
TAR-132.7	132.7	Townsend	Temporary	Gr	1,379.0	25	G/S
TAR-133.3	133.3	Townsend	Temporary	G	45.1	25	G/S
TAR-138.7	138.7	Riley	Temporary	Gr	502.9	25	G/S
TAR-143.2	143.2	Riley	Temporary	Gr	183.5	25	G/S
TAR-143.3	143.3	Riley	Temporary	G	217.7	25	G/S
TAR-147.2	147.2	Sandusky	Temporary	Gr	1,155.9	25	G/S
TAR-147.7	147.7	Sandusky	Temporary	Gr	262.0	25	G/S
TAR-155.1	155.1	Washington	Temporary	Gr	214.9	25	G/S

TABLE 1.6-3

Temporary and Permanent Access Roads along the NEXUS Project

State/Facility/ Road ID a/	Approx. MP of Intersect b/	Municipality, Township	Use (Permanent or Temporary)	Existing Surface c/	Approx. Length From Public Way to Project (feet) d/	Width (feet)	Proposed Improvements e/
TAR-158.6	158.6	Woodville	Temporary	G	1,193.3	25	G/S
TAR-160.2	160.2	Woodville	Temporary	G	20.6	25	G/S
TAR-163.9	163.9	Troy	Temporary	G/D	1,065.9	25	G/S
TAR-165.5	165.5	Troy	Temporary	G/Gr	2,474.9	25	G/S
TAR-166.8	166.8	Troy	Temporary	G/Gr	3,184.9	25	G/S
TAR-171.2	171.2	Webster	Temporary	Gr	571.3	25	G/S
TAR-173.9	173.9	Middleton	Temporary	Gr	513.3	25	G/S
TAR-174.5	174.5	Middleton	Temporary	Gr	42.1	25	G/S
TAR-175.1	175.1	Middleton	Temporary	Gr	1,268.7	25	G/S
TAR-179.1a	179.1	Middleton	Temporary	Gr	646.5	25	G/S
TAR-179.1b	179.1	Middleton	Temporary	Gr	1,599.4	25	G/S
TAR-179.9	179.9	Middleton	Temporary	Gr	1,224.1	25	G/S
TAR-180.1	180.1	Haskins	Temporary	Gr	945.0	25	G/S
TAR-182.1	182.1	Waterville	Temporary	G/Gr	3,122.8	25	G/S
TAR-185.3	185.3	Waterville	Temporary	Gr	145.8	25	G/S
TAR-200.7	200.7	Fulton	Temporary	G/Gr	1,287.9	25	G/S
					90,990.5		
Compressor Stations							
Compressor Station 1 - Hanoverton							
PAR-1.4	1.4	Hanover	Permanent	Gr	103.6	20	P/S
					103.6		
Compressor Station 2 - Wadsworth							
PAR-63.4	63.40	Guilford	Permanent	Gr	2,055.2	20	P/S
					2,055.2		
Compressor Station 3 - Clyde **f/**							
N/A	134.0	Townsend	Permanent	Gr	* *34.0*	20	P/S
					**** 34.0***		
Compressor Station 4 - Waterville							
PAR-183.4	183.4	Waterville	Permanent	Gr	47.1	20	P/S
					47.1		
Main Line Valve Stations							
PAR-16.8	16.8	Washington	Permanent	Gr	* 177.8	15	S
PAR-32.6	32.6	Greentown	Permanent	Gr	285.9	15	S
PAR-39.8	39.8	Green	Permanent	Gr	* 103.7	15	S
PAR-50.5	50.5	Chippewa	Permanent	Gr	* 87.1	15	S
PAR-58.1	58.1	Wadsworth	Permanent	Gr	* 125.3	15	S
PAR-71.8	71.8	Lafayette	Permanent	G/Gr	294.5	15	S
PAR-89.2	89.2	La Grange	Permanent	Gr	* 152.7	15	S

TABLE 1.6-3

Temporary and Permanent Access Roads along the NEXUS Project

State/Facility/ Road ID a/	Approx. MP of Intersect b/	Municipality, Township	Use (Permanent or Temporary)	Existing Surface c/	Approx. Length From Public Way to Project (feet) d/	Width (feet)	Proposed Improvements e/
PAR-96.8	96.8	Pittsfield	Permanent	Gr	* 199.7	15	S
PAR-116.3	116.3	Milan	Permanent	Gr	* 350.3	15	S
PAR-124.8	124.8	Oxford	Permanent	Gr	* 190.3	15	S
PAR-148.2	148.2	Sandusky	Permanent	Gr	* 99.2	15	S
PAR-157.1	157.1	Washington	Permanent	Gr	* 190.1	15	S
PAR-167.8	167.8	Troy	Permanent	Gr	* 84.7	15	S
PAR-190.2	190.2	Swan Creek	Permanent	Gr	* 178.2	15	S
					2,519.5		
Cathodic Protection Sites							
PAR-34.0	34.0	Greentown	Permanent	Gr	24.9	15	S
					24.9		
M&R Stations							
MR01 at TGP Interconnection							
PAR-0.0a	TGP 0.0	Franklin	Permanent	Gr	* 302.9	15	S
					302.9		
MR02 at Kensington and MR03 at OPEN							
PAR-0.0b	0.0/TGP 0.9	Hanover	Permanent	Gr	31.1	15	S
					31.1		
MR05 Dominion East Ohio							
PAR-128.8	128.8	Groton	Permanent	Gr	350.7	15	S
					350.7		
Michigan							
Mainline							
TAR-208.2	208.2	Amboy	Temporary	Gr	649.5	25	G/S
TAR-208.3	208.3	Ogden	Temporary	Gr	610.3	25	G/S
TAR-220.7	220.7	Blissfield	Temporary	Gr	21.5	25	G/S
TAR-226.4	226.4	Ridgeway	Temporary	Gr	1,398.9	25	G/S
TAR-229.6	229.6	Ridgeway	Temporary	G	1,025.2	25	G/S
TAR-230.7	230.7	Milan	Temporary	Gr	382.6	25	G/S
TAR-237.2	237.2	York	Temporary	Gr	2,244.3	25	G/S
TAR-239.6	239.6	York	Temporary	G/Gr	1,323.0	25	G/S
TAR-242.4	242.4	Augusta	Temporary	G	502.7	25	G/S
TAR-246.2	246.2	Augusta	Temporary	Gr	1,846.4	25	G/S
TAR 248.1	248.1	Ypsilanti	Temporary	Gr	36.6	25	G/S
TAR-249.9	249.9	Ypsilanti	Temporary	Gr	56.8	25	G/S
TAR-250.1	250.1	Ypsilanti	Temporary	A	28.1	25	P
TAR-250.2a	250.2	Ypsilanti	Temporary	G/Gr	319.0	25	G/S

TABLE 1.6-3

Temporary and Permanent Access Roads along the NEXUS Project

State/Facility/ Road ID a/	Approx. MP of Intersect b/	Municipality, Township	Use (Permanent or Temporary)	Existing Surface c/	Approx. Length From Public Way to Project (feet) d/	Width (feet)	Proposed Improvements e/
TAR-250.2b	250.2	Ypsilanti	Temporary	G/Gr	1,502.5	25	G/S
TAR-250.6	250.6	Ypsilanti	Temporary	D/Gr	791.2	25	G/S
TAR-251.1	251.1	Ypsilanti	Temporary	C/G	1,518.3	25	G/S
TAR-251.7	251.7	Ypsilanti	Temporary	Gr	149.0	25	G/S
					14,405.9		
Main Line Valve Stations							
PAR-208.9	208.9	Ogden	Permanent	Gr	* 211.6	15	S
PAR-228.2	228.2	Ridgeway	Permanent	Gr	* 260.6	15	S
PAR-247.4	247.4	Augusta	Permanent	Gr	* 118.4	15	S
					590.6		
M&R Stations							
MR04 at Willow Run							
PAR-255.1	255.1	Ypsilanti	Permanent	A/G	510.3	15	P
					510.3		
			PROJECT TOTAL:		**111,966.3**		

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

a/ TAR=Temporary, PAR=Permanent Access Road.
b/ Milepost at final intersection of access road with construction workspace. Approximate milepost rounded to the nearest tenth.
c/ Dominant surface condition provided. A=Asphalt, C=Concrete, G=Gravel, D=Dirt, Gr=Greenfield.
d/ Does not include area overlapping with pipeline permanent ROW or aboveground permanent facility boundary (fence line/footprint). With the exception for lengths denoted with an * which are part of permanent ROW.
e/ P=Paving, G=Grading, S=Stone, C=Culverts, W=Widening, R=Realignment. No improvements to occur within wetlands crossed by the access road.
f/ Engineering for confirmation of road easement is ongoing and will be confirmed upon completion of survey

TABLE 1.6-4

Land Requirements for NEXUS Project Ware Yards

State/County	Yard Name	Nearest MP a/	Construction Area (acres)	Existing Land Use Type b/
Ohio				
Stark	Yard 1-1	21.2	48.9	AG
Huron	Yard 2-1	110.5	56.6	AG
Wood	Yard 3-1a	176.4	23.0	AG
Wood	Yard 3-1b	176.4	38.1	AG
Fulton	Yard 3-2	186.3	75.3	AG
		Ohio Subtotal:	***241.9***	
Michigan				
Lenawee	Yard 4-1	228.0	44.4	AG
Washtenaw	Yard 4-2	251.8	4.2	FW
Washtenaw	Yard 4-3	250.0	13.4	AG
		Michigan Subtotal:	***62.0***	
		PROJECT TOTAL:	**303.9**	

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

a/ Approximate MP along the proposed pipeline rounded to the nearest tenth.
b/ Land use types include Agricultural (AG) and Forested Woodland (FW)

TABLE 1.7-1

Summary of Construction Methods to be Used Along the NEXUS Pipeline Project

Drawing Number	Typical Construction Corridor Width (feet) a/	Construction Method Description
S4NX-P-8000	75	Typical Wetland Construction 75ft Corridor Detail - Method #1
S4NX-P-8001	100	Typical Mainline Upland Construction 100ft Corridor Detail - Method #2
S4NX-P-8002	125 to 145	Typical Agricultural Mainline Construction 125ft to 145ft Corridor Detail - Method #3
S4NX-P-8003	125 to 145	Typical Existing Pipeline ROW Easement 125ft to 145ft Construction Corridor (East)
S4NX-P-8004	125 to 145	Typical Existing Pipeline ROW Easement 125ft to 145ft Construction Corridor (West)
S4NX-P-8005	100	Typical Existing Pipeline ROW Easement 100ft Construction Corridor (East)
S4NX-P-8006	100	Typical Existing Pipeline ROW Easement 100ft Construction Corridor (West)
S4NX-P-8007-A	125 to 145	Typical Mainline Construction Method #1A North Or East of Powerline Easement
S4NX-P-8007-B	125 to 145	Typical Mainline Construction Method #1B South Or West of Powerline Easement
S4NX-P-8008-A	125 to 145	Typical Mainline Construction Method #2A North Or East of Powerline Easement
S4NX-P-8008-B	125 to 145	Typical Mainline Construction Method #2B South Or West of Powerline Easement
S4NX-P-8009-A	125 to 145	Typical Mainline Construction Method #3A North Or East of Powerline Easement
S4NX-P-8009-B	125 to 145	Typical Mainline Construction Method #3B South Or West of Powerline Easement
S4NX-P-8010-A	125 to 145	Typical Mainline Construction Method #4A North Or East of Powerline Easement
S4NX-P-8010-B	125 to 145	Typical Mainline Construction Method #4B South Or West of Powerline Easement
S4NX-P-8011-A	125 to 145	Typical Mainline Construction Method #5A North Or East of Powerline Easement
S4NX-P-8011-B	125 to 145	Typical Mainline Construction Method #5B South Or West of Powerline Easement
S4NX-P-8012-A	125 to 145	Typical Mainline Construction Method #6A North Or East of Powerline Easement
S4NX-P-8012-B	125 to 145	Typical Mainline Construction Method #6B South Or West of Powerline Easement
S4NX-P-8013-A	125 to 145	Typical Mainline Construction Method #7A North Or East of Powerline Easement
S4NX-P-8013-B	125 to 145	Typical Mainline Construction Method #7B South Or West of Powerline Easement
S4NX-P-8014-A	125 to 145	Typical Mainline Construction Method #8A North Or East of Powerline Easement
S4NX-P-8014-B	125 to 145	Typical Mainline Construction Method #8B South Or West of Powerline Easement
S4NX-P-8015-A	125 to 145	Typical Mainline Construction Method #9A North Or East of Powerline Easement
S4NX-P-8015-B	125 to 145	Typical Mainline Construction Method #9B South Or West of Powerline Easement
S4NX-P-8016-A	125 to 145	Typical Mainline Construction Method #10A North Or East of Powerline Easement
S4NX-P-8016-B	125 to 145	Typical Mainline Construction Method #10B South Or West of Powerline Easement
S4NX-P-8017	-	Typical 36" Mainline Valve General Plot Plan
S4NX-P-8018	-	Typical 36" Mainline Valve W/ 190' Tower Base - General Plot Plan

TABLE 1.7-1

Summary of Construction Methods to be Used Along the NEXUS Pipeline Project

Drawing Number	Typical Construction Corridor Width (feet) a/	Construction Method Description
S4NX-P-8019	125 to 145	Typical Side Slope Construction - Right Side
S4NX-P-8020	125 to 145	Typical Side Slope Construction - Left Side
S4NX-P-8021	-	Typical Bore Railroad Crossing Control Measure Detail
S4NX-P-8022	-	Typical Bored Road Crossing Control Measure Detail
S4NX-P-8023	-	Typical Stream Crossing Control Measure Detail
S4NX-P-8024	-	Typical Water Body Construction Detail With HDD Plan
S4NX-P-8025	-	Typical Foreign Pipeline Crossing Construction Detail
S4NX-P-8026	-	Typical Bored Road Crossing Construction Detail
S4NX-P-8027	-	Typical 36" Mainline Valve Plot Plan With Remote Blow - Off Location - General Plot Plan
S4NX-P-8029	-	Typical Pipeline Construction Detail Crossing With Existing Utility
S4NX-P-8030	-	Typical Bored Road Crossing County / Township Road
S4NX-P-8031	-	Typical "Open Cut" Road Crossing County / Township Road

Notes:

a Typical Construction Corridor Widths identified as "-" will vary as identified on alignment sheets and as required by County / Township Crossing Permits

TABLE 1.7-2

Estimated Drilling Duration for Horizontal Directional Drills Proposed for NEXUS Project

State/Facility	Feature Crossed	County, State	Milepost Enter a/	Milepost Exit a/	Length (feet) b/	Estimated Drilling Duration (days) c/
Ohio						
Mainline	Wetland B15-31 HDD	Columbiana, Ohio	7.9	8.4	2,930.8	71
	Nimisila Reservoir HDD	Summit, Ohio	41.1	40.8	1,535.6	16
	Tuscarawas River HDD	Summit, Ohio	47.8	48.4	3,261.1	89
	Wetland C15-44 HDD	Medina, Ohio	71.1	71.4	1,627.9	14
	East Branch Black River HDD	Lorain, Ohio	86.9	86.5	1,868.6	49
	West Branch Black River HDD	Lorain, Ohio	92.5	92.2	1,669.1	40
	Vermilion River and Wetland C15-56 HDD	Huron, Ohio	104.1	104.7	2,944.7	76
	Interstate 80 HDD	Erie, Ohio	110.3	110.1	1,431.7	39
	Huron River HDD	Erie, Ohio	116.8	117.3	2,423.3	61
	Sandusky River HDD	Sandusky, Ohio	146.1	145.7	2,159.2	57
	Portage River HDD	Sandusky, Ohio	162.7	162.3	1,619.5	47
	Findlay Road HDD	Wood, Ohio	180.1	179.8	1,521.6	14
	Maumee River HDD	Wood, Ohio/Lucas, Ohio	181.2	181.9	3,998.7	82
				Ohio Subtotal:	***28991.8***	***655***
Michigan						
Mainline	River Raisin HDD	Lenewee, Michigan	215.0	215.3	1478.8	14
	Saline River HDD	Washtenaw, Michigan	237.4	237.7	1315.0	14
	Hydro Park HDD	Washtenaw, Michigan	250.7	251.1	2279.7	27
	Interstate 94 HDD	Washtenaw, Michigan	251.5	251.8	1359.1	14
				Michigan Subtotal:	***6432.6***	***69***
				PROJECT TOTAL:	**35424.4**	**724**

a/ Approximate milepost along the pipeline rounded to the nearest tenth.
b/ Length is provided in linear feet.
c/ Estimated drilling duration is based on J.D. Hair & Associates, Inc, HDD Design Report, Revision 0, NEXUS Pipeline Project, October 21, 2015.

TABLE 1.7-3

Areas Requiring Sidehill Construction Along the NEXUS Pipeline c/

State/Facility Name/County	Milepost Begin a/	Milepost End a/	Length (miles) b/
Ohio			
TGP Interconnecting Pipeline			
	0.2	0.3	0.1
Columbiana	0.4	0.5	0.1
	0.6	0.7	0.1
	0.7	0.8	0.1
	0.8	0.9	0.1
	Interconnecting Pipeline Subtotal:		***0.5***
Mainline Pipeline			
Columbiana	0.0	0.2	0.2
	0.5	0.6	0.2
	0.7	0.8	0.2
	1.3	1.4	0.1
	1.4	1.7	0.2
	1.7	1.7	0.1
	2.3	2.6	0.3
	2.6	2.8	0.1
	2.8	3.2	0.4
	3.3	3.8	0.5
	4.0	4.3	0.3
	4.4	4.7	0.3
	5.1	5.4	0.3
	5.4	5.6	0.2
	5.7	6.1	0.4
	6.1	6.2	0.1
	6.5	6.7	0.2
	7.1	7.2	0.1
	7.4	7.6	0.1
	7.7	7.8	0.1
	9.3	9.4	0.1
	9.9	10.0	0.2
	10.1	10.2	0.1
	10.2	10.3	0.1
	10.3	10.5	0.2
	11.4	11.6	0.2

TABLE 1.7-3

Areas Requiring Sidehill Construction Along the NEXUS Pipeline c/

State/Facility Name/County	Milepost Begin a/	Milepost End a/	Length (miles) b/
	11.7	11.9	0.2
	12.1	12.2	0.1
Stark	12.6	12.7	0.1
	13.0	13.0	0.1
	13.1	13.2	0.1
	13.4	13.5	0.1
	13.8	14.0	0.2
	14.1	14.3	0.1
	15.5	15.6	0.1
	15.8	16.2	0.5
	16.4	16.4	0.1
	17.4	17.6	0.2
	18.0	18.2	0.2
	18.7	18.9	0.2
	19.1	19.2	0.1
	19.3	19.5	0.2
	21.2	21.3	0.1
	21.6	21.7	0.1
	22.8	22.8	0.1
	23.2	23.5	0.3
	24.4	24.5	0.1
	25.0	25.3	0.3
	25.3	25.5	0.2
	26.4	26.4	0.1
	26.5	26.6	0.1
	26.9	27.0	0.1
	28.1	28.1	0.1
	28.9	29.0	0.1
	29.5	29.6	0.1
	29.8	30.0	0.1
	30.3	30.7	0.4
	30.9	31.2	0.3
	31.3	31.4	0.1
	32.4	32.5	0.1
	32.6	32.8	0.2

TABLE 1.7-3

Areas Requiring Sidehill Construction Along the NEXUS Pipeline c/

State/Facility Name/County	Milepost Begin a/	Milepost End a/	Length (miles) b/
	33.2	33.5	0.2
Summit	34.9	35.0	0.1
	36.3	36.6	0.3
	36.9	37.0	0.2
	37.2	37.3	0.1
	37.5	37.8	0.3
	37.9	38.1	0.2
	38.2	39.0	0.8
	39.0	39.1	0.1
	39.3	39.4	0.1
	39.4	39.5	0.1
	39.6	39.6	0.1
	39.9	40.0	0.1
	40.1	40.3	0.1
	41.2	41.3	0.1
	41.4	41.6	0.2
	41.6	41.7	0.1
	42.2	42.3	0.1
	42.3	42.5	0.1
	42.6	42.8	0.2
	43.0	43.2	0.2
	43.3	43.6	0.2
	43.7	43.8	0.2
	44.5	44.6	0.2
	45.1	45.2	0.1
	45.5	45.8	0.3
	45.9	46.7	0.9
	46.9	47.3	0.4
	48.6	48.7	0.1
	48.7	48.9	0.2
	49.5	50.0	0.5
	50.0	50.1	0.1
Wayne	51.3	51.4	0.2
	51.9	52.1	0.1
	52.2	52.6	0.4

TABLE 1.7-3

Areas Requiring Sidehill Construction Along the NEXUS Pipeline c/

State/Facility Name/County	Milepost Begin a/	Milepost End a/	Length (miles) b/
	52.7	52.9	0.1
	52.9	53.4	0.5
	53.7	53.8	0.2
	54.3	54.4	0.1
	54.9	55.0	0.1
	55.5	55.7	0.2
	56.3	56.6	0.3
Medina	56.6	56.6	0.0
	58.0	58.3	0.3
	58.6	58.7	0.1
	59.0	59.2	0.2
	59.2	59.3	0.1
	59.4	59.4	0.0
	59.8	59.9	0.1
	60.7	60.9	0.1
	63.2	63.3	0.1
	63.4	63.6	0.2
	63.6	63.7	0.2
	63.9	64.0	0.1
	64.5	64.8	0.3
	65.2	65.3	0.1
	65.3	65.4	0.1
	65.7	65.8	0.1
	66.1	66.1	0.1
	66.2	66.4	0.2
	67.1	67.3	0.2
	67.4	67.4	0.0
	67.5	67.6	0.1
	67.8	68.0	0.1
	68.0	68.2	0.1
	68.2	68.5	0.3
	68.7	68.8	0.0
	68.8	68.9	0.1
	70.1	70.2	0.1
	70.3	70.4	0.1

TABLE 1.7-3

Areas Requiring Sidehill Construction Along the NEXUS Pipeline c/

State/Facility Name/County	Milepost Begin a/	Milepost End a/	Length (miles) b/
	72.8	73.0	0.2
	73.2	73.2	0.0
	73.4	73.6	0.2
	73.9	74.0	0.1
	74.1	74.1	0.0
	74.9	75.0	0.1
	75.4	75.5	0.1
	75.6	75.7	0.1
	75.8	75.9	0.1
	76.1	76.1	0.1
	76.2	76.3	0.1
	76.7	76.8	0.1
Lorain	84.3	84.4	0.1
	85.9	86.0	0.1
	91.8	91.9	0.1
	98.9	98.9	0.1
Huron		None	
Erie	111.7	111.7	0.1
	113.0	113.0	0.0
	114.2	114.3	0.1
	114.5	114.5	0.1
	116.0	116.1	0.1
	116.4	116.7	0.4
	117.5	117.6	0.1
	117.6	117.7	0.1
	118.4	118.5	0.1
	118.7	119.2	0.5
	120.0	120.0	0.1
Sandusky	160.0	160.3	0.2
Wood		None	
Lucas		None	
Henry	190.0	190.1	0.1
Fulton		None	
		Ohio Mainline Pipeline Subtotal:	***27.2***

TABLE 1.7-3

Areas Requiring Sidehill Construction Along the NEXUS Pipeline c/

State/Facility Name/County	Milepost Begin a/	Milepost End a/	Length (miles) b/
Michigan			
Mainline Pipeline			
Lenawee		None	
Monroe		None	
Washtenaw		None	
Wayne		None	
	Michigan Mainline Pipeline Subtotal:		***0***
	PROJECT MAINLINE PIPELINE TOTAL:		**27.2**
	PROJECT TOTAL:		**27.7**

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a/ Approximate milepost along the pipeline rounded to the nearest tenth mile.
b/ Crossing length within county rounded to the nearest tenth mile.
c/ Sidehill construction areas are identified as locations where the pipeline crosses non-perpendicular side slopes ranging from 5 to 30 percent.

TABLE 1.7-4

Areas Potentially Requiring Blasting Along the NEXUS Pipeline c/

State/County	Milepost Begin a/	Milepost End a/	Length (miles) b/	Rock Formation	Lithology	Age	Vicinity Constraints d/, e/
Ohio							
COLUMBIANA	0.0	0.2	0.2	CONEMAUGH GROUP	SHALE, SILTSTONE, MUDSTONE, SANDSTONE, LIMESTONE, AND COAL	UPPER PENNSYLVANIAN	TRIBUTARY (TRIB) TO BRUSH CREEK AND WETLAND MP 0-0.1
COLUMBIANA	0.2	1.9	1.7	CONEMAUGH GROUP	SHALE, SILTSTONE, MUDSTONE, SANDSTONE, LIMESTONE, AND COAL	UPPER PENNSYLVANIAN	TRIBS TO SANDY CREEK AND WETLANDS MP 0.6-0.7, 0.9-1.0, 1.1-1.2; POWERLINE CROSSINGS MP 1.1, 1.3, 1.4
COLUMBIANA	2.3	4.3	2.0	CONEMAUGH GROUP	SHALE, SILTSTONE, MUDSTONE, SANDSTONE, LIMESTONE, AND COAL	UPPER PENNSYLVANIAN	INTERMITTENT STREAM MP 3.9; POWERLINE CROSSING MP 3.6; ACTIVE GAS WELL (110 FT) MP 2.3; 1 STRUCTURE MP 3.7 (135 FT); 3 STRUCTURES MP 4.1 (140 FT)
COLUMBIANA	4.4	4.5	0.1	CONEMAUGH GROUP	SHALE, SILTSTONE, MUDSTONE, SANDSTONE, LIMESTONE, AND COAL	UPPER PENNSYLVANIAN	
COLUMBIANA	5.3	5.4	0.1	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	
COLUMBIANA	5.7	5.8	0.1	CONEMAUGH GROUP	SHALE, SILTSTONE, MUDSTONE, SANDSTONE, LIMESTONE, AND COAL	UPPER PENNSYLVANIAN	
COLUMBIANA	5.8	5.9	0.1	CONEMAUGH GROUP	SHALE, SILTSTONE, MUDSTONE, SANDSTONE,	UPPER PENNSYLVANIAN	PARALLEL POWER LINE (100 FT)

TABLE 1.7-4

Areas Potentially Requiring Blasting Along the NEXUS Pipeline c/

State/County	Milepost Begin a/	Milepost End a/	Length (miles) b/	Rock Formation	Lithology	Age	Vicinity Constraints d/, e/
					LIMESTONE, AND COAL		
COLUMBIANA	5.9	6.0	0.1	CONEMAUGH GROUP	SHALE, SILTSTONE, MUDSTONE, SANDSTONE, LIMESTONE, AND COAL	UPPER PENNSYLVANIAN	POWERLINE CROSSING MP 5.9
COLUMBIANA	6.3	6.4	0.1	CONEMAUGH GROUP	SHALE, SILTSTONE, MUDSTONE, SANDSTONE, LIMESTONE, AND COAL	UPPER PENNSYLVANIAN	STREAM AND WETLAND MP 6.3 AND 6.4; POWERLINE CROSSING MP 6.3; SEPTIC TANK MP 6.3 (21 FT); 3 STRUCTURES MP 6.3 (100 FT); 3 STRUCTURES MP 6.4 (90 FT)
COLUMBIANA	6.4	6.5	0.1	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	STREAM AND WETLAND MP 6.3 AND 6.4; POWERLINE CROSSING MP 6.3; SEPTIC TANK MP 6.3 (21 FT); 3 STRUCTURES MP 6.3 (100 FT); 3 STRUCTURES MP 6.4 (90 FT)
COLUMBIANA	8.0	8.1	0.1	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	WETLAND MP 8.0 TO 8.1; POWERLINE CROSSING MP 8.0
COLUMBIANA	12.3	12.4	0.1	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	TRIB TO WOODLAND LAKE MP 12.3-12.4; PARALLEL POWERLINE (100 FT)
STARK	25.5	25.7	0.2	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE,	MIDDLE AND LOWER PENNSYLVANIAN	POWERLINE CROSSING MP 25.6

TABLE 1.7-4

Areas Potentially Requiring Blasting Along the NEXUS Pipeline c/

State/County	Milepost Begin a/	Milepost End a/	Length (miles) b/	Rock Formation	Lithology	Age	Vicinity Constraints d/, e/
					UNDERCLAY, COAL, AND FLINT		
STARK	26.0	26.1	0.1	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	POWERLINE CROSSING MP 26.0
STARK	26.4	26.5	0.1	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	
SUMMIT	42.1	42.2	0.1	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	WETLAND MP 42.1-42.2; STRUCTURE MP 42.1 (125 FT)
SUMMIT	43.2	43.4	0.2	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	TRIB TO NIMISILA CREEK MP 43.2-43.3
SUMMIT	44.5	44.6	0.1	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	
SUMMIT	44.8	44.9	0.1	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE,	MIDDLE AND LOWER PENNSYLVANIAN	

TABLE 1.7-4

Areas Potentially Requiring Blasting Along the NEXUS Pipeline c/

State/County	Milepost Begin a/	Milepost End a/	Length (miles) b/	Rock Formation	Lithology	Age	Vicinity Constraints d/, e/
					UNDERCLAY, COAL, AND FLINT		
SUMMIT	49.5	49.7	0.2	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	EPHEMERAL STREAM MP 49.6; TRIB TO WILLOWDALE LAKE AND WETLAND MP 49.6-49.7; POWERLINE CROSSING MP 49.6
SUMMIT	49.8	49.9	0.1	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	WETLAND MP 49.8; TRIB TO PANCAKE CREEK MP 49.8-49.9; 2 POWERLINE CROSSINGS 49.9
SUMMIT	50.0	50.2	0.2	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	WETLAND AND TRIB TO PANCAKE CREEK MP 50.1-50.2; 2 STRUCTURES (125 FT); PARALLEL POWERLINE (65 FT)
SUMMIT	50.3	50.4	0.1	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	3 STRUCTURES MP 50.3 (85 FT, 95 FT, 130 FT); SEPTIC TANK MP 50.3 (90 FT)
WAYNE	50.4	50.6	0.2	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	TRIB TO PANCAKE CREEK MP 50.4-50.5; POWERLINES PARALLEL MP 50.6 (85 FT)

TABLE 1.7-4

Areas Potentially Requiring Blasting Along the NEXUS Pipeline c/

State/County	Milepost Begin a/	Milepost End a/	Length (miles) b/	Rock Formation	Lithology	Age	Vicinity Constraints d/, e/
WAYNE	52.7	53.6	0.9	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	WETLANDS AND TRIB TO SILVER CREEK MP 52.7-53.0; NON-ACTIVE WATER WELL MP 52.9 (4 FT); POWERLINE CROSSING MP 52; POWERLINE CROSSING MP 53.0; ACTIVE SPRING MP 53.2 (60 FT); 3 STRUCTURES MP 53.3 (140 FT); STRUCTURE MP 53.6 (140 FT)
WAYNE	53.6	53.9	0.3	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	
WAYNE	54.5	54.8	0.3	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	POWERLINE CROSSING 54.6
WAYNE	55.6	55.8	0.2	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	WETLAND MP 55.7; MULTIPLE POWERLINE CROSSINGS MP 55.7, 5 STRUCTURES MP 55.7 (>90 FT), WATER WELL AND SEPTIC TANK MP 55.7 (70 FT)
WAYNE	56.3	56.5	0.2	ALLEGHENY AND POTTSVILLE GROUPS UNDIFFERENTIATED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, LIMESTONE, UNDERCLAY, COAL, AND FLINT	MIDDLE AND LOWER PENNSYLVANIAN	2 STRUCTURES MP 56.5 (125 FT AND 140 FT)
MEDINA	56.5	56.7	0.2	LOGAN AND CUYAHOGA FORMATIONS UNDIVIDED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, AND LIMESTONE	UPPER AND LOWER MISSISSIPPIAN	MULTIPLE POWERLINE CROSSINGS MP 56.6; SEPTIC LEACH FIELD MP 56.5 (50 FT)

TABLE 1.7-4

Areas Potentially Requiring Blasting Along the NEXUS Pipeline c/

State/County	Milepost Begin a/	Milepost End a/	Length (miles) b/	Rock Formation	Lithology	Age	Vicinity Constraints d/, e/
MEDINA	59.0	59.1	0.1	LOGAN AND CUYAHOGA FORMATIONS UNDIVIDED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, AND LIMESTONE	UPPER AND LOWER MISSISSIPPIAN	
MEDINA	59.1	59.3	0.2	LOGAN AND CUYAHOGA FORMATIONS UNDIVIDED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, AND LIMESTONE	UPPER AND LOWER MISSISSIPPIAN	TRIB TO STYX RIVER MP 59.2-59.3
MEDINA	68.7	68.8	0.1	LOGAN AND CUYAHOGA FORMATIONS UNDIVIDED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, AND LIMESTONE	UPPER AND LOWER MISSISSIPPIAN	MCCABE CREEK; 1 STRUCTURE (68 FT)
MEDINA	75.9	76.1	0.2	LOGAN AND CUYAHOGA FORMATIONS UNDIVIDED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, AND LIMESTONE	UPPER AND LOWER MISSISSIPPIAN	STREAM MP 76.0
MEDINA	78.9	79.0	0.1	LOGAN AND CUYAHOGA FORMATIONS UNDIVIDED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, AND LIMESTONE	UPPER AND LOWER MISSISSIPPIAN	
LORAIN	81.0	81.8	0.8	LOGAN AND CUYAHOGA FORMATIONS UNDIVIDED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, AND LIMESTONE	UPPER AND LOWER MISSISSIPPIAN	WETLAND MP 81.0-81.1; TRIB TO EAST BRANCH BLACK RIVER MP 81.3-81.4; WETLAND 81.5; PARALLEL POWERLINES (65 FT), POWERLINE CROSSING MP 81.2
LORAIN	82.1	82.9	0.8	LOGAN AND CUYAHOGA FORMATIONS UNDIVIDED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, AND LIMESTONE	UPPER AND LOWER MISSISSIPPIAN	WETLANDS MP 82.6-82.9; PARALLEL POWERLINES (62 FT), POWERLINE CROSSINGS MP 82.6 AND 82.8; STRUCTURE (100 FT) AND WATER WELL (30 FT) MP 82.7
LORAIN	84.3	84.4	0.1	LOGAN AND CUYAHOGA FORMATIONS UNDIVIDED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, AND LIMESTONE	UPPER AND LOWER MISSISSIPPIAN	WETLANDS AND SALT CREEK; NON-ACTIVE WATER WELL AT MP 84.4 (75 FT)

TABLE 1.7-4

Areas Potentially Requiring Blasting Along the NEXUS Pipeline c/

State/County	Milepost Begin a/	Milepost End a/	Length (miles) b/	Rock Formation	Lithology	Age	Vicinity Constraints d/, e/
LORAIN	86.9	87.0	0.1	LOGAN AND CUYAHOGA FORMATIONS UNDIVIDED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, AND LIMESTONE	UPPER AND LOWER MISSISSIPPIAN	
LORAIN	87.1	87.4	0.3	LOGAN AND CUYAHOGA FORMATIONS UNDIVIDED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, AND LIMESTONE	UPPER AND LOWER MISSISSIPPIAN	TRIB TO DENT DITCH MP 87.3-87.4; PARALLEL POWERLINE (90 FT)
LORAIN	90.8	91.5	0.7	LOGAN AND CUYAHOGA FORMATIONS UNDIVIDED	SHALE, SILTSTONE, SANDSTONE, CONGLOMERATE, AND LIMESTONE	UPPER AND LOWER MISSISSIPPIAN	WETLAND AND TRIB TO ELK CREEK MP 90.8-91.1; WETLAND AND ELK CREEK MP 91.3-91.4; 2 POWERLINE CROSSINGS MP 92.2
LORAIN	98.4	98.5	0.1	BEREA SANDSTONE AND BEDFORD SHALE, UNDIVIDED	SANDSTONE, SILTSTONE, AND SHALE	UPPER DEVONIAN	POWERLINE CROSSING MP 98.5; STRUCTURE (BARN) MP 98.5 (140 FT)
LORAIN	98.5	98.6	0.1	BEREA SANDSTONE AND BEDFORD SHALE, UNDIVIDED	SANDSTONE, SILTSTONE, AND SHALE	UPPER DEVONIAN	STRUCTURE (BARN) AT MP 98.5 (110 FT)
LORAIN	98.7	98.8	0.1	BEREA SANDSTONE AND BEDFORD SHALE, UNDIVIDED	SANDSTONE, SILTSTONE, AND SHALE	UPPER DEVONIAN	
HURON	103.3	103.4	0.1	BEREA SANDSTONE AND BEDFORD SHALE, UNDIVIDED	SANDSTONE, SILTSTONE, AND SHALE	UPPER DEVONIAN	
ERIE	105.8	105.9	0.1	BEREA SANDSTONE AND BEDFORD SHALE, UNDIVIDED	SANDSTONE, SILTSTONE, AND SHALE	UPPER DEVONIAN	WETLAND AND CHAPPEL CREEK; POWERLINE CROSSING MP 105.9
ERIE	106.5	107.3	0.8	BEREA SANDSTONE AND BEDFORD SHALE, UNDIVIDED	SANDSTONE, SILTSTONE, AND SHALE	UPPER DEVONIAN	WETLANDS MP 106.5-106.8; GAS WELL (STATUS UNKNOWN) AT MP 106.6 (27 FT)
ERIE	107.8	108.0	0.2	BEREA SANDSTONE AND BEDFORD SHALE, UNDIVIDED	SANDSTONE, SILTSTONE, AND SHALE	UPPER DEVONIAN	
ERIE	108.1	108.3	0.2	BEREA SANDSTONE AND BEDFORD SHALE, UNDIVIDED	SANDSTONE, SILTSTONE, AND SHALE	UPPER DEVONIAN	

TABLE 1.7-4

Areas Potentially Requiring Blasting Along the NEXUS Pipeline c/

State/County	Milepost Begin a/	Milepost End a/	Length (miles) b/	Rock Formation	Lithology	Age	Vicinity Constraints d/, e/
ERIE	108.5	108.7	0.2	BEREA SANDSTONE AND BEDFORD SHALE, UNDIVIDED	SANDSTONE, SILTSTONE, AND SHALE	UPPER DEVONIAN	POWERLINE CROSSING MP 108.6
ERIE	109.2	109.5	0.3	BEREA SANDSTONE AND BEDFORD SHALE, UNDIVIDED	SANDSTONE, SILTSTONE, AND SHALE	UPPER DEVONIAN	
ERIE	111.2	112.1	0.9	BEREA SANDSTONE AND BEDFORD SHALE, UNDIVIDED	SANDSTONE, SILTSTONE, AND SHALE	UPPER DEVONIAN	WETLANDS MP 111.4, 111.7; 2 WATER WELLS (15 FT, 75 FT) MP 112.0; 2 POWERLINE CROSSINGS MP 112.1
ERIE	112.1	112.3	0.2	OHIO SHALE	SHALE, SILTSTONE, AND VERY FINE-GRAINED SANDSTONE	UPPER DEVONIAN	POWERLINE CROSSING MP 112.3
ERIE	112.4	112.8	0.4	OHIO SHALE	SHALE, SILTSTONE, AND VERY FINE-GRAINED SANDSTONE	UPPER DEVONIAN	WETLAND MP 112.8; 2 POWERLINE CROSSINGS MP 112.6; PARALLEL POWERLINES FROM MP 112.6 TO MP 112.8 (50 FT)
ERIE	113.2	113.3	0.1	OHIO SHALE	SHALE, SILTSTONE, AND VERY FINE-GRAINED SANDSTONE	UPPER DEVONIAN	WETLAND; PARALLEL POWERLINE (110 FT) MP 113.2-113.3
ERIE	119.8	123.5	3.7	OHIO SHALE	SHALE, SILTSTONE, AND VERY FINE-GRAINED SANDSTONE	UPPER DEVONIAN	AGRICULTURAL CANAL MP 120; SHEERER DITCH AND WETLANDS MP 120.3-120.5; WETLAND MP 120.9; SHEERER DITCH MP 122.0; TRIB TO SHEERER DITCH MP 123.1; NON-ACTIVE GAS WELL MP 120.5 (55FT); POWERLINE CROSSING MP 120.9; POWERLINE CROSSING MP 122.0; PARALLEL POWERLINES FROM MP 121.0 TO 122.6 (65 FT); 2 POWERLINE CROSSINGS MP 122.6; POWERLINE CROSSING 123.3; WATER WELL 123.3 (140 FT)

TABLE 1.7-4

Areas Potentially Requiring Blasting Along the NEXUS Pipeline c/

State/County	Milepost Begin a/	Milepost End a/	Length (miles) b/	Rock Formation	Lithology	Age	Vicinity Constraints d/, e/
ERIE	123.6	124.2	0.6	OHIO SHALE	SHALE, SILTSTONE, AND VERY FINE-GRAINED SANDSTONE	UPPER DEVONIAN	PERENNIAL STREAM MP 124.0
ERIE	124.2	125.0	0.8	PROUT LIMESTONE	LIMESTONE	MIDDLE DEVONIAN	POWERLINE CROSSING MP 124.8
ERIE	125.0	125.5	0.5	PLUM BROOK SHALE	SHALE AND ARGILLACEOUS LIMESTONE	MIDDLE DEVONIAN	
ERIE	125.7	126.1	0.4	DELAWARE LIMESTONE	LIMESTONE	MIDDLE DEVONIAN	TRIB TO PIPE CREEK MP 125.7; PIPE CREEK MP 125.8; 3 POWERLINE CROSSINGS MP 125.8; 2 STRUCTURES MP 125.8 (115 FT); WATER WELL MP 125.8 (125 FT); 2 STRUCTURES MP 125.9 (82 FT, 120 FT)
ERIE	126.1	126.5	0.4	PLUM BROOK SHALE	SHALE AND ARGILLACEOUS LIMESTONE	MIDDLE DEVONIAN	STRUCTURE AT MP 126.3 (145 FT)
ERIE	126.5	126.9	0.4	DELAWARE LIMESTONE	LIMESTONE	MIDDLE DEVONIAN	POWERLINE CROSSING MP 126.7
ERIE	127.0	128.8	1.8	DELAWARE LIMESTONE	LIMESTONE	MIDDLE DEVONIAN	TRIB TO MILLS CREEK MP 127.9, 128.1; POWERLINE CROSSING MP 127.4; 2 POWERLINE CROSSINGS, 1 STRUCTURE (125 FT), 1 WATER WELL (130 FT) MP 127.7; 2 POWERLINE CROSSINGS MP 128.4
ERIE	128.8	131.2	2.4	COLUMBUS LIMESTONE	LIMESTONE AND DOLOMITE	MIDDLE AND LOWER DEVONIAN	PERENNIAL STREAM MP 129.2; 1 POWERLINE CROSSING, 1 STRUCTURE (120 FT); 1 WATER WELL (125 FT) MP 128.8; 1 WATER WELL (50 FT) MP 129.7; POWERLINE CROSSING MP 130.0; 2 POWERLINE CROSSINGS, 2 STRUCTURES (120 FT); 1 WATER WELL (145 FT) MP 130.7

TABLE 1.7-4

Areas Potentially Requiring Blasting Along the NEXUS Pipeline c/

State/County	Milepost Begin a/	Milepost End a/	Length (miles) b/	Rock Formation	Lithology	Age	Vicinity Constraints d/, e/
SANDUSKY	150.5	151.2	0.7	TYMOCHTEE AND GREENFIELD DOLOMITES, UNDIVIDED	DOLOMITE AND SHALE	UPPER AND LOWER SILURIAN	WETLAND MP 151.1
SANDUSKY	151.2	151.7	0.5	LOCKPORT DOLOMITE	DOLOMITE	UPPER AND LOWER SILURIAN	WETLAND MP 151.3
SANDUSKY	152.0	152.4	0.4	LOCKPORT DOLOMITE	DOLOMITE	UPPER AND LOWER SILURIAN	WETLAND MP 152.3
SANDUSKY	153.3	153.5	0.2	LOCKPORT DOLOMITE	DOLOMITE	UPPER AND LOWER SILURIAN	WETLAND AND MUDDY CREEK MP 153.3
SANDUSKY	154.4	155.5	1.1	LOCKPORT DOLOMITE	DOLOMITE	UPPER AND LOWER SILURIAN	TRIB TO MUDDY CREEK MP 154.4; WETLAND MP 154.9; NINEMILE CREEK MP 155.2; POWERLINE CROSSING MP 154.7; STRUCTURE MP 155.1 (120 FT)
SANDUSKY	156.1	156.2	0.1	LOCKPORT DOLOMITE	DOLOMITE	UPPER AND LOWER SILURIAN	
SANDUSKY	156.7	156.8	0.1	LOCKPORT DOLOMITE	DOLOMITE	UPPER AND LOWER SILURIAN	
SANDUSKY	157.2	160.1	2.9	LOCKPORT DOLOMITE	DOLOMITE	UPPER AND LOWER SILURIAN	WETLANDS MP 157.3-157.5; WETLAND MP 157.6; WOLF CREEK MP 157.8; WETLAND MP 157.9-158.5; WETLAND AND SUGAR CREEK MP 158.6; WETLAND MP 159.9; 3 STRUCTURES AT MP 157.5 (10 FT, 127 FT, 133 FT); 1 POWERLINE CROSSING, 1 STRUCTURE (70 FT) MP 157.6; 1 POWERLINE CROSSING MP 158.2; 2 POWERLINE CROSSINGS MP 159.0
SANDUSKY	160.3	161.1	0.8	LOCKPORT DOLOMITE	DOLOMITE	UPPER AND LOWER SILURIAN	
SANDUSKY	163.1	163.4	0.3	LOCKPORT DOLOMITE	DOLOMITE	UPPER AND LOWER SILURIAN	WETLAND MP 163.4; POWERLINE CROSSING MP 163.1

TABLE 1.7-4

Areas Potentially Requiring Blasting Along the NEXUS Pipeline c/

State/County	Milepost Begin a/	Milepost End a/	Length (miles) b/	Rock Formation	Lithology	Age	Vicinity Constraints d/, e/
SANDUSKY	163.4	163.5	0.1	TYMOCHTEE AND GREENFIELD DOLOMITES, UNDIVIDED	DOLOMITE AND SHALE	UPPER AND LOWER SILURIAN	
SANDUSKY	163.5	164.3	0.8	LOCKPORT DOLOMITE	DOLOMITE	UPPER AND LOWER SILURIAN	WETLANDS MP 163.5, 163.7; MARTIN DITCH MP 163.8; POWERLINE CROSSING MP 163.7
WOOD	164.4	164.5	0.1	LOCKPORT DOLOMITE	DOLOMITE	UPPER AND LOWER SILURIAN	POWERLINE CROSSING MP 164.5
WOOD	164.6	166.8	2.2	LOCKPORT DOLOMITE	DOLOMITE	UPPER AND LOWER SILURIAN	TRIB TO MARTIN DITCH MP 164.7; WETLANDS MP 164.8, 165.5; TRIB TO TOUSSAINT CREEK MP 165.6; WETLANDS MP 165.7, 166.2-166.3; TRIB TO TOUSSAINT CREEK MP 166.5; WETLANDS MP 166.6-166.8; 2 POWERLINE CROSSINGS MP 164.9; 5 POWERLINE CROSSINGS 165.5; POWERLINE CROSSING MP 166.1; POWERLINE CROSSING MP 166.8
WOOD	166.8	167.3	0.5	LOCKPORT DOLOMITE	DOLOMITE	UPPER AND LOWER SILURIAN	TRIB TO TOUSSAINT CREEK MP 166.8; POWERLINE CROSSING MP 166.7
WOOD	173.2	173.7	0.5	TYMOCHTEE AND GREENFIELD DOLOMITES, UNDIVIDED	DOLOMITE AND SHALE	UPPER AND LOWER SILURIAN	2 PARALLEL POWERLINES (50 FT), 1 STRUCTURE (130 FT), 1 WATER WELL (145 FT) AT MP 173.6
Michigan							
None							
Total length potentially requiring blasting			**38.2**				

TABLE 1.7-4

Areas Potentially Requiring Blasting Along the NEXUS Pipeline c/

State/County	Milepost Begin a/	Milepost End a/	Length (miles) b/	Rock Formation	Lithology	Age	Vicinity Constraints d/, e/

Ohio DNR GIS Data Sources:
Digital Elevation Model of Ohio, 1:500,000-scale bedrock-topography grid for Ohio, 1:500,000-scale bedrock-geology polygons for Ohio
References:
Powers, D.M., Laine, J.F., Pavey, R.R., 2002 (revised 2003), Shaded elevation map of Ohio: Ohio Division of Geological Survey Map MG-1, 1:500,000 scale.
Ohio Division of Geological Survey, 2003, Bedrock-topography data for Ohio: Ohio Division of Geological Survey BG-3, 1 CD-ROM, GIS file formats, Revised January 9, 2004.
Slucher, E.R., (principal compiler), Swinford, E.M., Larsen, G.E., and others, with GIS production and cartography by Powers, D.M., 2006, Bedrock geologic map of Ohio: Ohio Division of Geological Survey Map BG-1, version 6.0, scale 1:500,000.

a/ Approximate MP along the proposed pipeline rounded to the nearest tenth.
b/ Length within county rounded to the nearest tenth mile.
c/ Identifies segments where the depth to bedrock is estimated to be less than 10 feet. Segments located within proposed HDD crossings have been excluded. All of these segments are underlain by sedimentary rock. Specific areas that will require blasting will not be known until the time of construction.
d/ Wetland and water resources identified by field surveys
e/ Distances in parentheses are the distance of the feature from the centerline, in feet.

TABLE 1.9-1

Preliminary Construction Schedule and Work Force Requirements for the NEXUS Pipeline Project Facilities

State/Facility	Milepost Begin a/	Milepost End a/	Length (miles)	Construction	
				Month/Year Begin	Personnel
Ohio					
Pipelines					
Mainline Pipeline	0.0	208.3	208.3	Feb - 2017	2000
TGP Interconnection	TGP 0.0	TGP 0.9	0.9	Apr - 2017	--- b/
Compressor Stations					
Compressor Station 1 - Hanoverton	1.4	N/A	N/A	Feb - 2017	160
Compressor Station 2 - Wadsworth	63.5	N/A	N/A	Feb - 2017	160
Compressor Station 3 - Clyde	134.0	N/A	N/A	Feb - 2017	160
Compressor Station 4 - Waterville	183.5	N/A	N/A	Feb - 2017	160
M&R Stations					
MR01 at TGP Interconnect	TGP 0.0	N/A	N/A	Mar - 2017	40
MR02 at Kensington	0.0	N/A	N/A	Mar - 2017	25
MR03 at Texas Eastern	TGP 0.9	N/A	N/A	Mar - 2017	25
MR05 at DEO	128.8	N/A	N/A	Mar - 2017	40
Launcher and Receiver Stations					
Launcher at TGP Interconnect Pipeline (MR01)	TGP 0.0	N/A	N/A	Apr - 2017	--- b/
Launcher at Kensington (MR02)	0.0	N/A	N/A	Apr - 2017	--- b/
Receiver at Texas Eastern (MR03)	TGP 0.9	N/A	N/A	Apr - 2017	--- b/
Launcher/Receiver at Wadsworth (Compressor Station 2)	63.5	N/A	N/A	May - 2017	--- b/
Launcher/Receiver at Waterville (Compressor Station 4)	183.5	N/A	N/A	Apr - 2017	--- b/
Michigan					
Pipeline					
Mainline Pipeline	208.3	255.2	46.9	Feb - 2017	550
Launcher and Receiver Station					
Receiver at Willow Run (MR04)	255.2	N/A	N/A	Apr - 2017	--- b/
M&R Station					
MR04 at Willow Run	255.2	N/A	N/A	Apr - 2017	40

a/ Mileposts presented are the approximate milepost along the pipeline to the facility site rounded to the nearest tenth. Mileposts are presented for the mainline pipeline unless otherwise denoted (TGP=Interconnecting Pipeline to TGP).
b/ TGP Interconnect and Launcher / Receiver Stations will be constructed using Mainline Pipeline Personnel.
N/A = Not applicable.

TABLE 1.13-1

NEXUS Gas Transmission Project

Anticipated Environmental Permits, Reviews and Consultations

Agency	Permit/Approval/ Consultation	Contact	Consultation Initiated	Report/ Application Submitted	Anticipated Approval Date
<u>FEDERAL</u>					
Federal Energy Regulatory Commission	Certificate of Public Convenience and Necessity - Section 7(c) of the Natural Gas Act requires preparation of an ER (consisting of 12 Resource Reports) to be included with the Section 7(c) application. NEXUS used FERC's Pre-filing Process which involved conducting public open houses, preparation of responses to comments received on the Project during early scoping, and preparation of draft and final Resource Reports. Following submittal of the ER, support activities include responding to FERC staff data requests, reviewing FERC's EIS and preparing the Implementation Plan.	Joanne Wachholder, FERC Project Manager	17 Dec 14 introductory meeting	20 Nov 15 Certificate Application	Nov 2016
U.S. Army Corps of Engineers ("USACE"): Buffalo, Pittsburgh, Huntington, and Detroit Districts	Dredge and Fill Permit under Section 404 of the Clean Water Act (33 USC § 1344) and Fill Permit under Section 10 of the Rivers and Harbors Act of 1899 (33 USC § 403)	Shawn Blohm, Buffalo District NEXUS designated point of contact Tyler Bintrim, Pittsburgh District Regulatory Branch Mark Taylor, Huntington District Chief, Energy Resources Stanley F. Cowton, Jr., Detroit District Regulatory Project Manager	31 Oct 14 introductory letter 14 Jan 15 introductory meeting Buffalo District 13 Aug 15 Pittsburgh District 20 Oct 15	Planned Dec 2015	Sept/Oct 2016
United States Department of the Interior, U.S. Fish and	Consultation under Section 7 of the Endangered Species Act	Chris Mensing, Jeff Gosse, Fish and Wildlife Biologist	18 Sept 14 introductory letter	20 Nov 15	Sept/Oct 2016

TABLE 1.13-1

NEXUS Gas Transmission Project

Anticipated Environmental Permits, Reviews and Consultations

Agency	Permit/Approval/ Consultation	Contact	Consultation Initiated	Report/ Application Submitted	Anticipated Approval Date
Wildlife Service, Midwest Region 3 (Columbus, OH and East Lansing, MI Field offices)	Coordination per the Migratory Bird Treaty Act; and the Fish and Wildlife Coordination Act (16 USC §§ 661 et seq.)	Burr Fisher, Jack Dingledine Wildlife Biologist	07 Oct 15 Columbus Ohio Field Office introductory meeting		
		Angela Boyer, Endangered Species Coordinator	12 Nov 14 East Lansing Field Office introductory meeting		
U.S. Department of the Interior, National Park Service	Wild and Scenic Rivers Act Section 7(a) Determination	Mark Weekly, Deputy Regional Director	31 Oct 14 introductory letter	20 Nov 15	Sept/Oct 2016
U. S. Environmental Protection Agency ("EPA"), Region 3	NGA Section 7(c) application ER Review	Kenneth A. Westlake, Chief	31 Oct 14 introductory letter	20 Nov 15	Sept/Oct 2016
	Section 404 of the CWA (USEPA review of wetland permits issued by the USACE)				
	Determination of General Conformity Applicability				
National Marine Fisheries Service ("NMFS")	Federal Endangered Species Act	Donna Wieting, Director, Office of Protected Resources	31 Oct 14 introductory letter	N/A	N/A
Advisory Council on Historic Preservation and Consultation with Native American Tribes	Section 106 Consultation, National Historic Preservation Act ("NHPA") - Section 106 Consultation	Mark Epstein, Department Head, Resource Protection and Review	5 Nov 14 Ohio SHPO introductory letter	20 Nov 15	Sept/Oct 2016
		Brian D. Conway, State Historic Preservation Officer ("SHPO")	4 Dec 14 Michigan SHPO introductory letter	20 Nov 15	Sept/Oct 2016

TABLE 1.13-1

NEXUS Gas Transmission Project

Anticipated Environmental Permits, Reviews and Consultations

Agency	Permit/Approval/ Consultation	Contact	Consultation Initiated	Report/ Application Submitted	Anticipated Approval Date
<u>STATE</u>					
Ohio					
Ohio Environmental Protection Agency ("OEPA")	Section 401 Water Quality Certification	Mike Mansour, Central	9, 10 and 17 Dec 14 introductory meetings	Planned for Dec. 2015	Aug/Sept 2016
	Clean Air Act, Air Permit-to-Install-and-Operate	Dave Morehart, Central		14 July 15 compressor stations	Nov 2016
	NPDES Hydrostatic Test	Jana Gannon, Northeast, Kevin Fortune, Northeast Sean Vadas, Akron Regional Kelly Kanoza, Akron Regional Duane LaClair, Akron Regional Matt Stanfield, Toledo		Planned for Dec 2016	Jan 2017
Ohio Department of Natural Resources ("ODNR")	Consultation on Threatened and Endangered Species	John Kessler, P.E. Assistant Chief	18 Sep 14 introductory letter	20 Nov 15	Sept/Oct 2016
	Water Withdrawal Facility Registration (>100,000 gallons per day)	Brad Lodge Division of Soil and Water		Planned for Dec 2016	Jan 2017
	Coastal Management Zone Determination	Steve Holland, MPA Federal Consistency Administrator	5 Nov 15 introductory email	Planned for Dec 2015	Aug/Sept 2016
Ohio Historic Preservation Office	Section 106 NHPA Consultation	Mark Epstein, Department Head, Resource Protection and Review	5 Nov 14 Ohio SHPO introductory letter	20 Nov 15	Sept/Oct 2016

TABLE 1.13-1

NEXUS Gas Transmission Project

Anticipated Environmental Permits, Reviews and Consultations

Agency	Permit/Approval/ Consultation	Contact	Consultation Initiated	Report/ Application Submitted	Anticipated Approval Date
Michigan					
Michigan Department of Natural Resources ("MDNR"), Wildlife Division	State listed species consultation	Lori Sargent, Wildlife Division	22 Sep 14 introductory letter	20 Nov 15	Aug/Sept 2016
	Public Lands consultation, Permit to Use State Lands				
Michigan Department of Environmental Quality ("MDEQ"), Water Resources Division	MDEQ/USACE Joint Permit for impacts to wetlands, inland lakes, streams and floodplains; NPDES Hydrostatic Test; NPDES Permit for Storm Water Discharge from Construction Activities Water Withdrawal Authorization	Katherine David, Jackson District Office	18 Dec 14 introductory letter	Planned Dec. 2015	Aug/Sept 2016
	Possible permit to install for facility meter station air emissions	Mary Ann Dolehanty, Lansing Office	16 Sept 15 Applicability letter	N/A	N/A
Michigan Natural Resources Inventory ("MNRI")	State-listed threatened and endangered species consultations	Michael A. Sanders, Rare Species Review Specialist	23 Sep 14 introductory letter	20 Nov 15	Aug/Sept 2016
Michigan State Housing and Development Authority ("MSHDA") – Michigan Office of Historic Preservation	Section 106 NHPA Consultation	Brian D. Conway, SHPO	4 Dec 14 Michigan SHPO introductory letter	20 Nov 15	Sept/Oct 2016

TABLE 1.15-1

DTE Gas Facilities Anticipated Permits, Approvals, and Authorizations

Administrating Agency	Jurisdiction/Regulatory Involvement	Applicable Facilities	Anticipated Submittal Dates	Additional Notes
Michigan Department of Environmental Quality ("MDEQ") SE Michigan District Office 27700 Donald Court Warren, MI 48092-2793	Clean Water Act Section 401/404 permitting administered by MDEQ; Public Act 451, Parts 301 (streams), 303 (wetlands), and 31 (floodplains).	Willow Run Compressor Station ("WRCS") Willow Gate Station ("WGS")	TBD – Late 2015/early 2016	Part 303 (wetlands) permit will be required for discharge pipeline connecting WRCS and WGS
	General Construction Stormwater Notice of Coverage and Erosion & Sedimentation Control - Public Act 451, Part 91.	WRCS WGS Milford Compressor Station ("MCS")	TBD	Notice of coverage ("NOC") anticipated to be required for work at MCS as well as one NOC for cumulative impacts between WRCS and WGS.
	Hydrostatic Test Water Discharge – Public Act 451, Part 31	WRCS WGS MCS	TBD	Hydrostatic Test Water permits to be obtained for each station.
	Air Quality Division, Air Use Approval Rules - R 336.1201.	WRCS MCS	MCS – 8/1/2015 WRCS – 2/1/2016	
County or local municipality	Local agencies – County Enforcement Agency or Municipal Enforcement Agency delegated review/enforcement authority for Part 91 E&S and SWPPP compliance.	WRCS WGS MCS	TBD	Local County Soil Erosion and Sedimentation Control permits will be obtained for each facility prior to construction.
	Building Permits as required by Local Code	WRCS MCS	TBD	As local regulating authority requires for building permits at a facility.
United States Army Corps of Engineers ("USACE") Detroit District 477 Michigan Ave Detroit, MI 48226	Clean Water Act Section 404 - Wetland and Waterbody crossing permits (and Section 401 Water Quality Certification **a/** will be requested and issued by MDEQ for water resource permit items detailed below).	WRCS WGS	N/A	Would not anticipate USACE as a participating agency. Delegated authority to MDEQ under the Joint Permit Application process.
U.S. Fish and Wildlife Service East Lansing Field Office 2651 Coolidge Road East Lansing, MI 48823	Section 7 Consultation – Endangered Species Act 16 USC Chapter 35.	WRCS WGS MCS	TBD or N/A	T&E surveys being verified in May 2015. Preliminary station surveys indicate no present bat habitat at the effected stations. Not anticipating T&E issues.

a/ 401 Water Quality Certification administrated by MDEQ and applies to any permit program where a finding of water quality impact needs to be made by MDEQ (e.g. Section 404 permits Stormwater General Permit coverage, hydrostatic test discharge, other NPDES discharges *as* applicable).

MCS – Milford Compressor Station – Milford Township, Oakland County, MI;
WRCS – Willow Run Compressor Station – Ypsilanti Township, Washtenaw County, MI
WGS – Willow Gate Station - Ypsilanti Township, Washtenaw County, MI

TABLE 1.15-2

DTE Gas Required Notifications

Administrating Agency	Jurisdiction/Regulatory Involvement	Applicable Facilities	Anticipated Submittal Dates	Additional Notes
Pipeline and Hazardous Material Safety Administration ("PHMSA")	PHMSA Title-49, Part-192	Willow Run Compressor Station ("WRCS") Willow Gate Station ("WGS") Milford Compressor Station ("MCS")	Submission by 5/1/2016	60 Day Advance Notice – Facility Improvement
Michigan Public Service Commission ("MPSC")	MPSC Rule 502, Gas Safety Standard	Willow Run Compressor Station ("WRCS") Willow Gate Station ("WGS") Milford Compressor Station ("MCS")	Submission by 5/1/2016	60 Day Advance Notice – Facility Improvement

MCS – Milford Compressor Station – Milford Township, Oakland County, MI;

WRCS – Willow Run Compressor Station – Ypsilanti Township, Washtenaw County, MI

WGS – Willow Gate Station - Ypsilanti Township, Washtenaw County, MI

TABLE 1.15-3

Vector Milford Meter Station Modifications Anticipated Permits, Approvals, and Authorizations

Administrating Agency	**Approval/Required Review/**Permit a/	**Description/Requirements**
Federal		
Federal Energy Regulatory Commission	Automatic Blanket Certificate	FERC schedule set by Vector.
US Fish and Wildlife Service ("USFWS")	Informal Section 7 Consultation – Endangered Species Act 16 USC Chapter 35. Migratory Bird Treaty Act including Executive Order 13186.	Project consultation regarding threatened and endangered species and migratory birds. No T&E bat species were captured during mist netting surveys in June.
Advisory Council on Historic Preservation, Tribal Historic Preservation Office(s) ("THPO") and State Historic Preservation Office ("SHPO", see below).	National Historic Preservation Act of 1966 Section 106 Reviews	Project consultation and review by AHCP, applicable THPOs, and SHPO regarding potential impacts to historic properties. No discoveries were made. MISHPO currently reviewing Phase I Cultural Resources Report.
State		
Michigan SHPO	National Historic Preservation Act of 1966, Section 106 Consultation	Project consultation and review by SHPO regarding potential impacts to historic properties. No discoveries were made. MISHPO currently reviewing Phase I Cultural Resources Report.
Michigan Department of Environmental Quality ("MDEQ")	Clean Water Act Section 404 - Wetland and Waterbody crossing permits (and Section 401 Water Quality Certification1 will be requested and issued by MDEQ for water resource permit items). DEQ permits include - Public Act 451, Parts 301 (streams), 303 (wetlands), 31 (floodplains).	Joint permit application (with USACE) for wetland, streams, floodplain impacts.
	General Construction Storm water Notice of Coverage and Erosion & Sedimentation Control - Public Act 451, Part 91.	Application notice for earth disturbance over five acre and stormwater pollution prevention plan consistent with MDEQ requirements. MDEQ WRD has responsibility for oversight of Part 91, but review delegated to local agencies (see below).
	Rare, Threatened, and Endangered Species Consultation	Consultation regarding state designated threatened and endangered species.
	Water Withdrawal -Public Act 451, Parts 327/328.	Registration or permit for large quantity water withdrawal (if needed for hydrostatic testing).
	Hydrostatic Test Water Discharge General Permit – Public Act 451, Part 31	General permit coverage for hydrostatic test water discharge of new pipeline(s).

TABLE 1.15-3

Vector Milford Meter Station Modifications Anticipated Permits, Approvals, and Authorizations

Administrating Agency	**Approval/Required Review/**Permit a/	**Description/Requirements**
Local		
Local	Additional County, Town, Municipality Reviews, Permits or Approvals	Other local approvals – may include county/city/town planning or zoning reviews, site or special use approvals for selected facilities (e.g. buildings, interconnects, station locations), building permits, water conservation districts, state or local road crossings, pipeline safety, emergency response plans, spill or site contingency plans may be necessary depending on Project design and siting.
Oakland County Water Resources Commissioner's Office (WRC)	On behalf of the State of Michigan the County Enforcement Agency has granted the WRC with the jurisdiction to enforce Part 91, Soil Erosion and Sedimentation Control of the Natural Resources and Environmental Protection Act. Soil Erosion Permit.	a. Soil Erosion Permit Application form – on file b. Sediment and Erosion Control Plans c. Permit and Inspection Fees – Calculated by WRC
Road Commission For Oakland County ("RCOC")	RCOC Application to Work in a County Road Right-of-Way	Permit application for installing a pipeline along County roads, County road right-of-way, or highway easement. a. As part of the application, a tree removal, trimming, or tunneling requirement is included. If trees are going to be removed that are not directly fronting the Road Frontage, a "wood disposal license agreement" form will need to be signed for each Property Owner, specifically identifying each of the trees impacted. b. Bond requirements and permit fees apply (TBD). c. Before start of work, a Start of Work Notification must be send to RCOC 2 days in advance. d. Upon completion of the work, you must request a final inspection and release of the permit. e. RCOC Inspector for this Project will most likely be Bob Zschering (248) 858-4756.
	RCOC Application for an Extended Transportation Cab Card Permit	a. Forms to be submitted with information for each vehicle/piece of equipment and number of cab cards needed, including mobile office trailers. b. Fees TBD depending on number and size of each vehicle/piece of equipment.
Milford Township	No Permits required from Milford Township	Don Green, the Supervisor of Milford Township confirmed that the Project will not need additional permits from Milford Township for the portion of work within Milford Township. He also confirmed that Pinewood Court is a privately owned drive and to make sure all landowners impacted by this Project within Milford Township have been contacted. Don Green was reassured that the Land staff has been in contact with all landowners about this Project.

TABLE 1.15-3

Vector Milford Meter Station Modifications Anticipated Permits, Approvals, and Authorizations

Administrating Agency	**Approval/Required Review/**Permit a/	**Description/Requirements**
Highland Township	No permits required from Highland Township (Planning Director Beth Corwin did request an update on schedule once ready to go to construction.)	Beth Corwin, Planning Director for Highland Township confirmed that permits from Highland Township are not necessary as long as no building/structure is being constructed as part of the Project. There is no permit needed for above ground valves or meter piping. She did request notification of a construction schedule once finalized.

a/ 401 Water Quality Certification administrated by MDEQ and applies to any permit program where a finding of water quality impact needs to be made by MDEQ (e.g. Section 404 permits, Stormwater General Permit coverage, hydrostatic test discharge, other NPDES discharges *as* applicable).

TABLE 1.16-1

Recently Completed, Current, and Potential Future Projects within Resource Areas of Impact Affected by the NEXUS Project

Project, County a/	Figure 1.16-1 Reference ID (Page Ref.) b/	Description	Anticipated Date of Construction / Project Status	Approximate Closest Distance from NEXUS (mi)	Resources with Potential Overlapping Areas of Impact[1] with NEXUS Project	Source c/
Texas Eastern's Ohio Pipeline Energy Network (OPEN) Project Columbiana County, OH	1 (Page 1 of 3)	The OPEN project consists of approximately 76 miles of new 30-inch diameter mainline pipeline and pipeline 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.	Project is under construction with a planned in-service date of November 2015. FERC issued Section 7c Certificate in December 2014 (FERC Docket Number: CP14-68-000).	0.28	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise and Air Quality, Socioeconomics	Spectra Energy website. 2015
State Route 14F Columbiana County, OH	2 (Page 1 of 3)	Construct new four lane limited access highway from US Route 62 in Columbiana County to SR 11 in Mahoning County.	Ongoing 2005 to 2025.	10	Socioeconomics	Dot.state.oh.us website. 2014a
US Route 62 (Hubbard Arterial) Highway Columbiana County, OH	3 (Page 1 of 3)	Construct new four lane arterial from US Route 62F to Interstate 80.	Ongoing 2014-2030.	10	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Socioeconomics	Dot.state.oh.us website. 2014b
US Route 30 Highway Work Columbiana and Stark Counties, OH	4 (Page 1 of 3)	Construct new four-lane limited access highway from State Route 44 to State Route 9.	Ongoing 2011-2030.	0	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Dot.state.oh.us website. 2014c
Columbia Pipeline Group Pipeline Improvement Project Stark County, OH	5 (Page 1 of 3)	Columbia Gas is replacing more than 20,000 feet of gas pipeline in North Lawrence and Navarre.	Work is ongoing and will be continued into 2017.	6.5 to 12	Socioeconomics	Columbia Pipeline Group website. 2015b
Energy Transfer Rover Pipeline Project Carroll, Stark, Wayne, Wood, Fulton, Lucas Counties, OH	6 (Pages 1, 2, & 3 of 3)	Rover Pipeline LLC ("Rover") is a proposed interstate natural gas pipeline company being designed to transport natural gas from processing facilities located in the Marcellus and Utica Shale areas to market regions in the United States and Canada. The Rover Project consists of 711 miles of 24-inch, 30-inch, 36-inch and 42-inch pipelines consisting of ten Supply Laterals and three Mainlines, nine compressor stations, and associated meter stations and other aboveground facilities that would be located in parts of West Virginia, Pennsylvania, and Ohio.	Construction is requested to begin June/July 2016 with an in-service date of Q1/Q2 2017. A formal application was filed with FERC in February 2015 (FERC Docket No. CP15-93-000).	25	Air Quality, Socioeconomics	Energy Transfer website; FERC docket 2015
FirstEnergy Transmission Glenwillow-Bruce Mansfield Project Columbiana County, OH	7 (Page 1 of 3)	This 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 the Cleveland, Ohio suburb of Glenwillow.	Construction started Spring 2013 with a proposed In-Service Date of June 1, 2015. Project still under construction.	8	Socioeconomics	firstenergycorp.com website. 2015
CAK International Business Park Development Summit County, OH	8 (Page 1 of 3)	This project involves future development at an existing commercial industrial park. Lots have not been developed yet but are available for sale.	NEXUS is not aware of any specific development plans for schedules.	0	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Meeting with the City of Green. 2015

TABLE 1.16-1

Recently Completed, Current, and Potential Future Projects within Resource Areas of Impact Affected by the NEXUS Project

Project, County a/	Figure 1.16-1 Reference ID (Page Ref.) b/	Description	Anticipated Date of Construction / Project Status	Approximate Closest Distance from NEXUS (mi)	Resources with Potential Overlapping Areas of Impact[1] with NEXUS Project	Source c/
Kinder Morgan Utopia East Project Stark, Wayne, Huron, Sandusky, Wood, Henry, Lucas, and Fulton Counties, OH	9 (Pages 1, 2, & 3 of 3)	Kinder Morgan is proposing to develop, construct, own, and operate a 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.	Stakeholder outreach and field survey activities are on-going. Construction is planned to begin in November 2016 with an in-service date of January 2018.	0 - MP 195	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise and Air Quality, Socioeconomics	Kinder Morgan website. 2015
Residential Subdivision - Woods at Silver Creek Ltd. Wayne County, OH	10 (Page 1 of 3)	Tract # OH-WA-026.0000. Woods at Silver Creek Ltd. – Township approved 65 Allotments for future development.	Allotments approved by Township since 2003. Construction schedule is unknown; however, a Page is on file in Wayne County.	0.1	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	The Woods at Silver Creek website. 2013 Discussions with landowner
Shopping Center, Apartment Complex, Residential Development Wayne and Medina Counties, OH	11 (Page 1 of 3)	Tract # OH-WA-030.0000, OH-ME-030.0000-TAR-3-53.6, OH-ME-030.0100, OH-WA-000.0001-SA-2-SPRD-2..A R Lockhart Development – plans contingent upon developer installing sewage line. Plans have been filed with the county but zoning has not been approved.	Plans filed with the county.	0	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Discussions with landowner
Wadsworth Airport Expansion Medina County, OH	12 (Page 1 of 3)	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.	No status given; City of Wadsworth received a grant from the Federal Aviation Administration in May 2009. According to the City, the project will begin in the next four to five years.	0	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Master Plan Working Paper "A" for Wadsworth Municipal Airport, February 2009. Medina Gazette, 2009
Residential Subdivision Proposed by Damar Valley LLC Medina County, OH	13 (Page 1 of 3)	Tract # OH-ME-016.0000. Damar Valley LLC – Subdivision proposed on 68-acre property.	Potential future project; however, no plans have been filed by the landowner.	0	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Discussions with landowner
Residential Subdivision Proposed by Private Landowner Medina County, OH	14 (Page 1 of 3)	Tract # OH-ME-060.0000, OH-ME-062.0000, OH-ME-063.0000. Plans to subdivide property along road frontage on Blake/Guilford roads.	Potential future project; however, no plans have been filed by the landowner.	0	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Discussions with landowner
Residential Subdivision Proposed by Private Landowner Medina County, OH	15 (Page 1 of 3)	Tract # OH-ME-077.0000. Plans to subdivide 40-acre lot.	Potential future project; however, no plans have been filed by the landowner.	0	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Discussions with landowner
Property Development Medina County, OH	16 (Page 1 of 3)	Tract # OH-ME-116.0000, OH-ME-117.0000. VGL Properties LLC – stone driveways and paths to be created for outdoor public attractions.	In process of obtaining permits.	0	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Discussions with landowner
TransCanada ANR East Pipeline Project Wayne County, OH	17 (Pages 1 & 2 of 3)	The pipeline would consist of approximately 320 miles of large diameter, 1440 psig maximum allowable operating pressure pipeline and up to 140,000 hp of compression and is anticipated to have a capacity between 1.2 and 2.0 Bcf/d, depending upon contractual commitments, project scope and final design.	TransCanada has not entered the pre-filing process of the FERC.	23.7	Air Quality, Socioeconomics	TransCanada ANR East Pipeline Project Brochure. 2014
Columbia Pipeline Group Pipeline Improvement Project	18 (Page 1 of 3)	Columbia Gas is replacing more than 10,000 feet of gas pipeline.	Started in June 2015 and was scheduled to be completed in October 2015.	4	Socioeconomics	Columbia Pipeline Group website. 2015b

TABLE 1.16-1

Recently Completed, Current, and Potential Future Projects within Resource Areas of Impact Affected by the NEXUS Project

Project, County a/	**Figure 1.16-1 Reference ID (Page Ref.) b/**	**Description**	**Anticipated Date of Construction / Project Status**	**Approximate Closest Distance from NEXUS (mi)**	**Resources with Potential Overlapping Areas of Impact[1] with NEXUS Project**	**Source c/**
Medina County, OH						
Columbia Pipeline Group Pipeline Improvement Project Lorain County, OH	19 (Pages 1 & 2 of 3)	Columbia Gas is replacing more than 16,000 feet of gas pipeline.	Project was completed in 2014.	1	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Socioeconomics	Columbia Pipeline Group website. 2015b
Widen and rehab SR 57 between the Ohio Turnpike and I-90 in the City of Elyria Lorain County, OH	20 (Pages 1 & 2 of 3)	Widening and rehabilitation of SR 57 to occur between the Ohio Turnpike and I-90 in the city of Elyria. The 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 Summer 2016.	5	Land Use, Socioeconomics	Dot.state.oh.us website. 2014b
Widen and rehab SR 611 bridge over I-90 in the City of Avon Lorain County, OH	21 (Page 1 & 2 of 3)	The project includes widening and rehabilitation of the existing SR 611 bridge over I-90 in the City of Avon, OH. The project includes widening for a bike lane and sidewalk on both sides, new bridge deck and resurfacing a portion of SR 611. SR 611 is reduced to one lane of traffic and I-90 to two narrowed lanes in each direction.	Project was completed in June 2015.	15	Socioeconomics	Dot.state.oh.us website. 2014b
Potential Commercial Park Lorain County, OH	22 (Page 2 of 3)	Tract # OH-LO-094.0000, OH-LO-095.0000. West Park, LLC – plans for 35-acre commercial park to be updated and/or renovated.(recently sold to Western Land Conservancy)	Potential future project; however, no plans have been filed by the landowner (recently sold to Western Land Conservancy).	0	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Discussions with landowner
Columbia Pipeline Group – Pipeline Improvement Project Lorain County, OH	23 (Page 2 of 3)	Columbia Gas is replacing more than 16,000 feet of gas pipeline in two locations.	Project was completed in 2014.	1	Socioeconomics	Columbia Pipeline Group website. 2015b
2015 Road Construction Project Huron County, OH	24 (Page 2 of 3)	Along US Route 224, just east of State Route 99 is a rehabilitation project.	The project began on May 1, 2015 and is expected to be complete December 15, 2015.	20.1	Socioeconomics	Dot.state.oh.us website. 2014b
Columbia Pipeline Group Pipeline Improvement Project Huron County, OH	25 (Page 2 of 3)	Columbia Gas is replacing more than 10,000 feet of gas pipeline in Willard.	Work is in progress and is expected to be completed by the end of 2015.	6.5	Socioeconomics	Columbia Pipeline Group website. 2015b
Columbia Pipeline Group Pipeline Improvement Project Huron County, OH	26 (Page 2 of 3)	Columbia Gas is replacing more than 10,000 feet of gas pipeline in Norwalk.	Work is in progress and is expected to be completed by the end of 2015.	20	Socioeconomics	Columbia Pipeline Group website. 2015b
2015 Road Construction Project Huron County, OH	27 (Page 2 of 3)	Construct bridge replacement by Lovers Lane.	Construction started on April 1, 2015 and is expected to end on October 31, 2015.	5	Socioeconomics	Dot.state.oh.us website. 2014b

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Recently Completed, Current, and Potential Future Projects within Resource Areas of Impact Affected by the NEXUS Project

Project, County a/	Figure 1.16-1 Reference ID (Page Ref.) b/	Description	Anticipated Date of Construction / Project Status	Approximate Closest Distance from NEXUS (mi)	Resources with Potential Overlapping Areas of Impact[1] with NEXUS Project	Source c/
Potential Commercial Park Erie County, OH	28 (Page 2 of 3)	Tract # OH-ER-106.0020-TAR-7. Avery Commerce Park, LLC – plans for 67-acre commercial park to be updated and/or renovated.	Potential future project; however, no plans have been filed by the landowner.	0.2	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Discussions with landowner
Columbia Pipeline Group Pipeline Improvement Project Erie County, OH	29 (Page 2 of 3)	Columbia Gas is replacing more than 25,000 feet of gas pipeline in the vicinity of Hayes Avenue.	Started in Summer 2015 and proposed to be completed by the end of 2015.	6.2	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Socioeconomics	Columbia Pipeline Group website. 2015b
FirstEnergy Proposed Hayes-West Fremont Transmission Line Project Erie County, OH	30 (Page 2 of 3)	This Project involves building approximately 30 miles of new 138 kV transmission line that will extend 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.	0.5	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	firstenergycorp.com website. 2015
2014 Construction Projects on I-90 Sandusky County, OH	31 (Page 2 of 3)	Projects will involve base pavement replacement from Milepost 101.2 to 107.3. Pavement resurfacing will occur in both east and westbound lanes.	Construction started on April 7, 2015. The estimated completion date is November 2, 2015.	0	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Ohioturnpike.com website. 2014
State of Ohio and Sandusky County creating new intersection/road Sandusky County, OH	32 (Page 2 of 3)	Intersection of 53 and Turnpike just south of proposed pipeline route. 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.	Possibly start construction in 2016.	0.1	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Ohio DOT website, 2015
Ohio DOT Anthony Wayne Bridge (SR2) Widening Project Lucas County, OH	33 (Pages 2 & 3 of 3)	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, substructure improvements, new street lighting and rebuilding sidewalks, railings and fencing.	Started in July 2014 and proposed to be completed by December, 2015.	11	Socioeconomics	Dot.state.oh.us website. 2014b
Ohio DOT I-75 Reconstruction Project Lucas County, OH	34 (Page 3 of 3)	The Project involves reconstructing over 3 miles of pavement from Dorr Street to Central Avenue in downtown Toledo. The Project will also add a third lane to 32 miles of interstate I-75.	Started in Summer 2014 and proposed to be completed by Summer 2016.	11	Socioeconomics	Dot.state.oh.us website. 2014b
Columbia Pipeline Group Pipeline Improvement Project Lucas County, OH	35 (Page 3 of 3)	Columbia Gas is replacing more than 95,000 feet of gas pipeline in the Toledo area.	Started in January 2015 and proposed to be completed by the end of 2015.	10.6	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Socioeconomics	Columbia Pipeline Group website. 2015b
Jefferson Street Widening/Improvement Project Wood County, OH: City of Perrysburg/Perrysburg Township	36 (Page 3 of 3)	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 State Route 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.	5	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Socioeconomics	Wood County Commissioners website. 2015

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FirstEnergy Dowling Substation and Transmission Line Project Wood County, OH	37 (Page 3 of 3)	This project includes extending an existing transmission line by 150 feet and constructing a new substation (Dowling Substation) in Wood County.	Construction started 1st Quarter 2014 with a proposed In-Service Date of June 1, 2015.	5	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Land Use, Socioeconomics	firstenergycorp.com website. 2015
Columbia Pipeline Group Pipeline Improvement Project Wood County, OH	38 (Page 3 of 3)	Columbia Gas is replacing more than 25,000 feet of gas pipeline in the Bowling Green area.	Started in January 2015 and proposed to be completed by the end of 2015.	6.7	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Socioeconomics	Columbia Pipeline Group website. 2015b
Masonic Lodge Retirement Home Build Out Lucas County, OH	39 (Page 3 of 3)	Tract # 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. Browning Masonic Community Inc. – plans to build a retirement community with housing and other facilities on the property.	Pre-filing stage.	0	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Discussions with landowner
Noward Road Rebuild Project Waterville Township and Lucas County, OH	40 (Page 3 of 3)	Lucas County, Waterville Township, TWSP RD 137 (Noward) between Highway 64 and Neopolis Waterville Rd.	The plans are firm and they intend to start in the Spring of 2017.	1	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Socioeconomics	Ohio DOT website, 2015
2014 Lucas Culvert Projects Lucas County, OH	41 (Page 3 of 3)	Lucas County will replace culverts in the following locations: 935 Jeffers Road, 989 Perry Road, and 1038 Manore Road.	Completed in 2014.	1	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Socioeconomics	Providence Township, Lucas County Engineer website. 2014
Ohio DOT I-475 Bridge Widening Project Lucas County, OH	42 (Page 3 of 3)	Replace and widen three bridges on I-475. Bridges are located on I-475 over Wolf Creek, Norfolk Southern Railroad tracks and Angola Road.	Started in June 2014 and proposed to be completed in August, 2016.	4	Socioeconomics	Dot.state.oh.us website. 2014b
Ohio DOT McCord Rd Railroad Grade Separation Project Lucas County, OH	43 (Page 3 of 3)	The Project 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. The roundabout at the intersection of McCord Road and North Mall Drive/Hill Street was scheduled for completion in August 2015.	5	Land Use, Socioeconomics	Dot.state.oh.us website. 2014b
Ohio DOT I-475/US23 Improvement Project Lucas County, OH	44 (Page 3 of 3)	This safety project will improve 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.	5	Land Use, Socioeconomics	Dot.state.oh.us website. 2014b
2015 Monroe County Road Construction Projects Monroe County, MI	45 (Page 3 of 3)	Monroe 2015 Road Construction	Ongoing; 2015.	varies within county	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Monroe County Road Commission website. 2015
Planned Residential Subdivision Monroe County, MI	46 (Page 3 of 3)	Tract # MI-MR-049.0000-SC. Crescent Hills Associates, LLC – Subdivision Expansion. Planned subdivision would take up the entire parcel. There are two existing lines here already.	Potential future project; however, no plans have been filed by the landowner.	0	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Discussions with landowner.

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2014 Washtenaw County Road Construction Projects Washtenaw County, MI	47 (Page 3 of 3)	Washtenaw 2014 Road Construction	Ongoing; 2015.	varies within county	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Washtenaw County Road Commission website. 2014
2015 Washtenaw County Road Construction Projects Washtenaw County, MI	48 (Page 3 of 3)	Washtenaw 2015 Road Construction	Ongoing; 2015.	varies within county	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Washtenaw County Road Commission website. 2015
Bridge Replacement and Construction Project Washtenaw County, MI	49 (Page 3 of 3)	Small bridge along Arkona Road, just west of Pagele Road, in Saline is being replaced.	Construction is expected to start in September 2015 and to be finished by late October 2015.	3.4	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Socioeconomics	Washtenaw County Road Commission website. 2015
2015/2016 Road Construction Project Washtenaw County, MI	50 (Page 3 of 3)	Asphalt Overlay is being laid out over Stony Creek Rd to Mooreville Rd.	Construction expected to begin in Fall 2015, and to finish in Summer 2016.	1	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Socioeconomics	Washtenaw County Road Commission website. 2015
Subdivision Expansion Washtenaw County, MI	51 (Page 3 of 3)	An easterly expansion of the subdivision is proposed on the property to the west of parcel tract # MI-WA-048.0000.	Tentatively breaking ground on road construction in the spring of 2016.	0	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Discussions with landowner.
2014 Monroe County Road Construction Projects Monroe County, MI	52 (Page 3 of 3)	Monroe 2014 Road Construction	Ongoing.	varies within county	Socioeconomics	Monroe County Road Commission website. 2014
Planned Apartment Complex/ Gas Station / Service Station Washtenaw County, MI	53 (Page 3 of 3)	Apartment complex and restaurant construction proposed along southern portion of the lake. Gas Station/Retail Space proposed in the northeast corner of property on MI-WA-112.0000, MI-WA-112.0000-TAR-9.251.1, MI-WA-112.0000-HTAR-2.	Plans filed with Ypsilanti Township.	0	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Discussions with landowner.
Utica/Point Pleasant Shale Horizontal Wells Columbiana County, OH townships: Knox, West, Hanover Medina County, OH townships: Harrisville Stark County, OH townships: Marlboro, Osnaburg, Washington, Bethlehem, Sandy, Paris, Pike Wayne County, OH townships: East Union	not shown on map	146 horizontal drilling permits have been issued and 83 wells have been drilled and/or are producing in counties traversed by the NEXUS Project area.	Data from Ohio Department of Natural Resources through October 5, 2015.	Varies	Surface Waters, Wetlands, Groundwater, Vegetation, Wildlife & Fisheries (including protected species and Migratory Birds), Soils, Geology, Cultural, Land Use, Noise, Socioeconomics	Oilandgas.ohiodnr.gov website. 2015
Columbia Gas Transmission, LLC Leach XPress Project	not shown on map	The proposed Leach XPress project involves construction of approximately 160 miles of 30- and 36-inch diameter natural gas pipelines, along with associated	Construction is planned to begin in late 2016, with a targeted in-service date during the second half	70		Columbia Pipeline Group website. 2015a

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Outside of NEXUS counties; located in Monroe, Noble, Muskingum, Morgan, Perry, Fairfield, Hocking, and Vinton Counties, OH		compression and other appurtenant facilities, in southeastern Ohio and West Virginia's northern panhandle. The final route extends 1.5 miles into southwestern Pennsylvania.	of 2017. FERC is reviewing the application. The FERC assigned the project a new docket number (No. CP15-514-000).		NEXUS acknowledges this project is proposed in the general vicinity; however, it does not share the same Areas of Impact as the NEXUS Project.	
FirstEnergy Harmon-Toronto Transmission Line Project Stark County, OH	not shown on map	This project involves constructing approximately 60 miles of new 345 kV transmission line to connect two new substations, the Harmon and Toronto Substations. The new transmission line will be located in Stark, Carroll and Jefferson counties in Ohio. The Harmon Substation will be located in Stark County and the Toronto Substation will be located in Jefferson County.	Construction proposed to start in December 2013 with an In-Service Date of June 2017 (project Withdrawn).	13	This project has been withdrawn since the Pre-filing Draft of Resource Report 1 for the NEXUS Project was filed in June 2015.	firstenergycorp.com website. 2015
FirstEnergy Harmon-Star Transmission Line Project Stark County, OH	not shown on map	This project involves constructing approximately 25 miles of new 345 kV transmission line from the new Harmon Substation in Stark County to the existing Star Substation in Medina County.	Construction proposed to start in December 2013 with an In-Service Date for Summer 2015 (project Withdrawn).	0	This project has been withdrawn since the Pre-filing Draft of Resource Report 1 for the NEXUS Project was filed in June 2015.	firstenergycorp.com website. 2015

[1] The resource Area of Impact (AOI) used in these cumulative impact analyses were identified by the FERC in its March 24, 2015, comments on NEXUS' January 2015 pre-filing submittal of Resource Report 1 and are summarized in Section 1.16 of Resource Report 1. These AOI differ and are dependent upon the type of resource potentially impacted. The AOI identified by the FERC include use of Hydrologic Unit Code 12 Watersheds (HUC 12 Watersheds) for surface waters, wetlands, groundwater, vegetation, wildlife, fisheries, protected species, migratory birds, soils and geology; projects with overlapping impacts on historic properties; 0.5 mile for land use (including visual and residential); and 5 miles for Projects having greater than 10 acres of land use alteration; 0.5 mile for overlapping noise sensitive areas; counties for socioeconomics and air quality impacts (pipeline and stationary sources); 50-kilometer radius from stationary sources near county borders.

a/ Counties listed only if intersected by the NEXUS Project.

b/ See Figure 1.16-1 in Resource Report 1 for locations of projects that are identified by Figure Reference IDs.

c/ Sources:

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Columbia Pipeline Group. 2015b. Current Projects. Online: https://www.columbiagasohio.com/community-news/replacement/list-of-our-projects. Accessed October 14, 2015.

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TransCanada. 2014. ANR East Pipeline Project Brochure: Providing transportation for emerging Utica supplies to access diverse markets in the Midwest, Ontario and Gulf Coast. July 2014.

Washtenaw County Road Commission. 2015. Online: http://www.wcroads.org/Roads/MajorRoadWork. Accessed October 5, 2015.

TABLE 1.16-1

Recently Completed, Current, and Potential Future Projects within Resource Areas of Impact Affected by the NEXUS Project

Project, County a/	Figure 1.16-1 Reference ID (Page Ref.) b/	Description	Anticipated Date of Construction / Project Status	Approximate Closest Distance from NEXUS (mi)	Resources with Potential Overlapping Areas of Impact[1] with NEXUS Project	Source c/

Washtenaw County Road Commission. 2014. Road and Bridge Projects. Online: http://www.wcroads.org/Roads/MajorRoadWork# . Accessed October 5, 2015.

Wood County Board of County Commissioners, Ohio. 2015. Online: http://www.co.wood.oh.us/Commissioners/bids/September%202014/FY13%20Jefferson%20Street%20Tech%20Specs.pdf. Accessed January 20, 2015.

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FIGURES

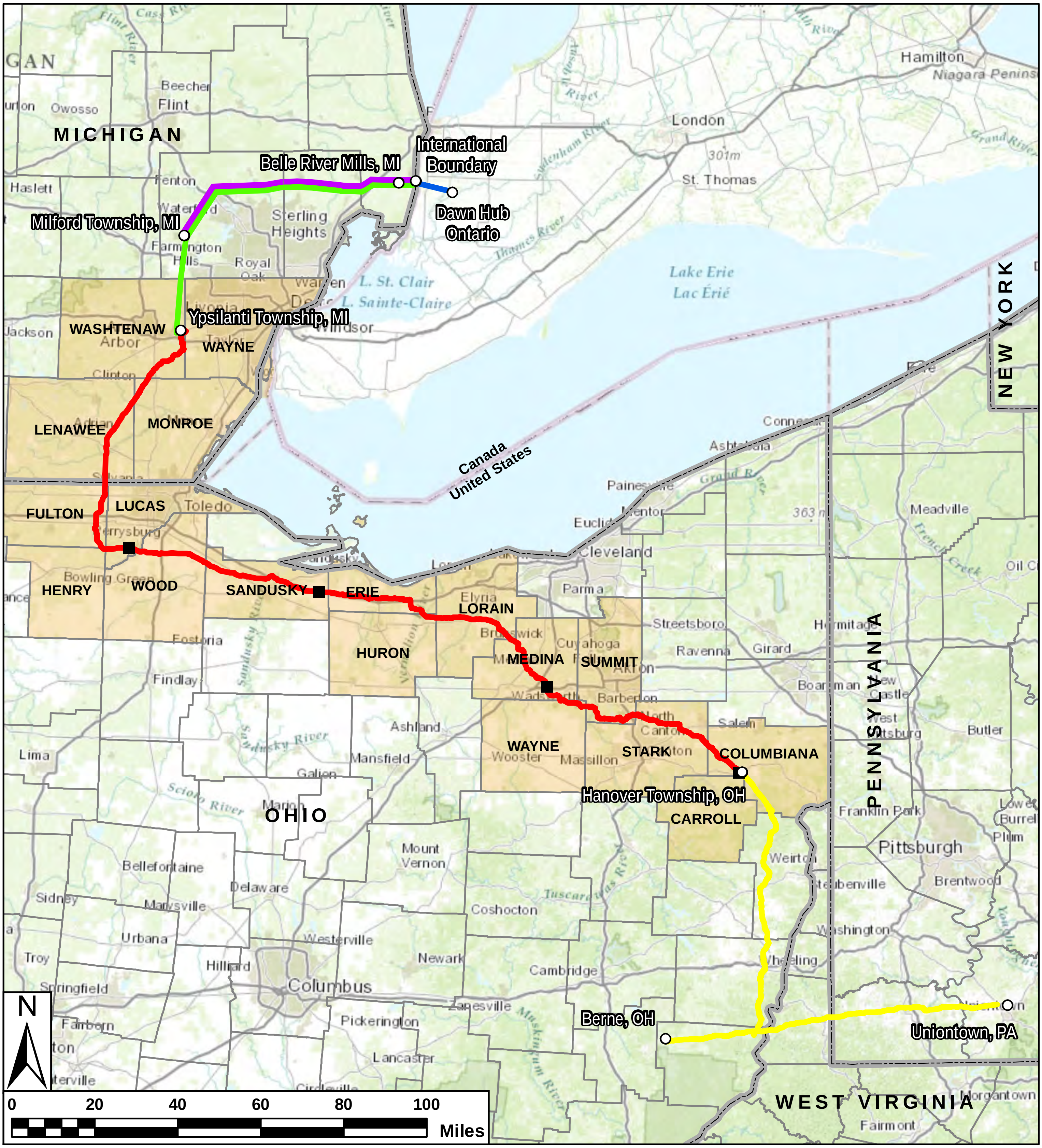
Proposed NEXUS Mainline Pipeline
Proposed Compressor Sites
Proposed M & R Station
Confirmed Market Connection
County Boundary
State Boundary

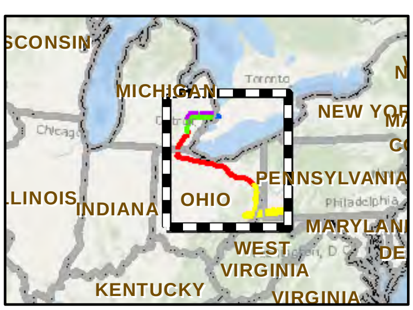
Figure 1.1-1

NEXUS Project Location Map

NEXUS GAS TRANSMISSION

11/16/2015





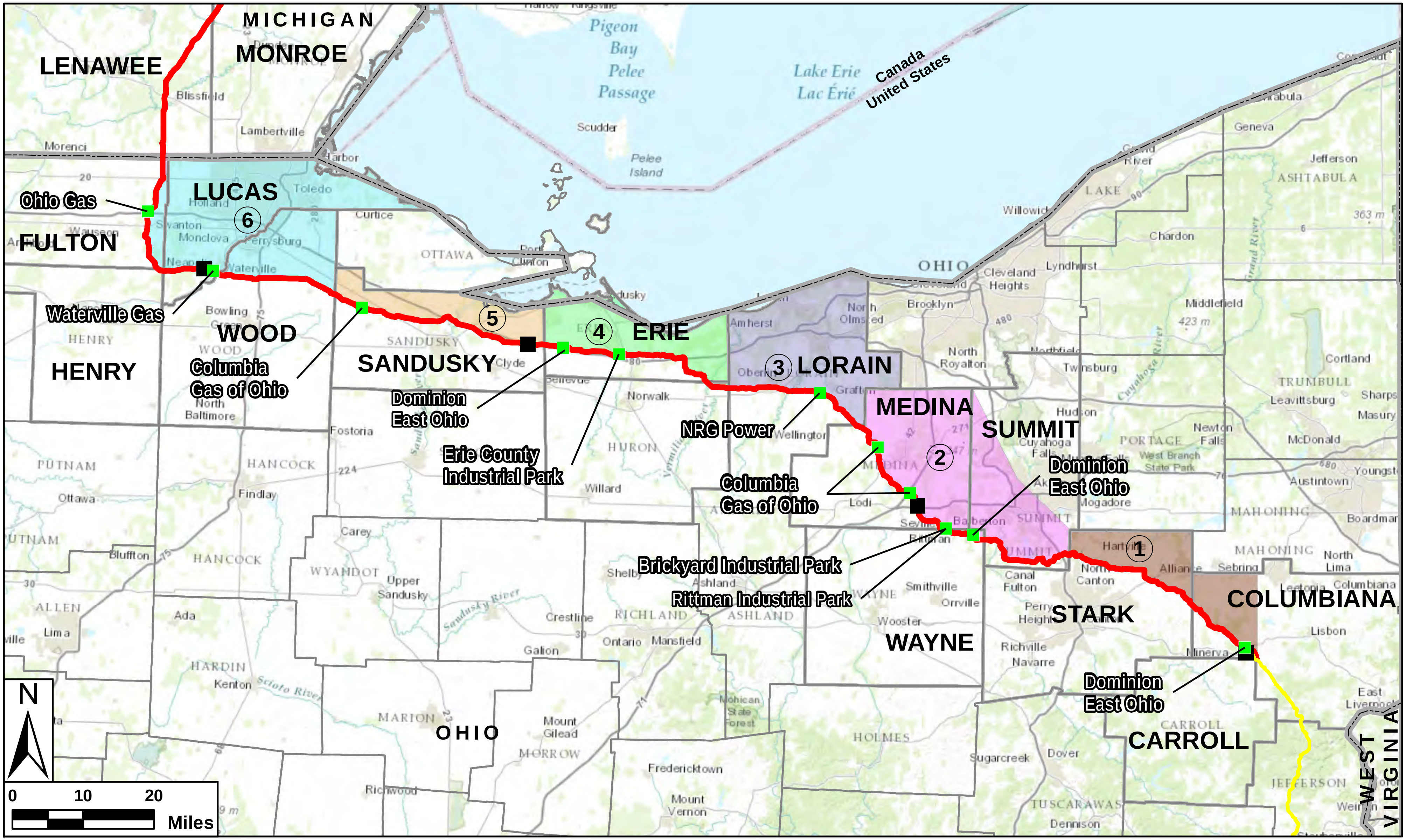
- Proposed NEXUS Mainline Pipeline
- Proposed Compressor Sites
- Texas Eastern Pipeline System (Contracted Capacity)
- Vector U.S. Pipeline System (Contracted Capacity)
- Vector Canada Pipeline System (Contracted Capacity)
- DTE Gas Transportation System (Contracted Capacity)
- County Boundary
- State Boundary

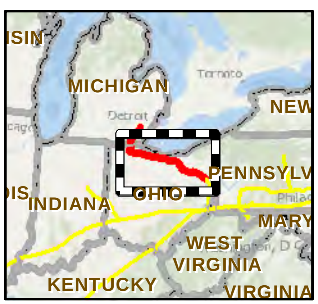
Figure 1.1-2

NEXUS Systems Overview Map

NEXUS GAS TRANSMISSION

11/11/2015





Confirmed Market Connections
Proposed Compressor Sites
Proposed NEXUS Mainline Pipeline
Texas Eastern Pipeline System
County Boundary
State Boundary

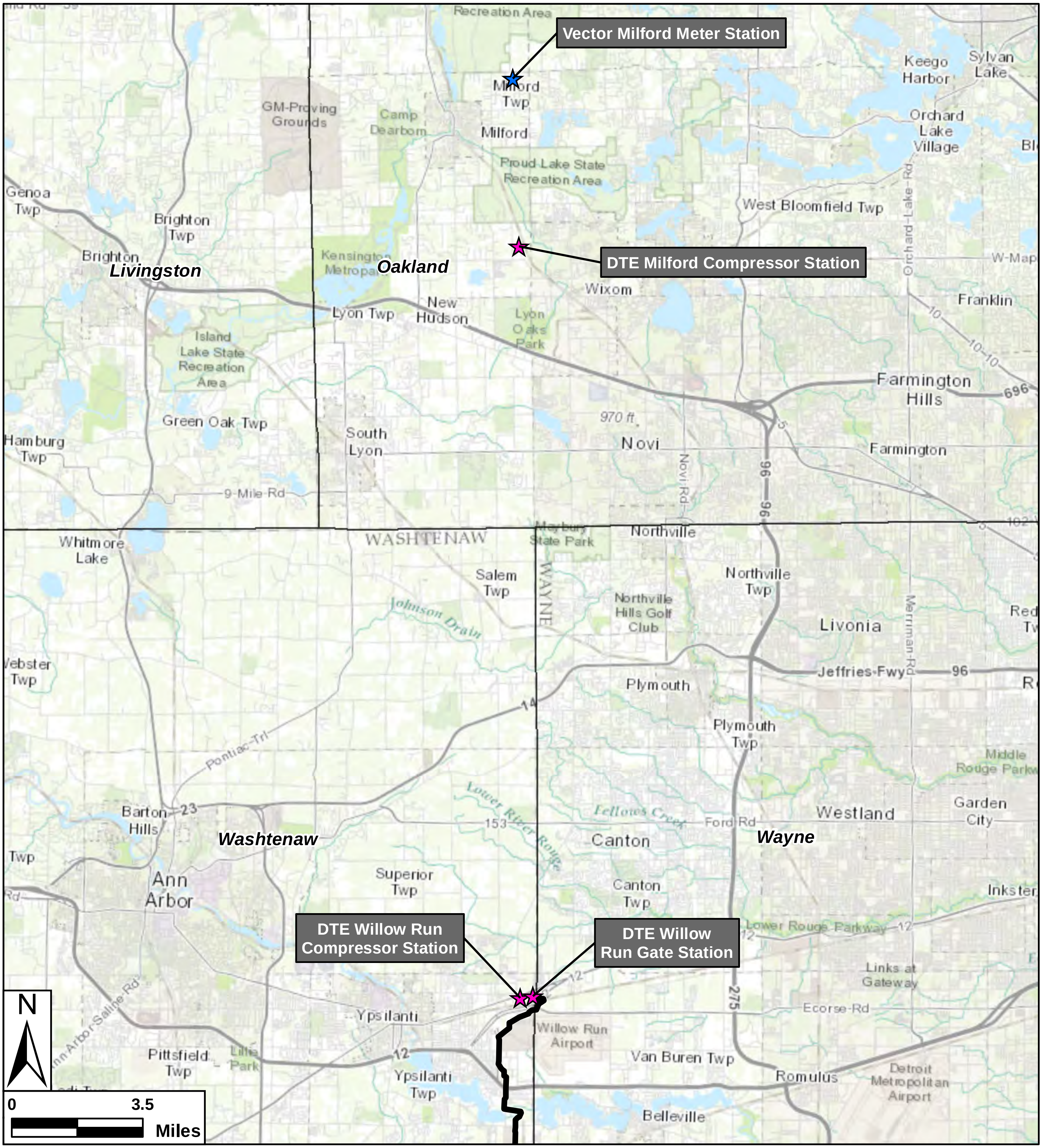
Prospective Market Areas
1
2
3
4
5
6

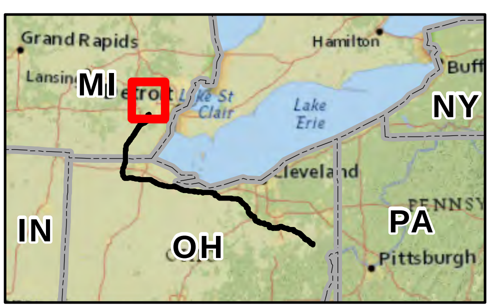
Figure 1.2-1

Ohio Market Areas

NEXUS GAS TRANSMISSION

11/6/2015





Proposed NEXUS Mainline Pipeline
County Boundary
State Boundary

Facilities

DTE
Vector

Figure 1.15-1

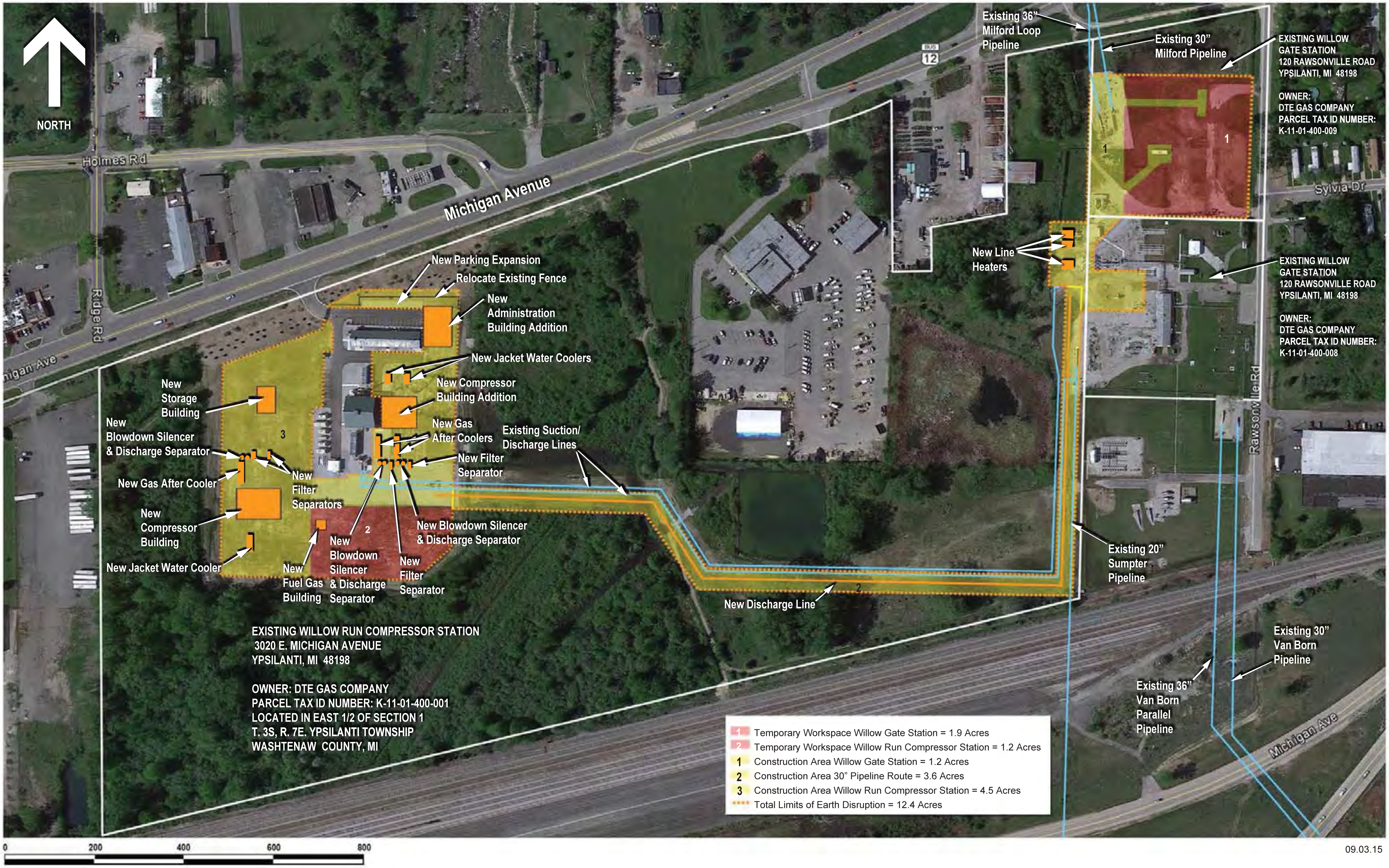
Vicinity Map
DTE and Vector Facilities

NEXUS GAS TRANSMISSION

11/6/2015

Proposed Modifications to DTE's Existing Willow Run Compressor Station and Gate Station

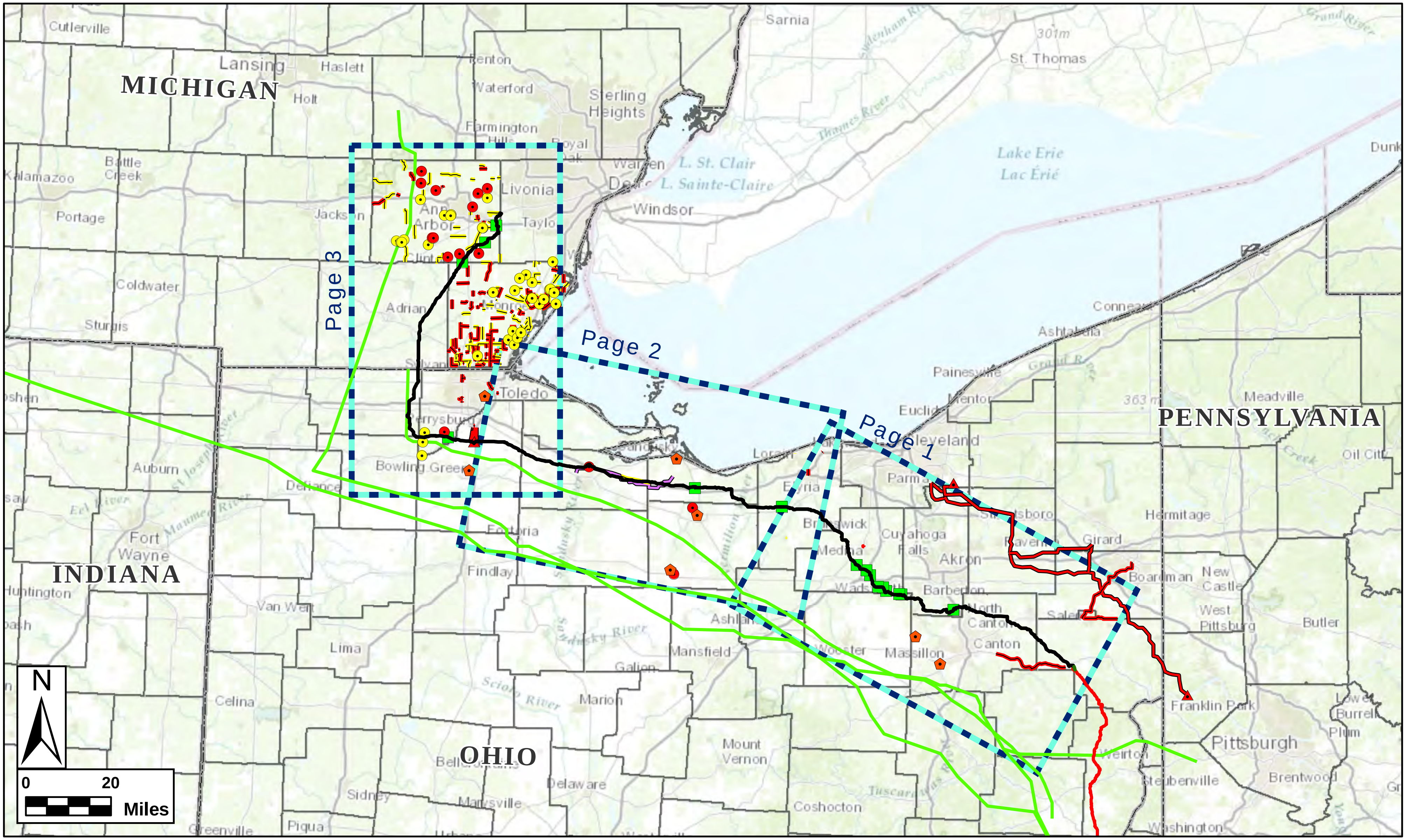
FIGURE 1.15-2



Proposed Modifications to DTE's Existing Milford Compressor Station

FIGURE 1.15-3

OAKLAND COUNTY, MICHIGAN
PROPOSED MODIFICATIONS TO VECTOR US MILFORD METER STATION
FIGURE 1.15-4
HIGHLAND STATION
VECTOR PIPELINE
DTE ENERGY LINE
S. DUCK LAKE RD.
DUCK LAKE RD.
VECTOR MILFORD METER STATION
SEE DRAWING 6190102 FOR MILFORD METER STATION MODIFICATIONS
EXISTING RETAINING POND
ACCESS ROAD A
AREA A 330' X 675' 5.71 ACRES
BEGIN PRIMARY ROUTE MILEPOST 0.0
EXISTING OVERHEAD ELECTRIC
EXISTING PIPELINE
25' TWS
50' PERM
25' x 100' ATWS
10' PRIVATE DR.
MICHIGAN DEPT OF NATURAL RESOURCES
END PRIMARY ROUTE MILEPOST 0.6
ACCESS ROAD B
TEMP. LAUNCHING/RECEIVING TAP SITE 1.18 ACRE
PRELIMINARY
FOR INFORMATION ONLY
NOT FOR CONSTRUCTION
LEGEND
EXISTING OVERHEAD ELECTRIC
EXISTING GASLINE
EXISTING FENCELINE
EXISTING PROPERTY LINE
EXISTING PAVED
EXISTING UNPAVED
ROAD CENTERLINE
PROPOSED PIPELINE
PROPOSED ACCESS ROAD
PROPOSED PERMANENT EASEMENT
PROPOSED TEMPORARY WORKSPACE
PROPOSED ADDITIONAL TEMPORARY WORKSPACE
PROPOSED MILE MARKER
200 100 0 200 400
SCALE IN FEET
D SQUARED ENGINEERING, PLLC.
ENERGY MANAGEMENT & SERVICES CO.
CORPORATE OFFICE: 109 FIELDVIEW DRIVE P.O. BOX 1007 VERSAILLES, KY 40383
TEL:(859) 873-0078 · FAX:(859) 873-5872
BRANCH OFFICES: HOUSTON, TX : DETROIT, MI CHARLESTON, WV : PITTSBURGH, PA
www.emseng.com
REVISIONS
MATERIAL SUMMARY
APPROVED FOR CONSTRUCTION
APPROVED FOR BIDDING
APPROVED FOR FILING
OVERVIEW MAP
MILFORD METER STATION MODIFICATIONS AND SUPPORTING 30" SUCTION-SIDE PIPELINE
Vector Pipeline
SCALE: 1" = 200'
DRAWN BY: CDH 4/27/15
DRAFTING CK: RMM 4/27/15
ENGINEERING CK: JHS 4/27/15
CONSTRUCTION CK: –
ENVIRONMENTAL CK: –
AFE/P.O.NO.: –
EMS PROJECT NO.: 6190
DRAWING NO.: 61901001
SHEET: 1 OF 1 REVISION: –
DATE OF PLOT: 9/11/2015



Proposed NEXUS Mainline Pipeline	Electrical Transmission, Under Construction (point)
Proposed TGP Interconnect	Road, Under Construction (point)
County Boundary	Road, Completed (point)
Page Index	Gas Pipeline, Under Construction (point)
	Residential/Commercial Development, Planned

Proposed NEXUS Mainline Pipeline
Proposed TGP Interconnect
County Boundary
Page Index

Electrical Transmission, Under Construction
Road, Under Construction
Road, Completed
Gas Pipeline, Under Construction
Residential/Commercial Development, Planned

Electrical Transmission, Under Construction
Electrical Transmission, Proposed
Gas Pipeline, Under Construction
Gas Pipeline, Planned
Gas Pipeline, Completed
Road, Under Construction
Road, Completed

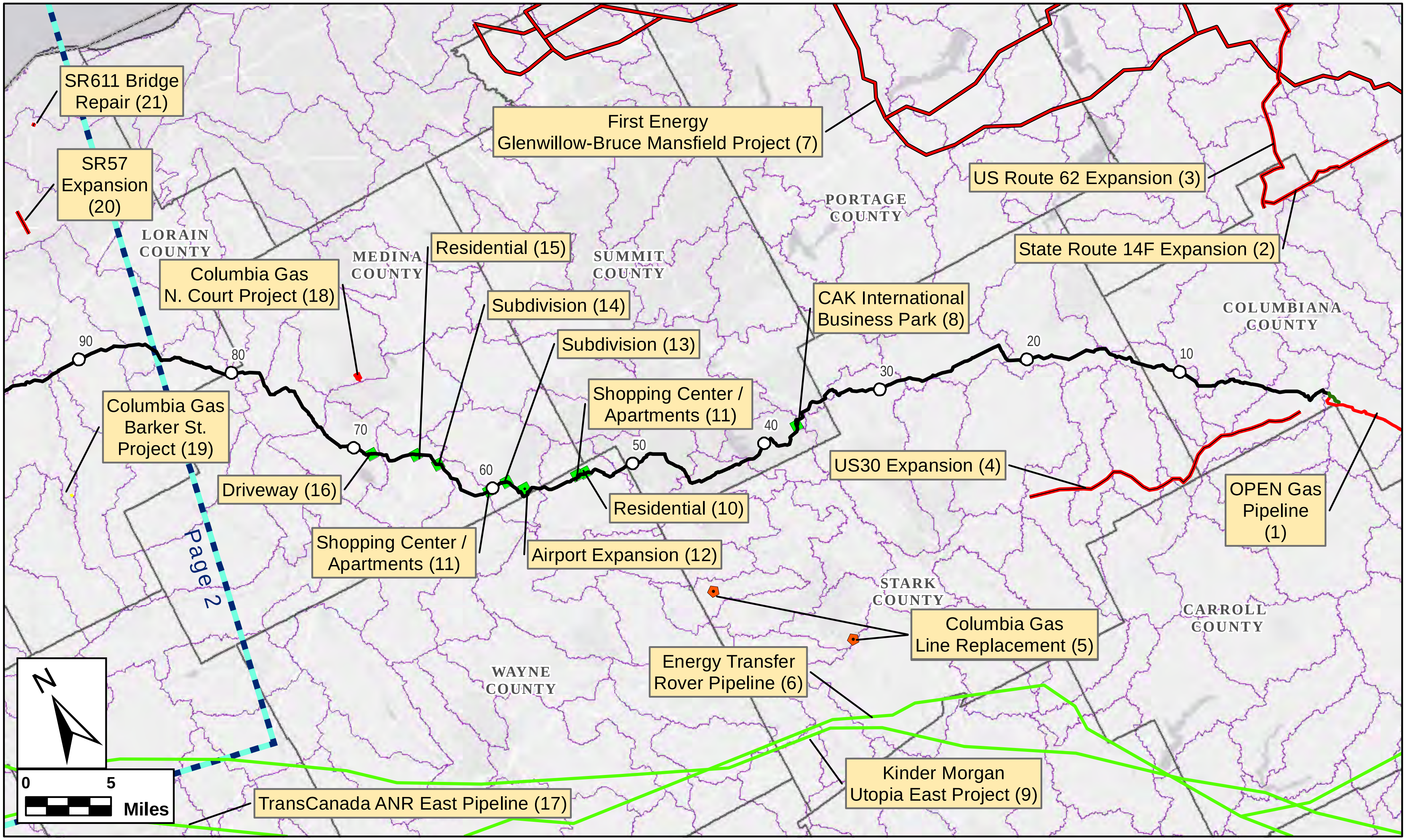
Figure 1.16-1
Recently Completed, Current, and Potential Future Projects within Resource Areas of Impact Affected by the NEXUS Project

NEXUS GAS TRANSMISSION

Created: 11/16/2015

Overview

DATA SOURCES: TRC, Spectra, Columbia Pipline Group, Energy Transfer, First Energy, Lucas County, USGS, Monroe County Road Commission, Ohio DOT, TransCanada, Washtenaw County Road Commission, and Wood County



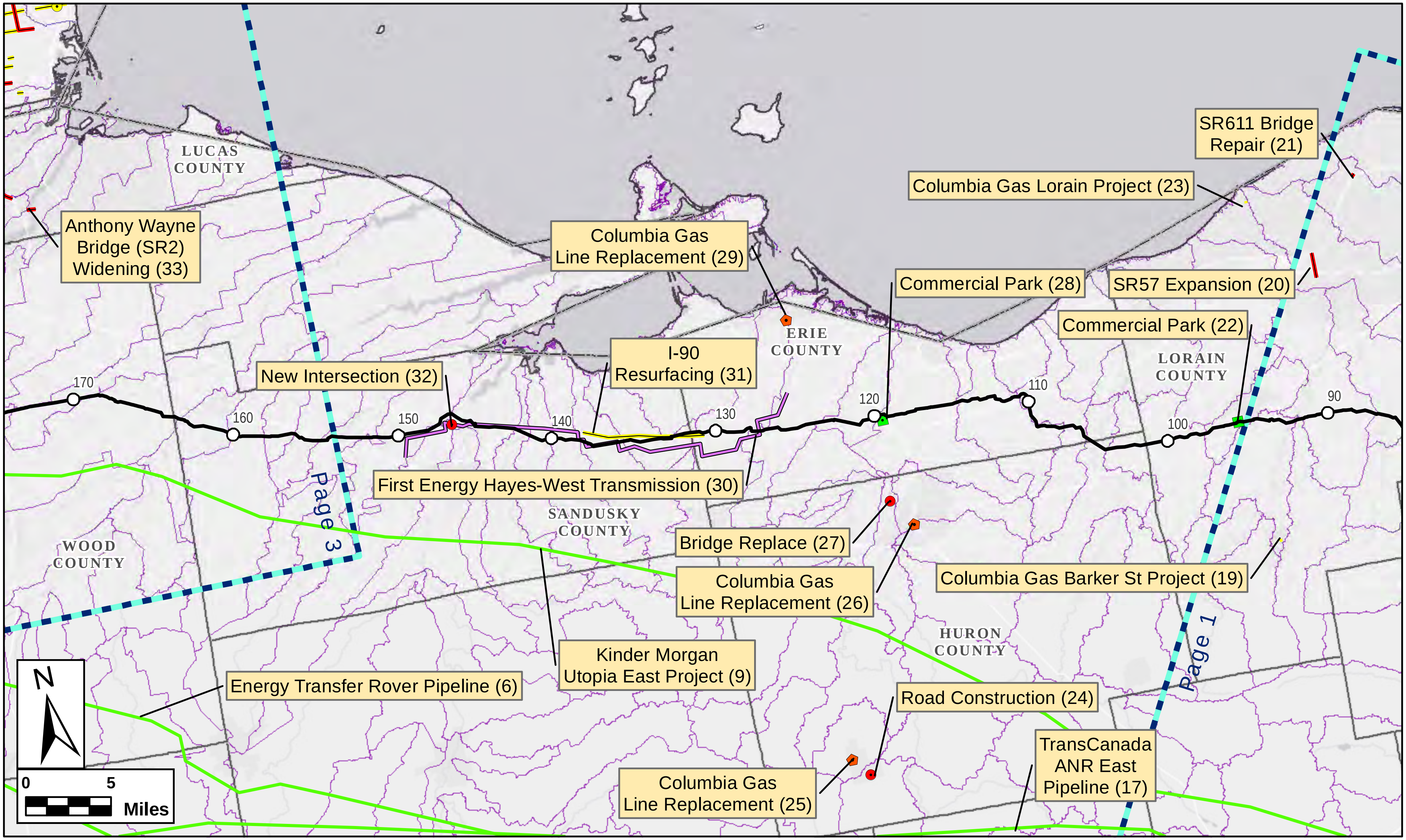
- Milepost (10 miles)
- Proposed NEXUS Mainline Pipeline
- Proposed TGP Interconnect
- Adjacent Page
- HUC 12 Watersheds
- County Boundary
- Gas Pipeline, Under Construction
- Residential/Commercial Development, Planned
- Electrical Transmission, Under Construction
- Gas Pipeline, Under Construction
- Gas Pipeline, Planned
- Gas Pipeline, Completed
- Road, Under Construction

Figure 1.16-1
Recently Completed, Current, and Potential Future Projects within Resource Areas of Impact Affected by the NEXUS Project

NEXUS GAS TRANSMISSION

Created: 11/16/2015

DATA SOURCES: TRC, Spectra, Columbia Pipline Group, Energy Transfer, First Energy, Lucas County, USGS, Monroe County Road Commission, Ohio DOT, TransCanada, Washtenaw County Road Commission, and Wood County



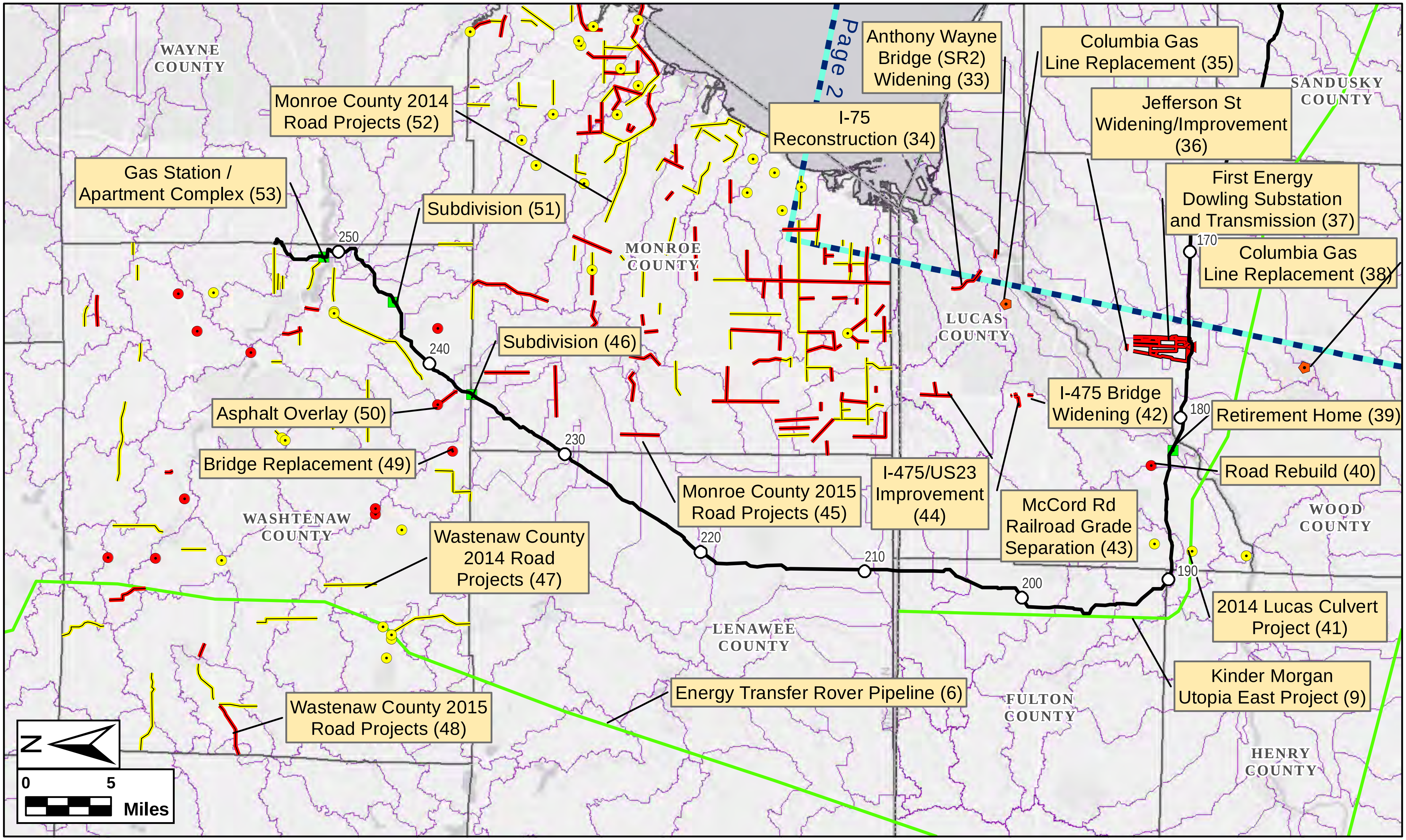
Milepost (10 miles)
Proposed NEXUS Mainline Pipeline
Proposed TGP Interconnect
Adjacent Page
HUC 12 Watersheds
County Boundary
Road, Under Construction
Road, Completed
Gas Pipeline, Under Construction
Residential/Commercial Development, Planned
Electrical Transmission, Proposed
Gas Pipeline, Planned
Gas Pipeline, Completed
Road, Under Construction
Road, Completed

Figure 1.16-1
Recently Completed, Current, and Potential Future Projects within Resource Areas of Impact Affected by the NEXUS Project

NEXUS GAS TRANSMISSION

Created: 11/16/2015

DATA SOURCES: TRC, Spectra, Columbia Pipline Group, Energy Transfer, First Energy, Lucas County, USGS, Monroe County Road Commission, Ohio DOT, TransCanada, Washtenaw County Road Commission, and Wood County



○	Milepost (10 miles)	▲	Electrical Transmission, Under Construction	▬	Electrical Transmission, Under Construction
▬	Proposed NEXUS Mainline Pipeline	●	Road, Under Construction	▬	Gas Pipeline, Planned
▬	Proposed TGP Interconnect	●	Road, Completed	▬	Road, Under Construction
▭	Adjacent Page	⬟	Gas Pipeline, Under Construction	▬	Road, Completed
	HUC 12 Watersheds	■	Residential/Commercial Development, Planned		
▭	County Boundary				

Figure 1.16-1
Recently Completed, Current, and Potential Future Projects within Resource Areas of Impact Affected by the NEXUS Project

NEXUS GAS TRANSMISSION

Created: 11/16/2015

DATA SOURCES: TRC, Spectra, Columbia Pipline Group, Energy Transfer, First Energy, Lucas County, USGS, Monroe County Road Commission, Ohio DOT, TransCanada, Washtenaw County Road Commission, and Wood County

- Typical ROW Configurations
- 8.5- x 11-inch USGS Quadrangle Map Excerpts

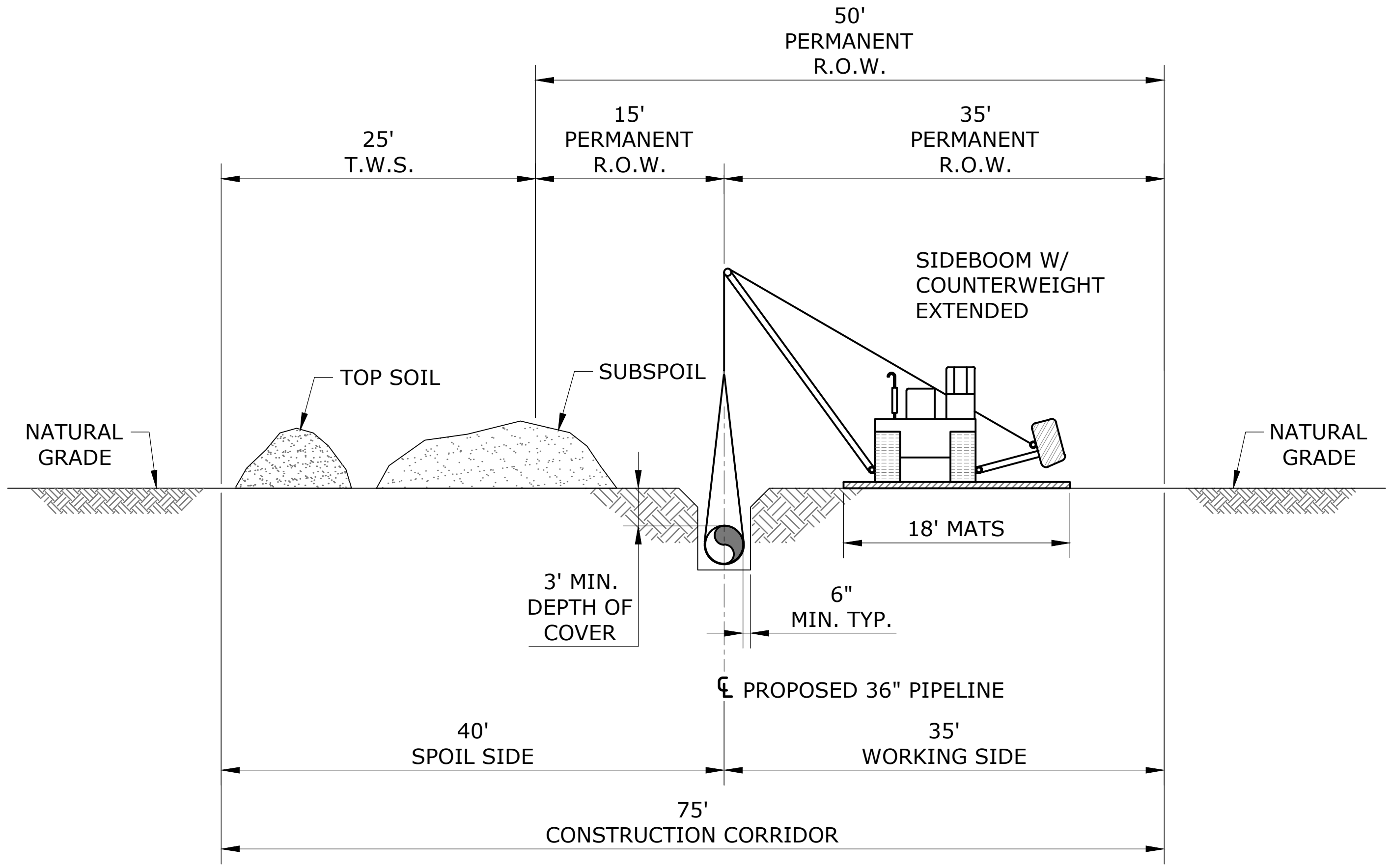
Volume II-B – Oversized Mapping

- Alignment Sheets
- Full Size USGS Quadrangle Maps
- Full Size National Wetland Inventory ("NWI") Maps

Volume IV - CEII Information (bound separately)

- Proposed Compressor Station Site Plan Drawings
- Proposed M&R Station Site Plan Drawings

Typical ROW 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

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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

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GAS TRANSMISSION

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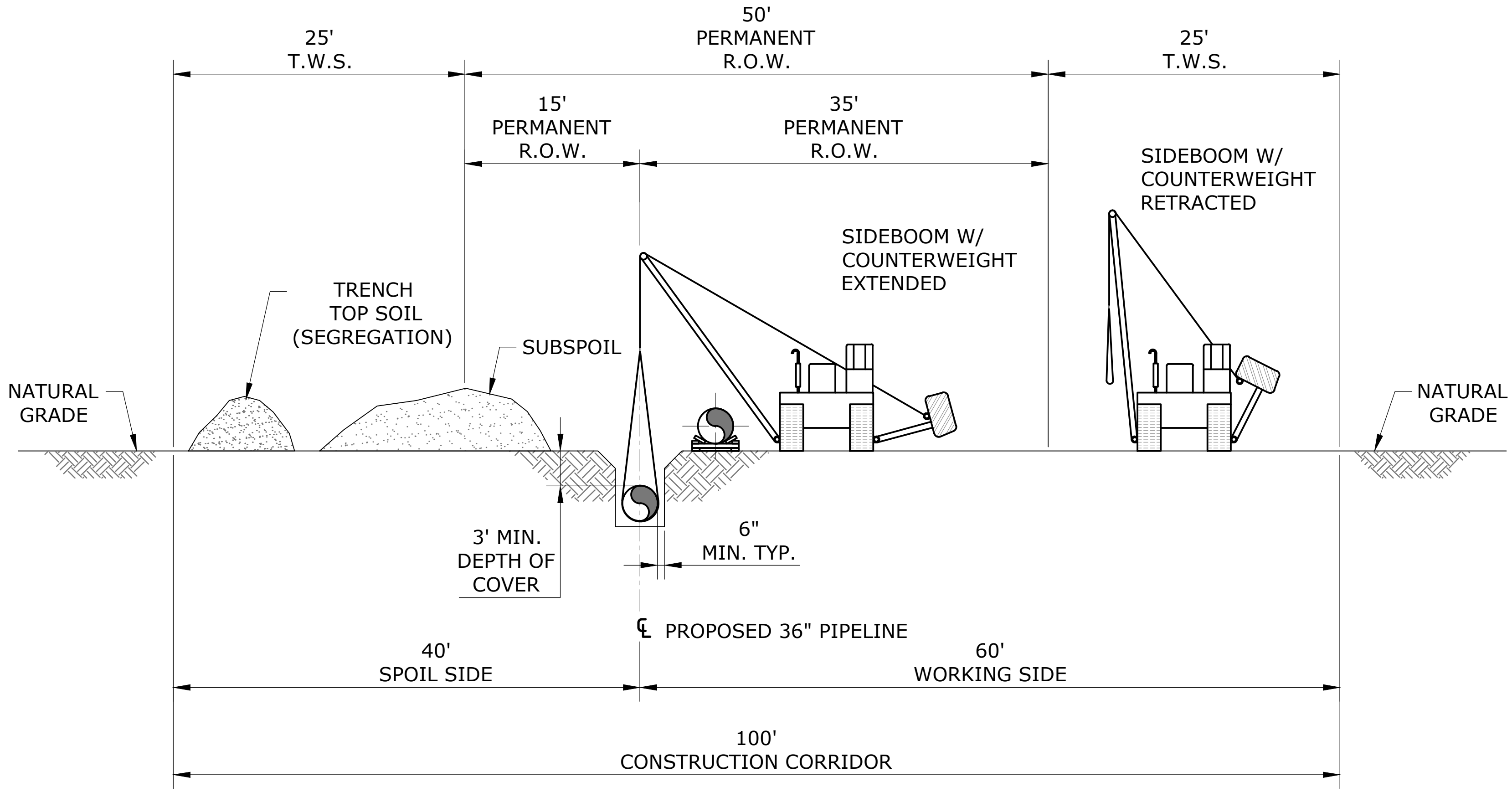

TYPICAL 100' CONSTRUCTION CORRIDOR

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.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

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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

NEXUS GAS TRANSMISSION

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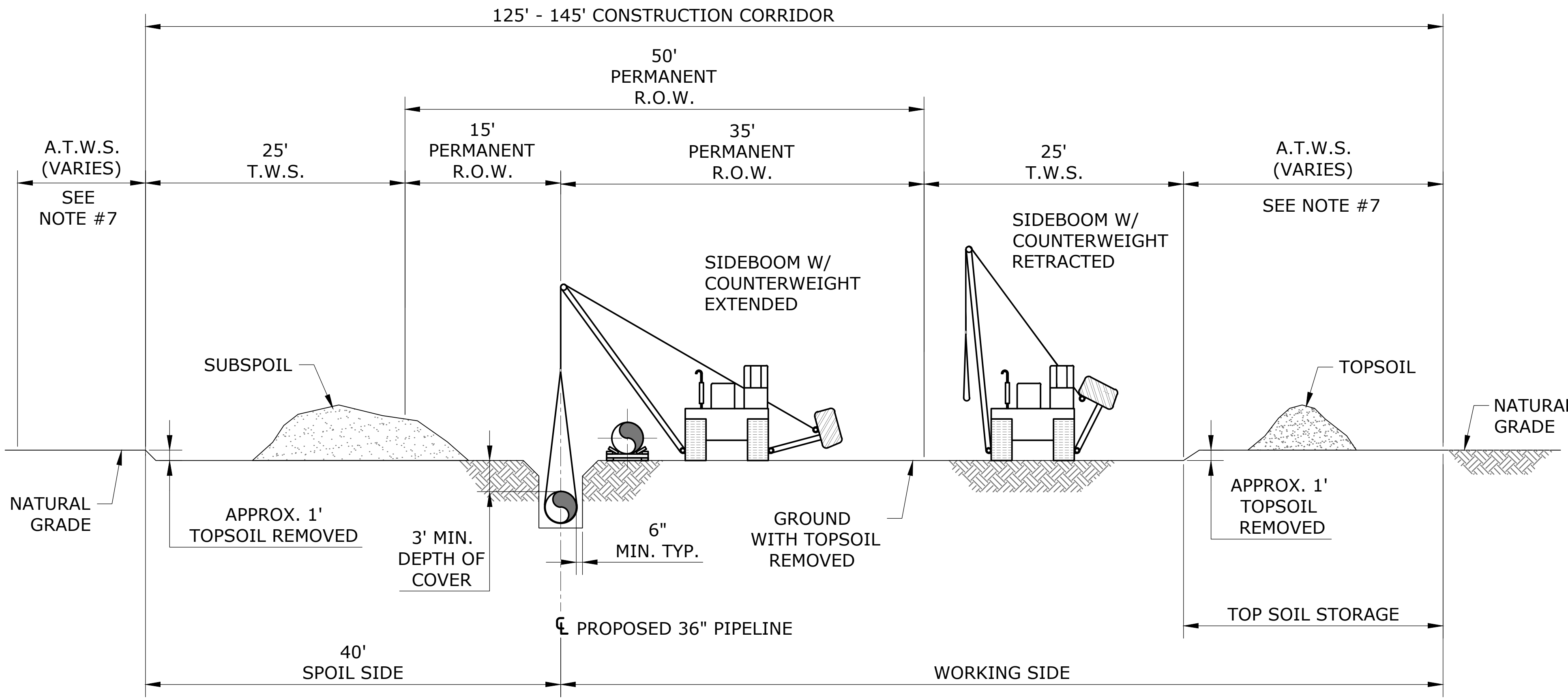

TYPICAL 125' - 145' CONSTRUCTION CORRIDOR

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

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SCALE: NTS	DATE	REV.: 0	LOC.: OHIO / MICHIGAN

DWG. NO. S4NX–P–8002

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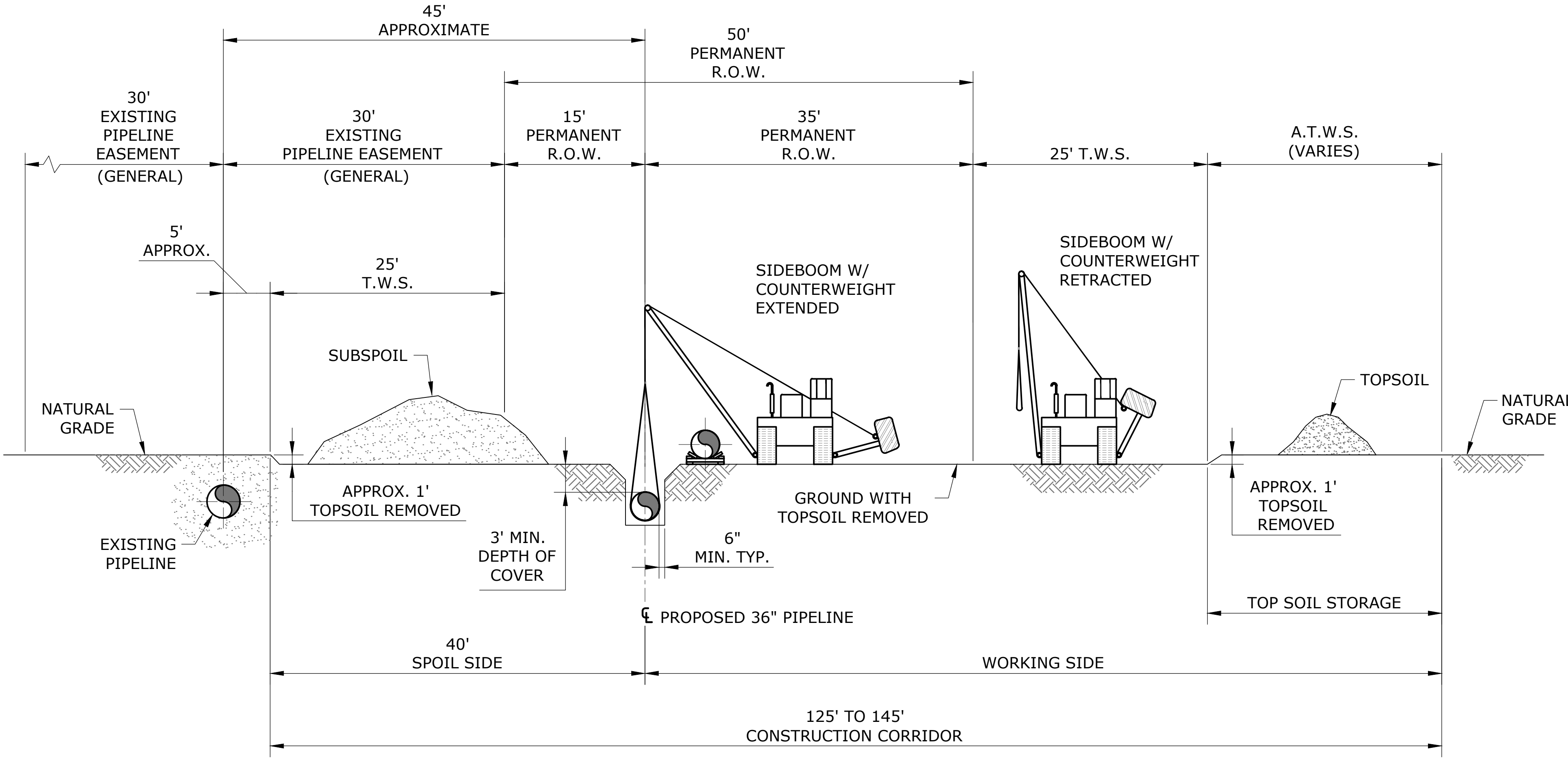


TYPICAL 125' TO 145' CONSTRUCTION PROPOSED PIPELINE TO THE EAST OF EXISTING LINE

N.T.S.

NOTES:

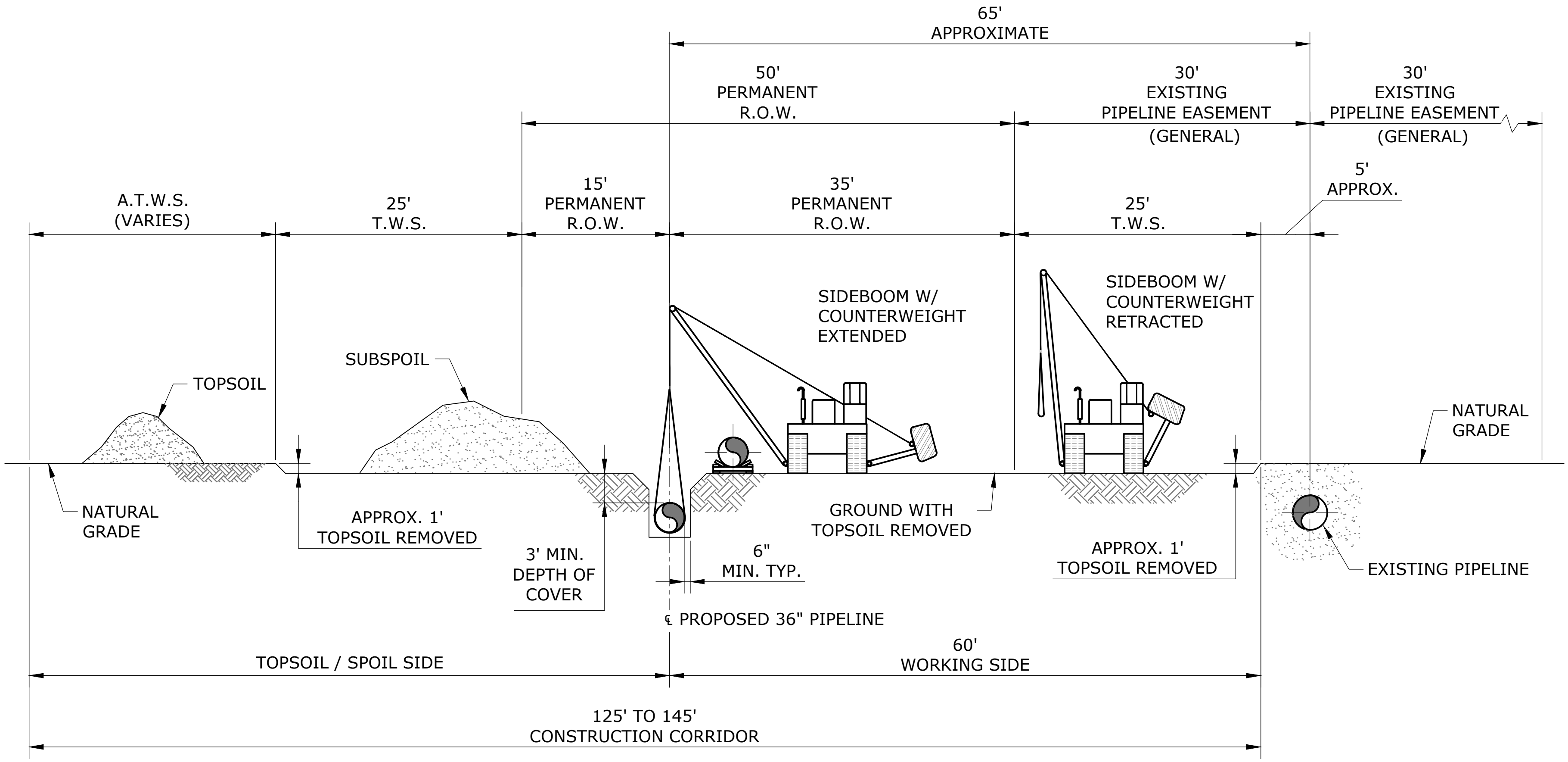
1. THIS CONSTRUCTION METHOD APPLIES TO LOCATIONS WHERE THE APPLICABLE R.O.W. ARRANGEMENT CALLS FOR 15'-35' PERMANENT R.O.W.
2. THIS CONSTRUCTION METHOD APPLIES TO FORWARD & REVERSE PIPELINE LAY.
3. ALL SPOIL SHALL BE CONTAINED WITHIN THE CONFINES OF THE ROW.
4. THE PIPELINE COVER HAS A MINIMUM DEPTH 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		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL EXISTING PIPELINE ROW EASEMENT 125' TO 145' CONSTRUCTION CORRIDOR (EAST)	
CHECKED BY: DF	23Oct15	YR.: 2017		
DRAWN BY: RVE	23Oct15	W.O.		
SCALE: NTS	DATE	REV.: 0	LOC.: OHIO \ MICHIGAN	DWG. NO. S4NX-P-8003

IG.#

NEXUS SM
GAS TRANSMISSION



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.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

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

NEXUS GAS TRANSMISSION SM

FOR63995 October 28, 2015 7:15pm

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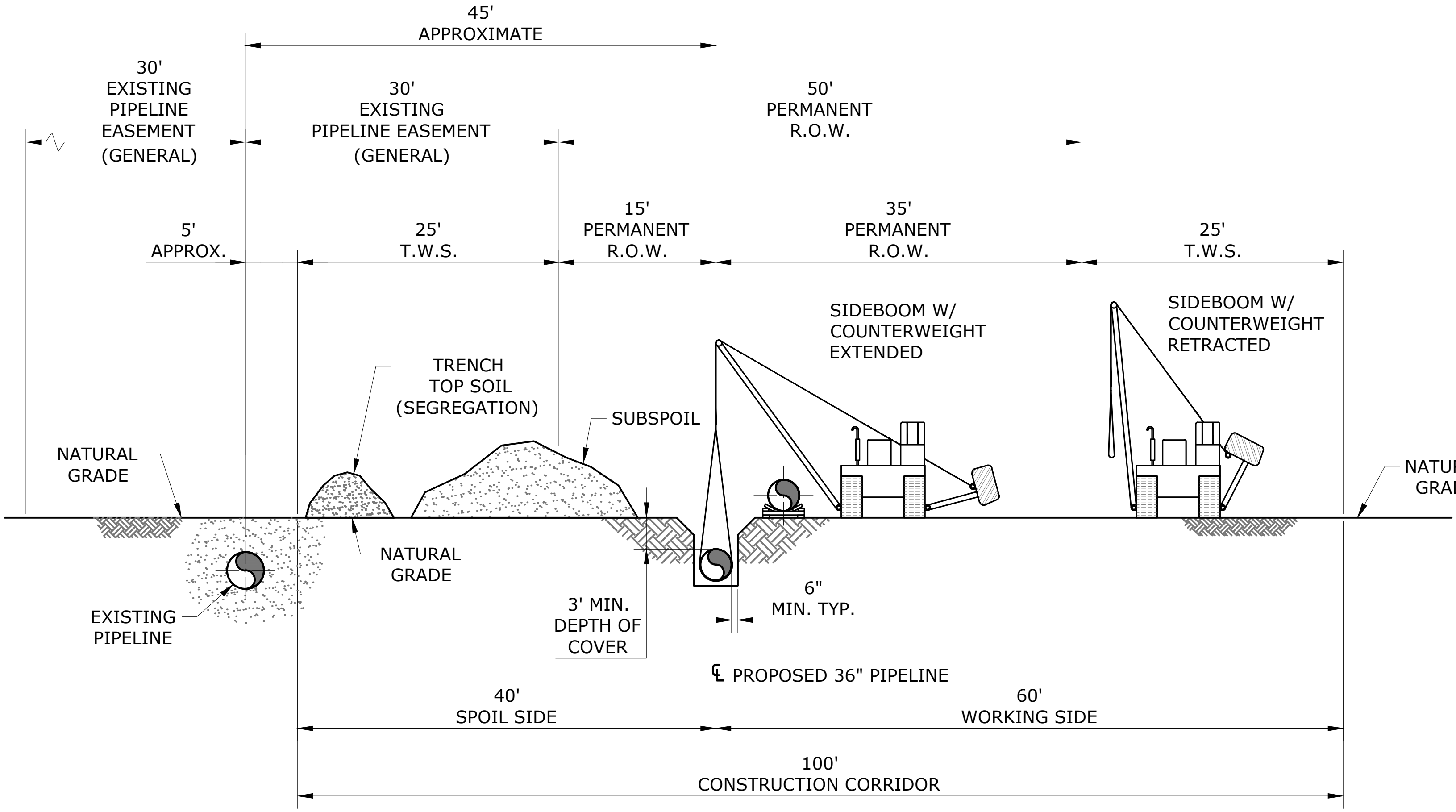


TYPICAL 100' CONSTRUCTION
PROPOSED PIPELINE TO THE EAST OF EXISTING LINE

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

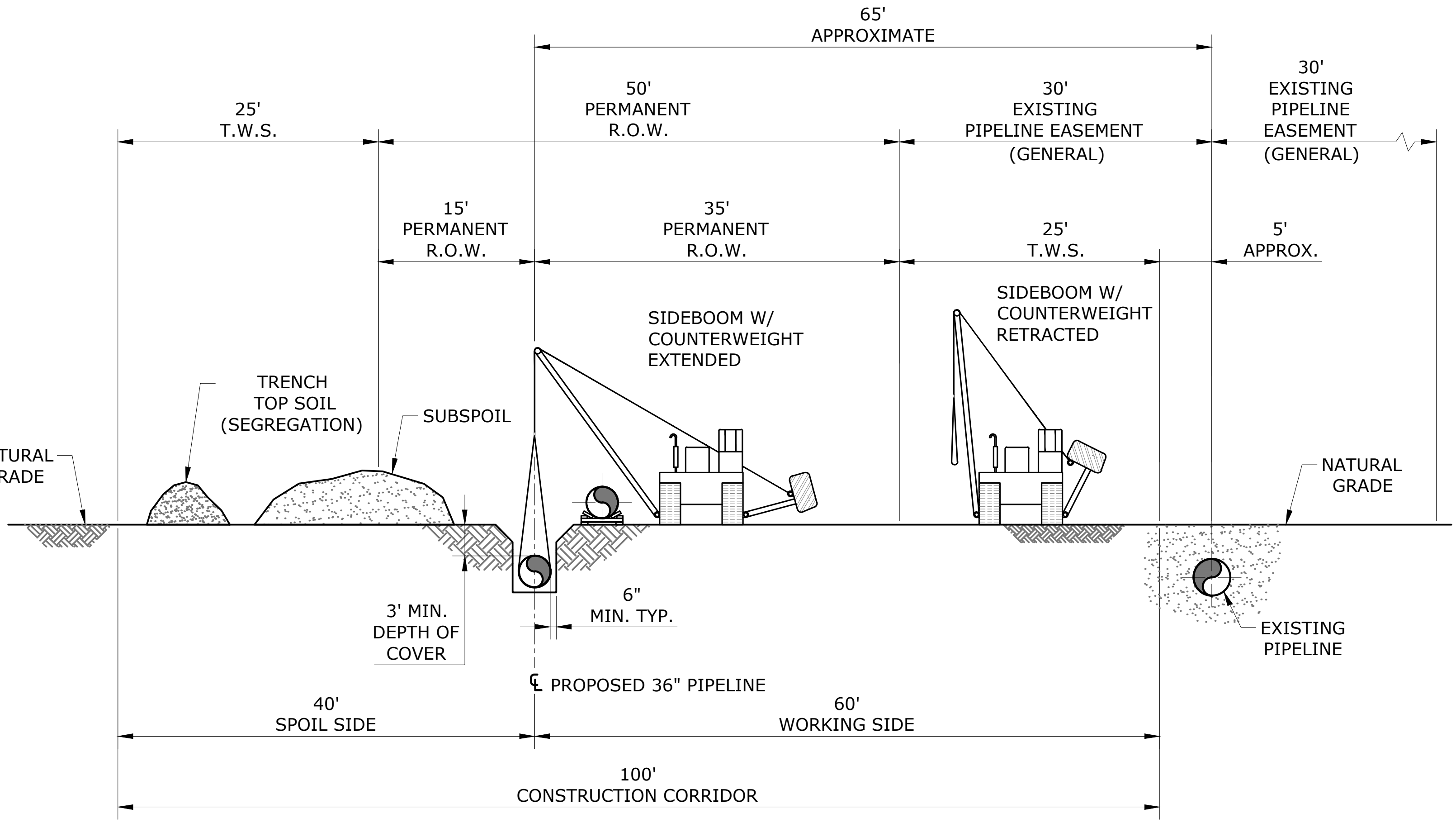
DWG. NO. S4NX-P-8005

NEXUS GAS TRANSMISSION

FOR63995 October 28, 2015 7:16pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8005_0.DWG

IG.#

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	
CHECKED BY:	DC	15Oct15	YR.: 2017
DRAWN BY:	RVE	15Oct15	W.O.
SCALE: NTS		DATE	REV.: 0

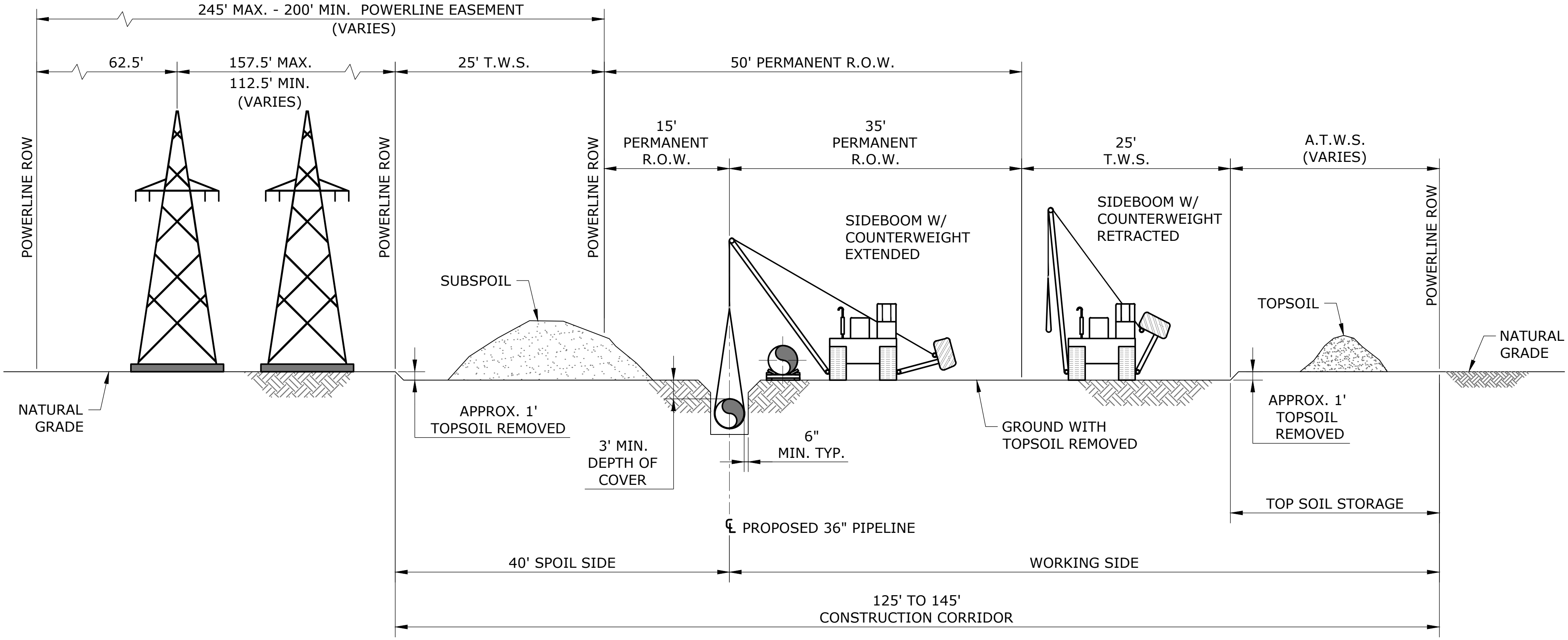
TITLE: NEXUS GAS TRANSMISSION PROJECT
TYPICAL EXISTING PIPELINE ROW EASEMENT
100' CONSTRUCTION CORRIDOR (WEST)

LOC.: OHIO \ MICHIGAN

DWG. NO. S4NX-P-8006

NEXUS[SM] GAS TRANSMISSION

IG.#



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 245' MAX - 200' MIN. POWERLINE EASEMENT

N.T.S.

FOR63995 October 28, 2015 7:18pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8007-A_0.DWG

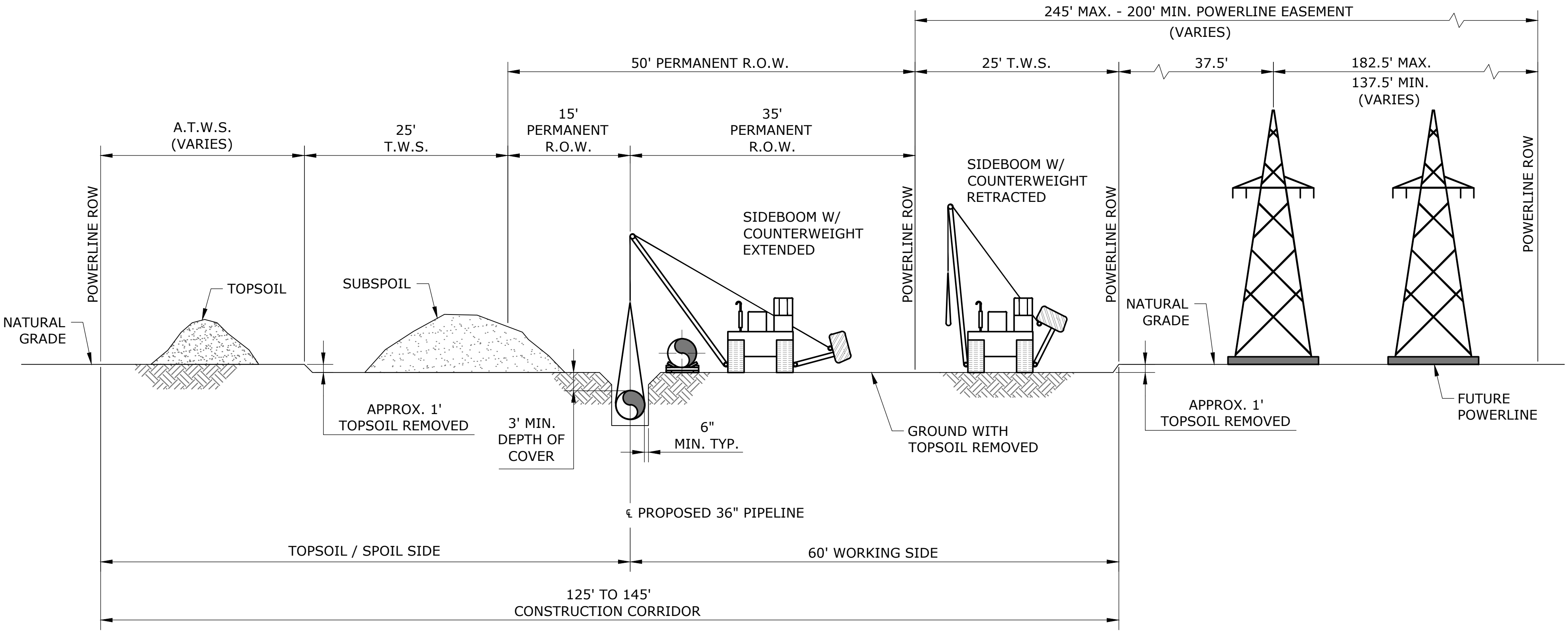
REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	23Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #1A NORTH OR EAST OF POWERLINE EASEMENT
CHECKED BY: DF	23Oct15	YR.: 2017	
DRAWN BY: RVE	23Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: COLUMBIANA COUNTY, OHIO

DWG. NO. S4NX-P-8007-A

NEXUS GAS TRANSMISSION

IG.#



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

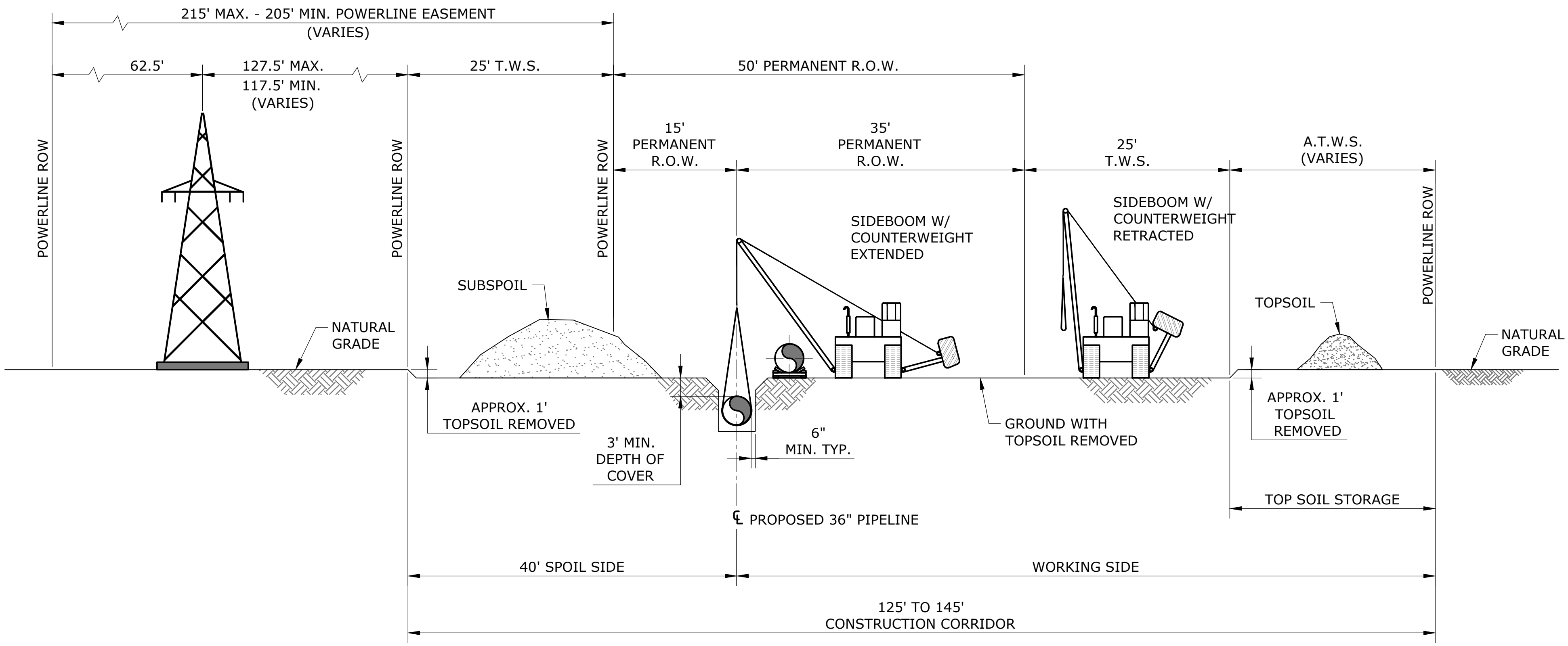
DWG. NO. S4NX-P-8007-B

NEXUS GAS TRANSMISSION

FOR63995 October 28, 2015 7:19pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8007-B_0.DWG

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.

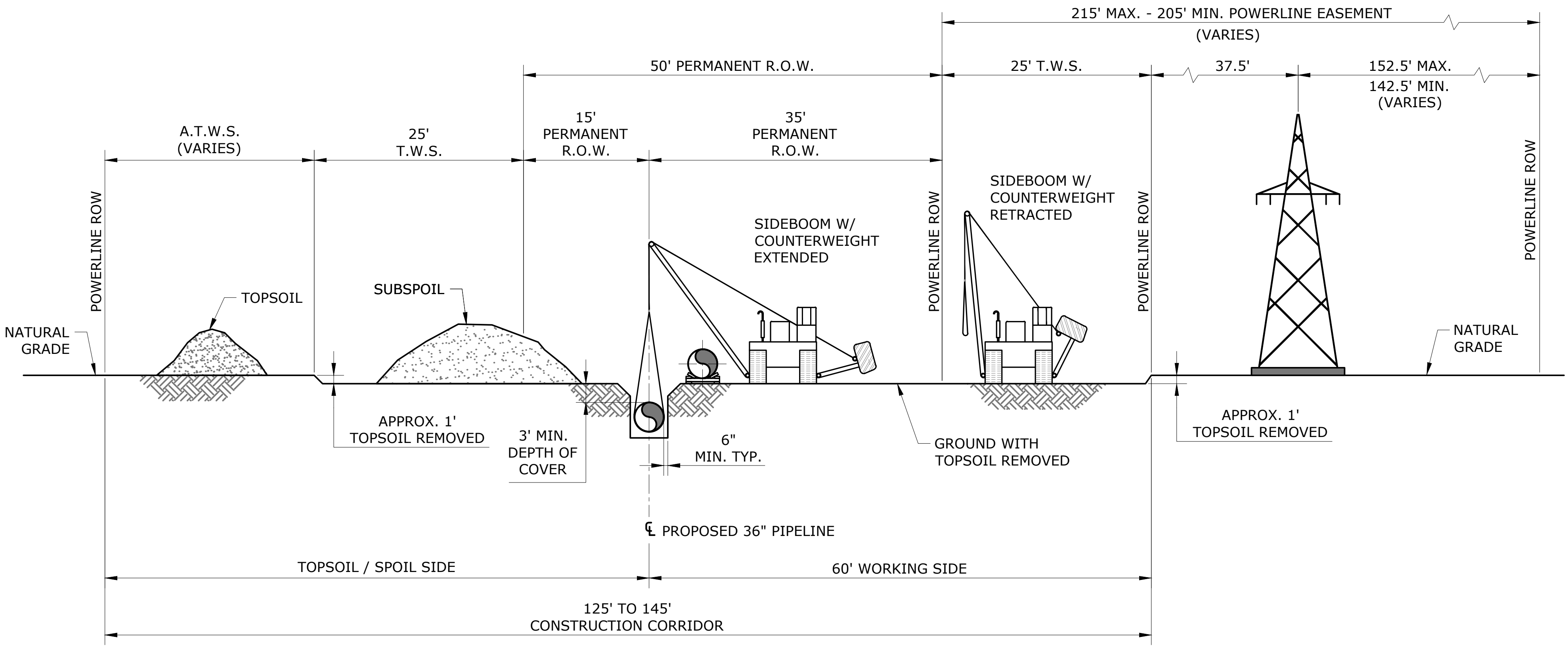
REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	23Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #2A NORTH OR EAST OF POWERLINE EASEMENT
CHECKED BY: DF	23Oct15	YR.: 2015	
DRAWN BY: RVE	23Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: STARK COUNTY, OHIO

DWG. NO. S4NX-P-8008-A

NEXUS GAS TRANSMISSION

IG.#



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR
WITH 215' MAX. - 205' MIN. POWERLINE EASEMENT
N.T.S.

FOR63995 October 28, 2015 7:20pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8008-B_0.DWG

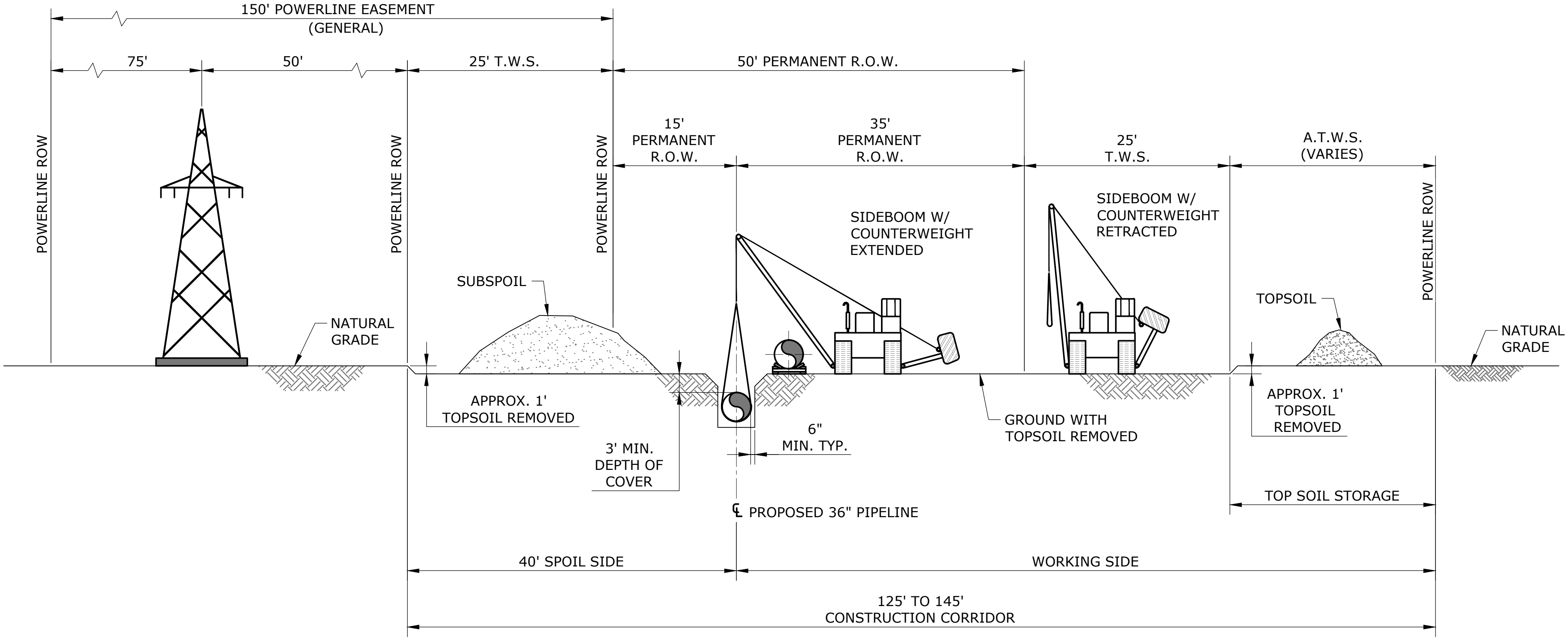
REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

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

NEXUS GAS TRANSMISSION

IG.#



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 150' POWERLINE EASEMENT

N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

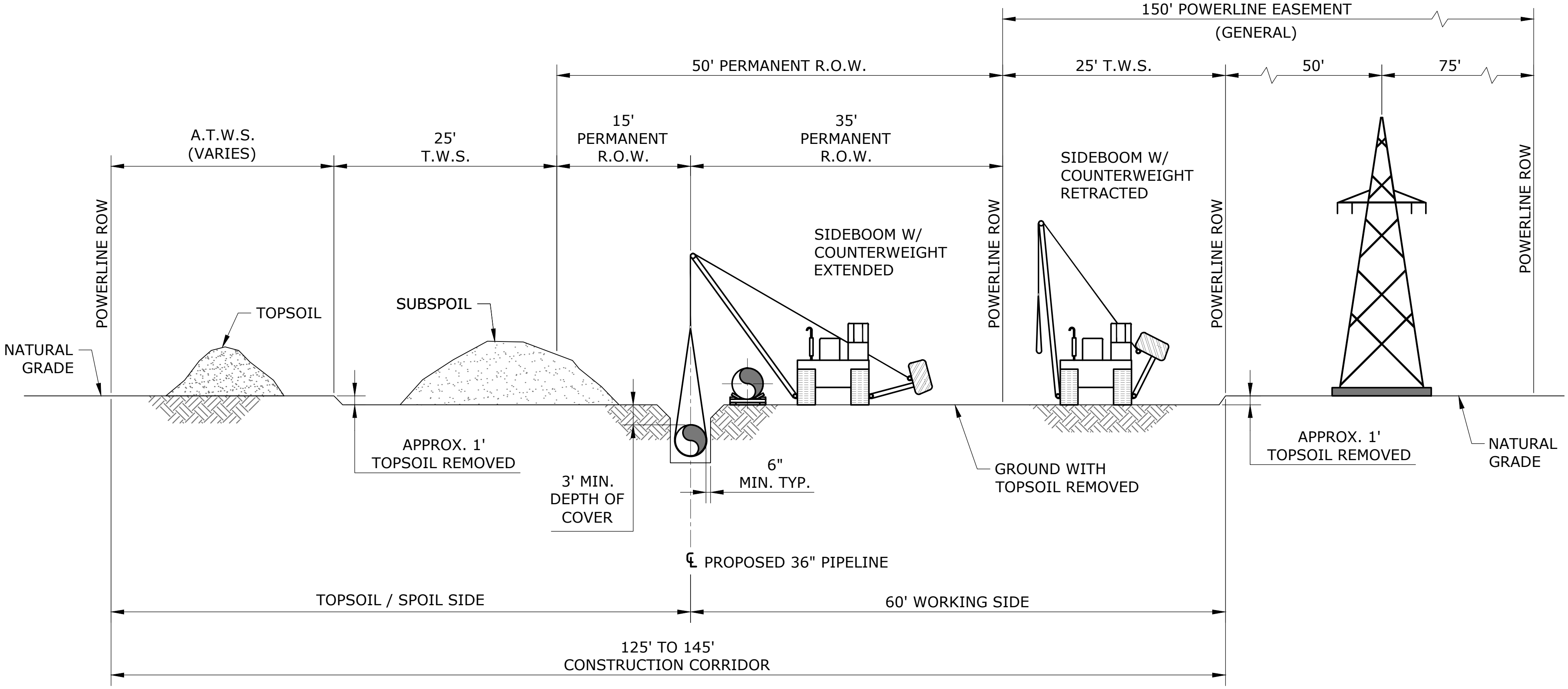
PROJ. ENG. KG	26Oct15	YR.: 2017	TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #3A NORTH OR EAST OF POWERLINE EASEMENT
CHECKED BY: DC	26Oct15	W.O.	
DRAWN BY: RVE	26Oct15		
SCALE: NTS	DATE	REV.: 0	LOC.: SUMMIT COUNTY, OHIO

DWG. NO. S4NX-P-8009-A

NEXUS GAS TRANSMISSION

FOR63995 October 28, 2015 7:22pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8009-A_0.DWG

IG.#



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 #3B SOUTH OR WEST OF POWERLINE EASEMENT
CHECKED BY:	DC	26Oct15	YR.: 2017	
DRAWN BY:	RVE	26Oct15	W.O.	
SCALE:	NTS	DATE	REV.: 0	LOC.: SUMMIT COUNTY, OHIO

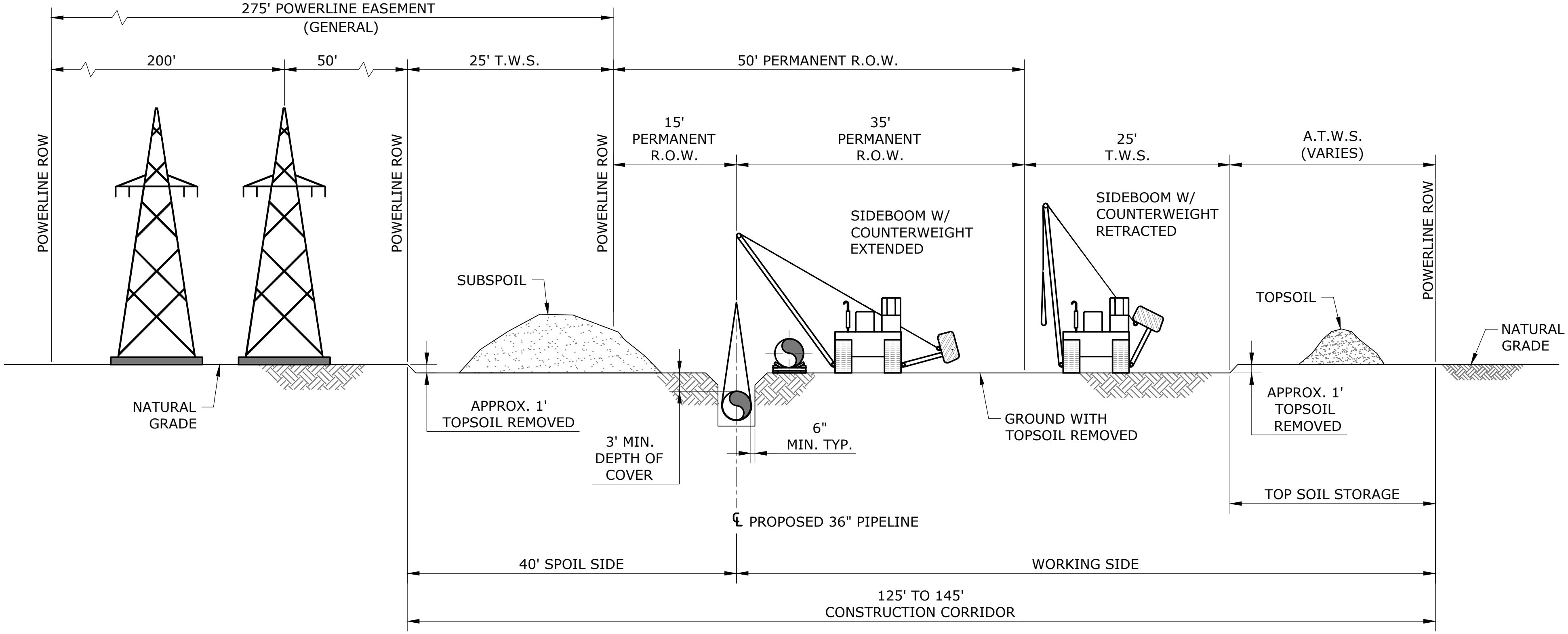
DWG. NO. S4NX-P-8009-B

NEXUS GAS TRANSMISSION SM

FOR63995 October 28, 2015 7:24pm

Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8009B_0.DWG

IG.#



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR
WITH 275' POWERLINE EASEMENT
N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

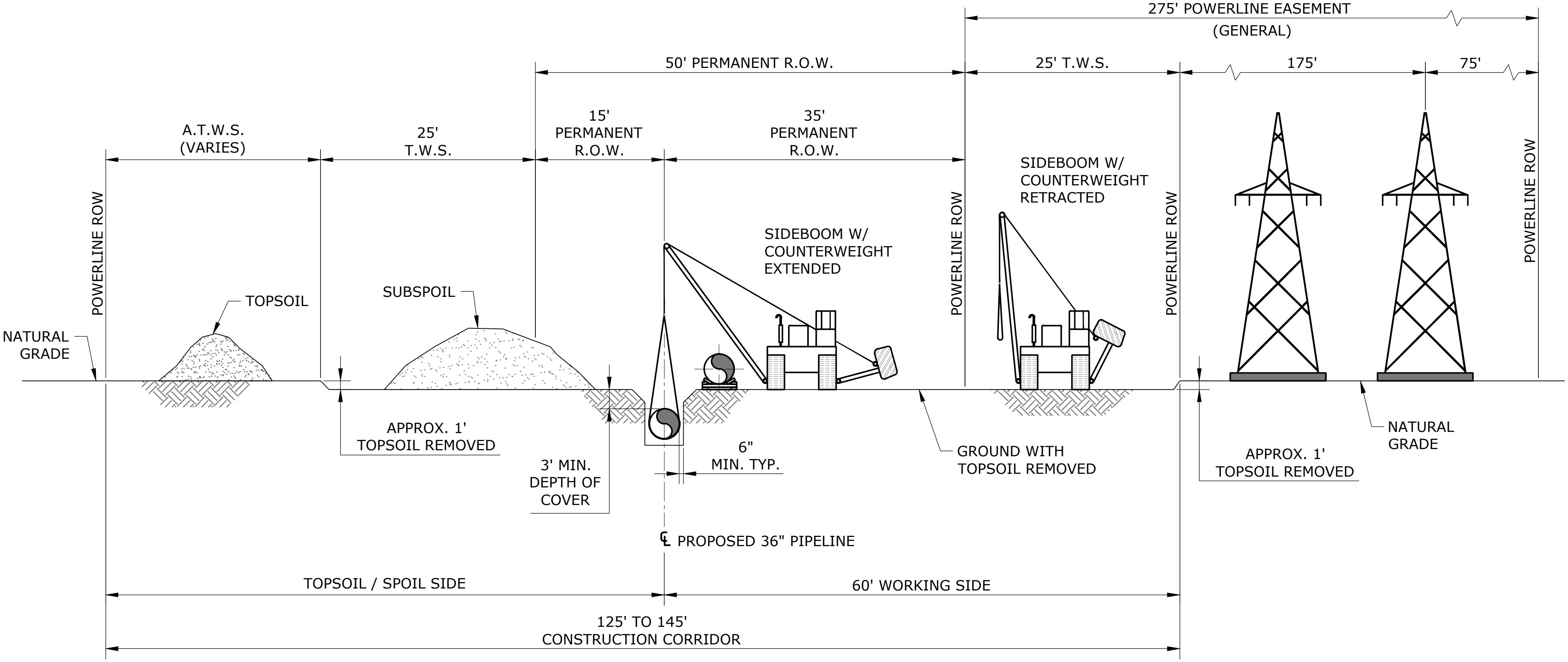
PROJ. ENG. KG	26Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #4A NORTH OR EAST OF POWERLINE EASEMENT
CHECKED BY: DC	26Oct15	YR.: 2017	
DRAWN BY: RVE	26Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: WAYNE COUNTY, OHIO

DWG. NO. S4NX-P-8010-A

NEXUS SM
GAS TRANSMISSION

FOR63995 October 28, 2015 7:25pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8010-A_0.DWG

IG.#



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		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #4B SOUTH OR WEST OF POWERLINE EASEMENT
CHECKED BY: DC	26Oct15	YR.: 2017	
DRAWN BY: RVE	26Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: WAYNE COUNTY, OHIO — DWG. NO. S4NX-P-8010-B

NEXUS GAS TRANSMISSION

IG.#

FOR63995 October 28, 2015 7:26pm
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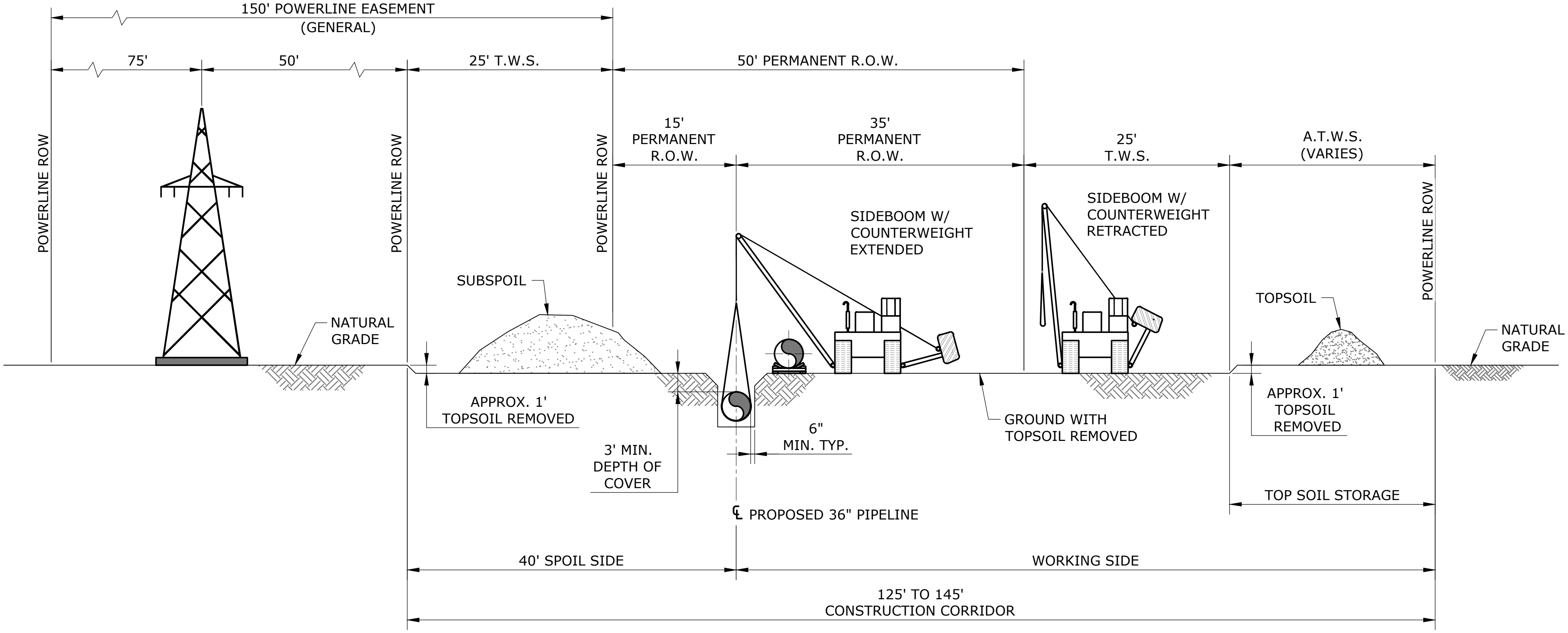

TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 150' POWERLINE EASEMENT

N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	26Oct15	YR.: 2017	TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #5A NORTH OR EAST OF POWERLINE EASEMENT
CHECKED BY: DC	26Oct15	W.O.	
DRAWN BY: RVE	26Oct15		
SCALE: NTS	DATE	REV.: 0	LOC.: MEDINA COUNTY, OHIO

DWG. NO. S4NX-P-8011-A

NEXUS GAS TRANSMISSION

FOR63995 October 28, 2015 7:27pm
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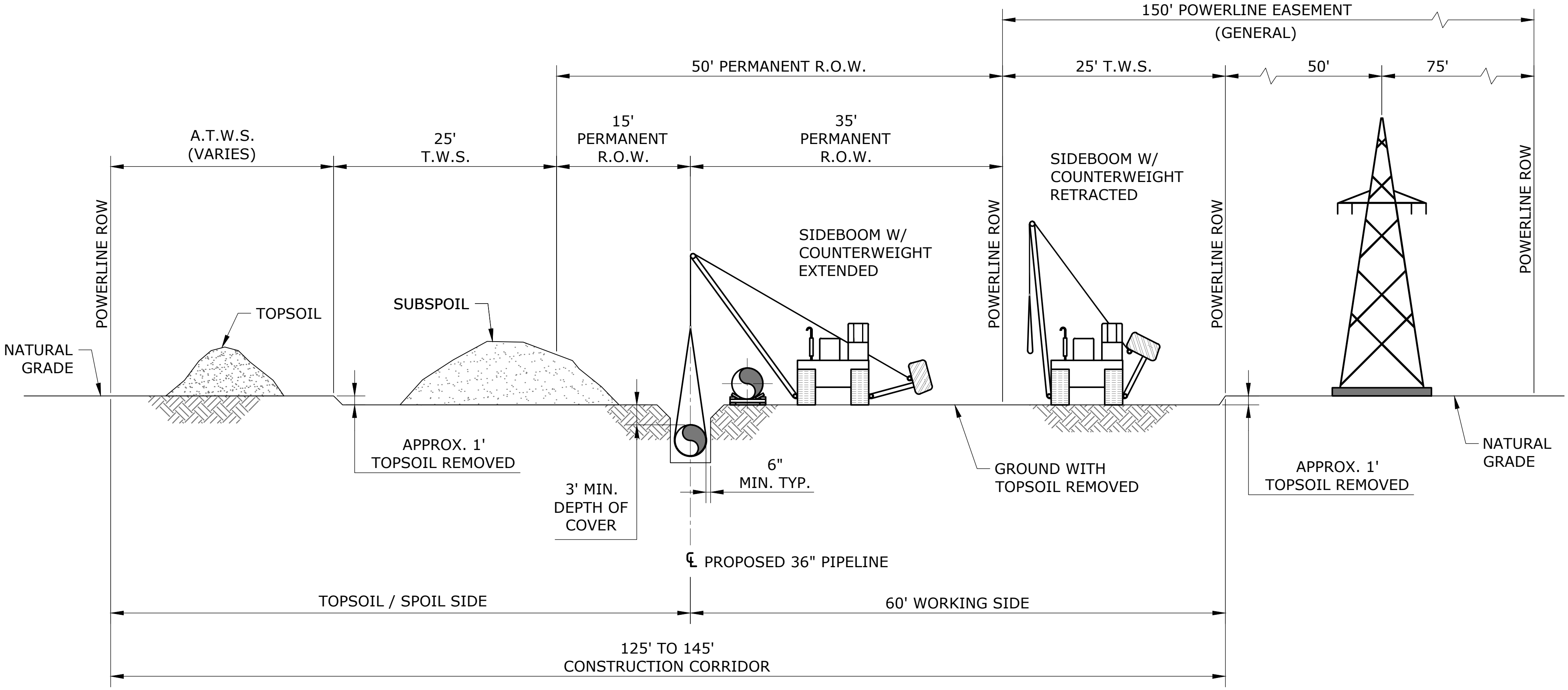
IG.#



TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 150' POWERLINE EASEMENT

N.T.S.

FOR63995 October 28, 2015 7:28pm

Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8011-B_0.DWG

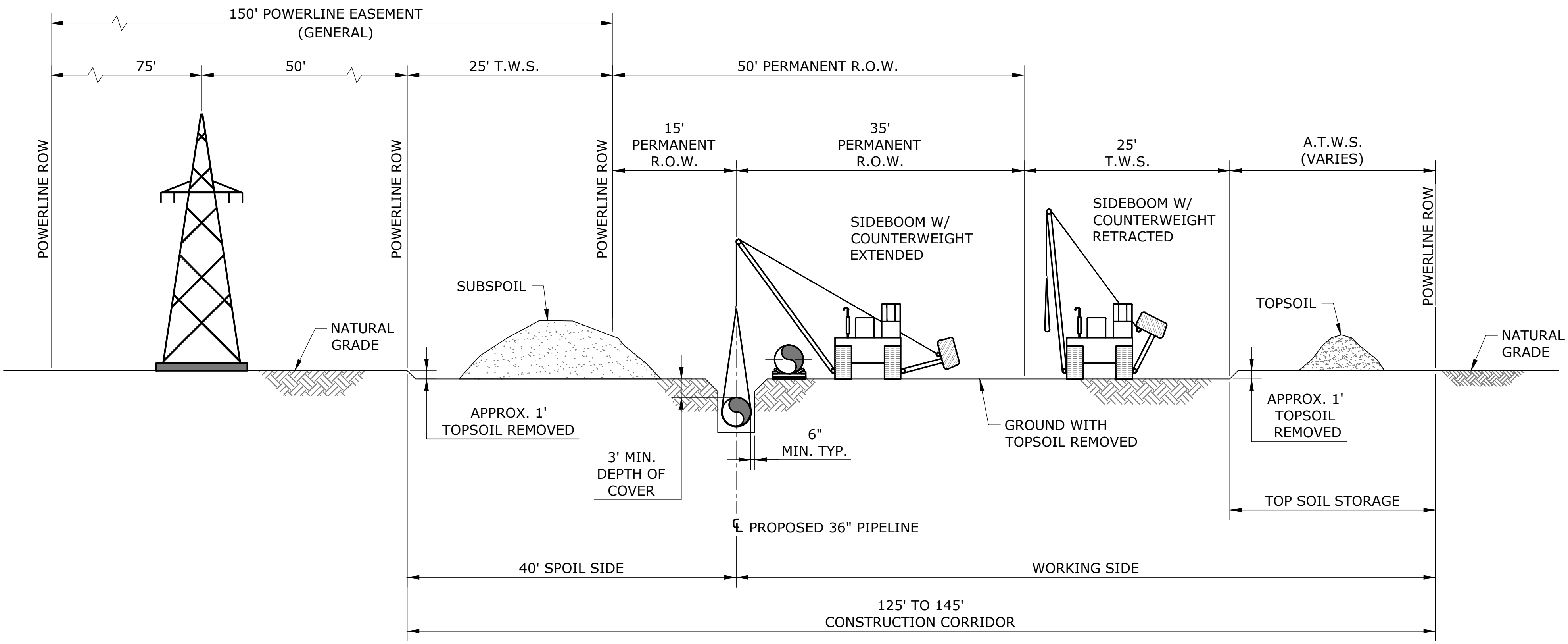
REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

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

NEXUS GAS TRANSMISSION

IG.#



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

NEXUS GAS TRANSMISSION

IG.#

FOR63995 October 28, 2015 7:29pm
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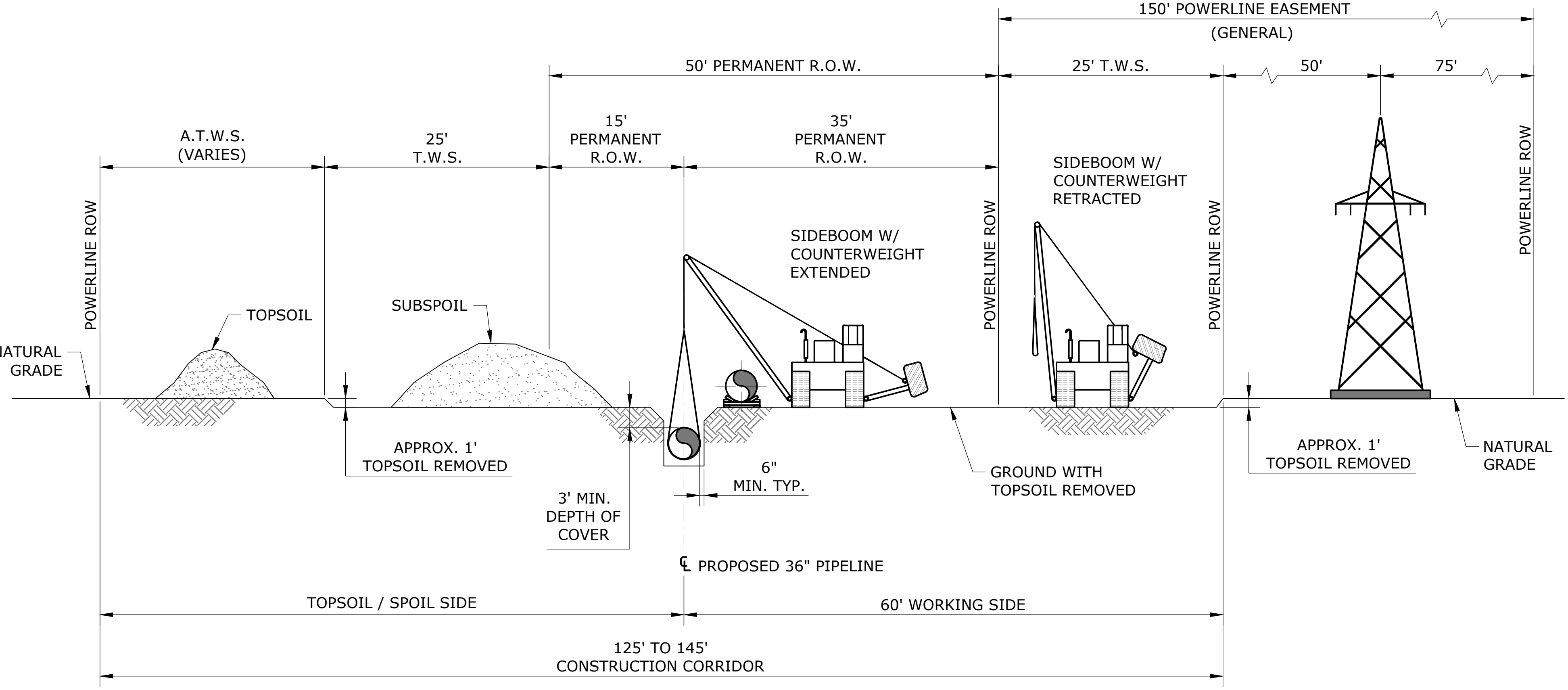

TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR
WITH 150' POWERLINE EASEMENT

N.T.S.

FOR63995 October 28, 2015 7:30pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8012-B_0.DWG

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	26Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #6B SOUTH OR WEST 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-B

NEXUS GAS TRANSMISSION

IG.#

FOR63995 October 28, 2015 7:31pm
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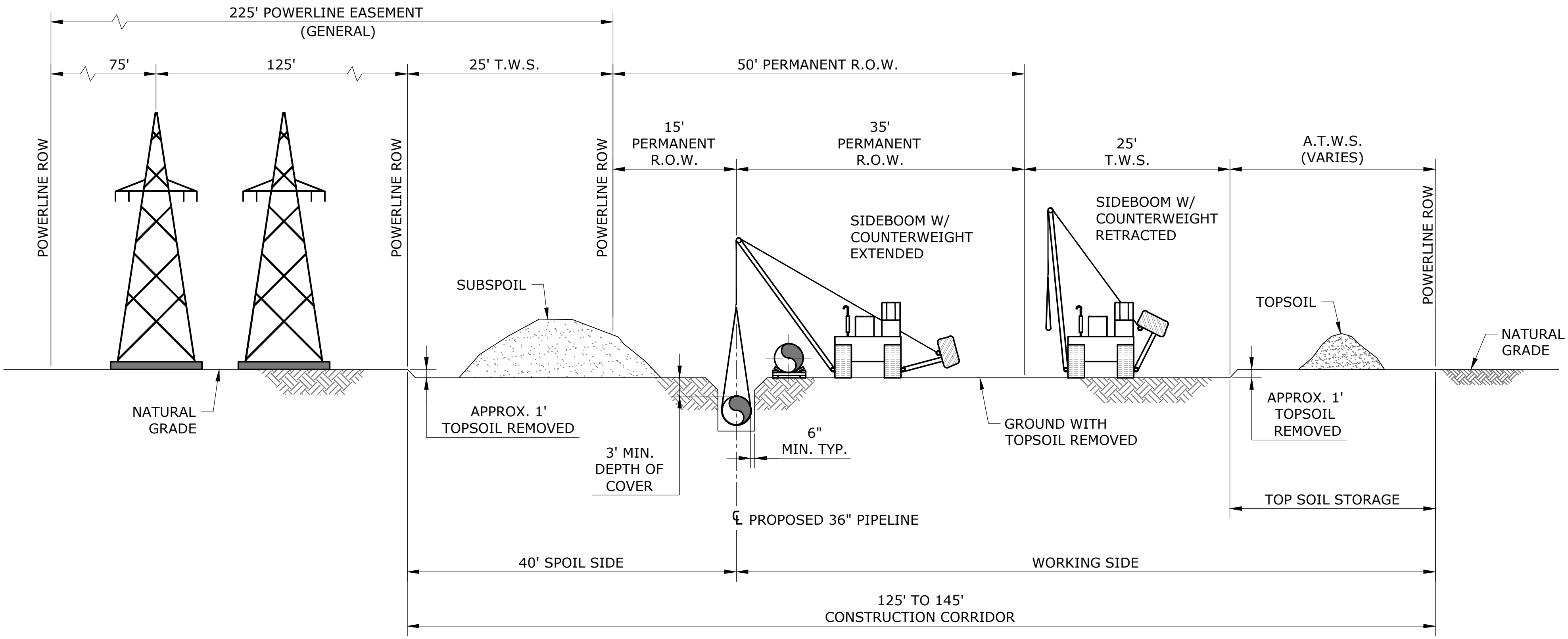


TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR
WITH 225' POWERLINE EASEMENT

N.T.S.

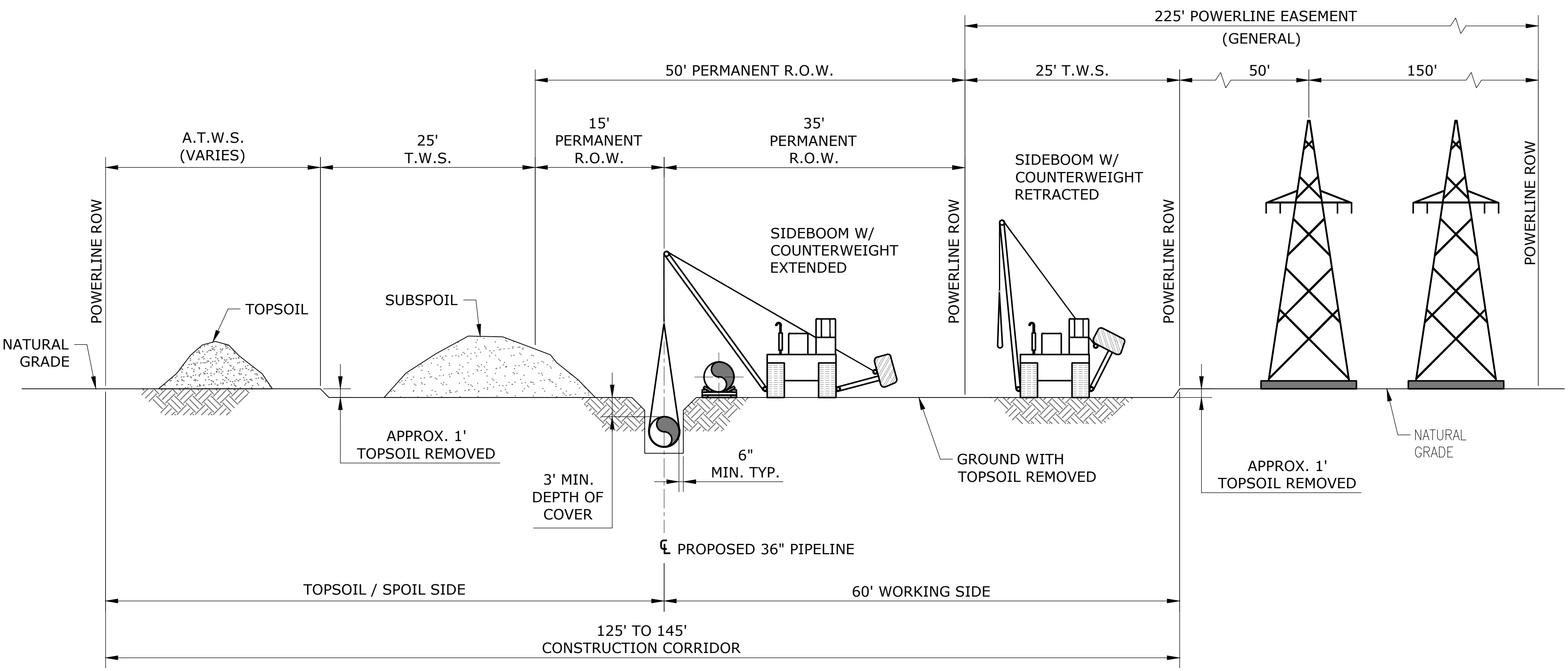
REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG. KG	26Oct15	YR.: 2017	TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #7A NORTH OR EAST OF POWERLINE EASEMENT
CHECKED BY: DC	26Oct15		
DRAWN BY: RVE	26Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: ERIE COUNTY, OHIO

DWG. NO. S4NX-P-8013-A

NEXUS℠ GAS TRANSMISSION

IG.#



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	YR.: 2017	TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #7B SOUTH OR WEST OF POWERLINE EASEMENT
CHECKED BY: DC	26Oct15	W.O.	
DRAWN BY: RVE	26Oct15		
SCALE: NTS	DATE	REV.: 0	LOC.: ERIE COUNTY, OHIO — DWG. NO. S4NX-P-8013-B

NEXUS GAS TRANSMISSION

FOR63995 October 28, 2015 7:32pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8013-B_0.DWG

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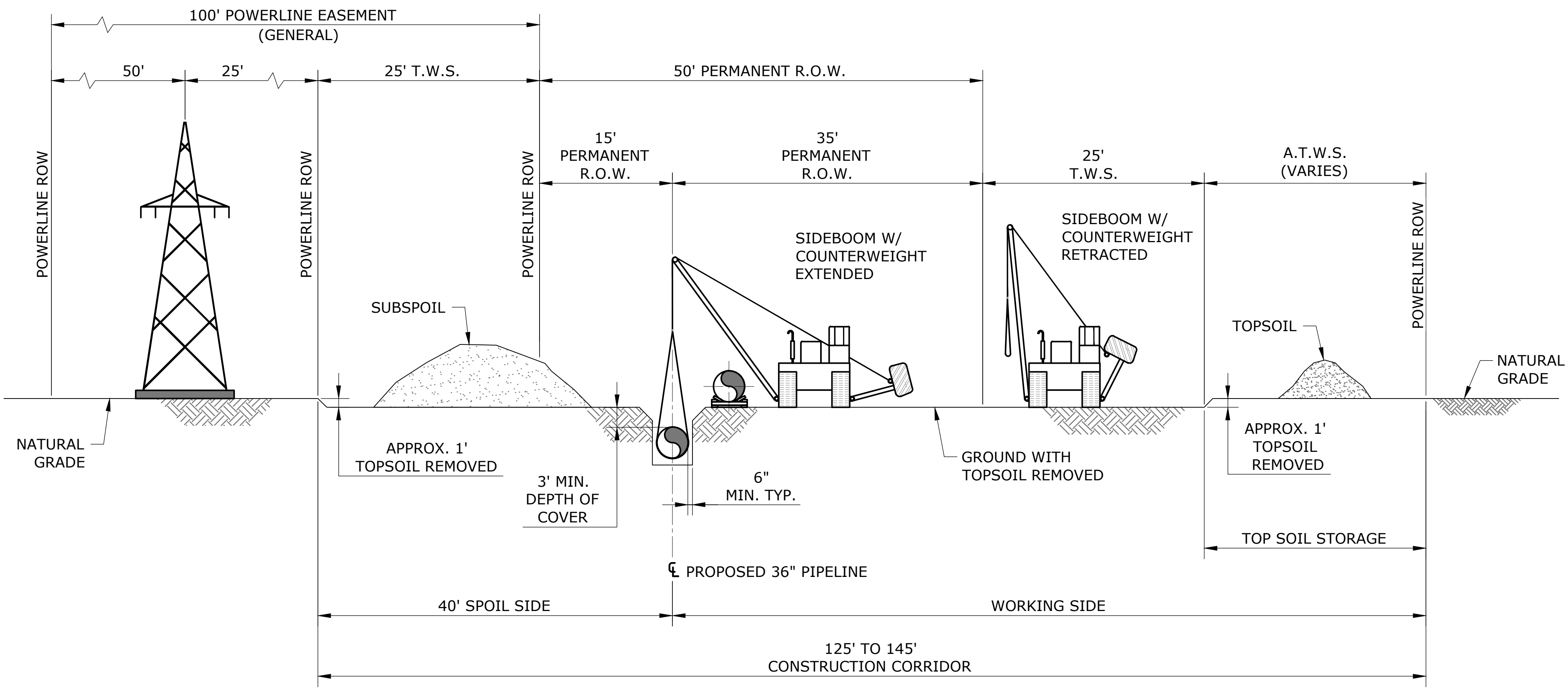


TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 100' POWERLINE EASEMENT

N.T.S.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

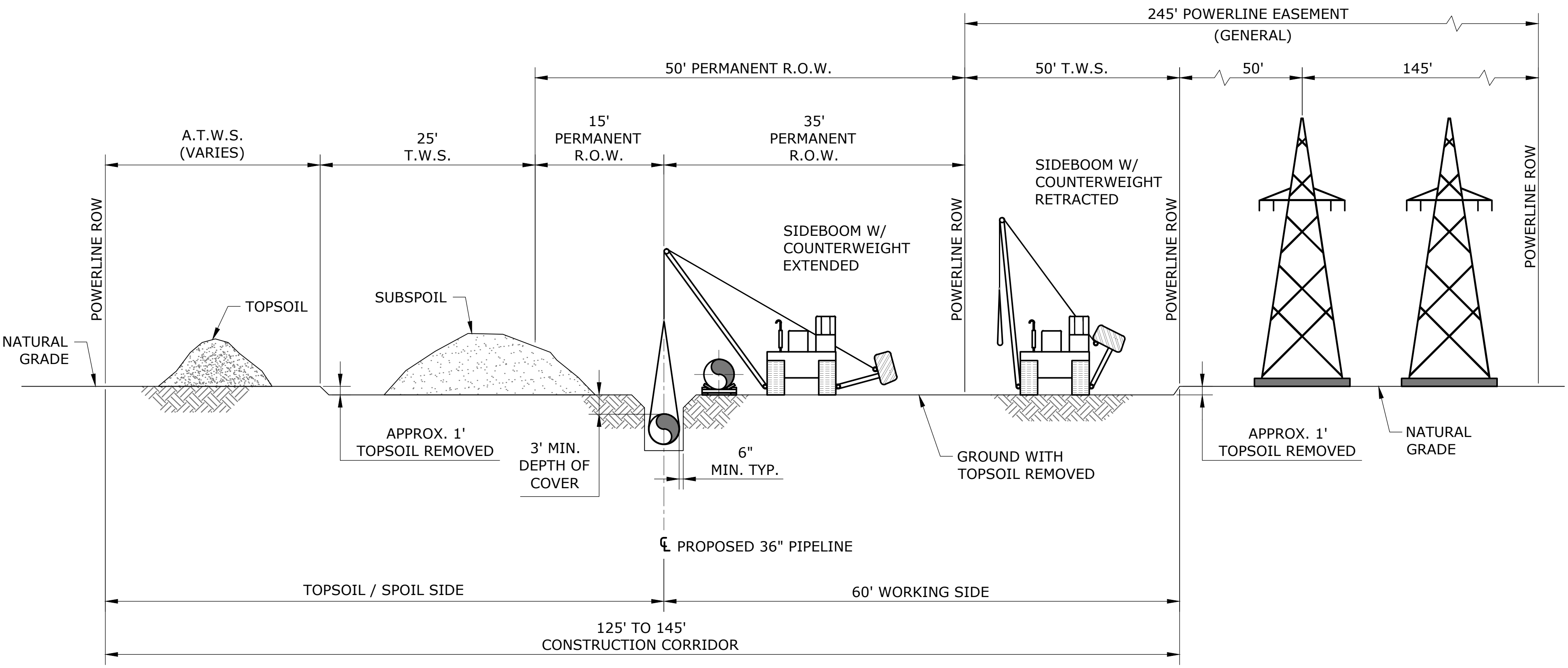
PROJ. ENG. KG	23Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL MAINLINE CONSTRUCTION METHOD #8A NORTH OR EAST OF POWERLINE EASEMENT
CHECKED BY: DF	23Oct15	YR.: 2017	
DRAWN BY: RVE	23Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: WOOD COUNTY, OHIO

DWG. NO. S4NX-P-8014-A

NEXUS GAS TRANSMISSION SM

IG.#

FOR63995 October 29, 2015 2:39pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8014-A_0.DWG



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	
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 #8B
SOUTH OR WEST OF POWERLINE EASEMENT

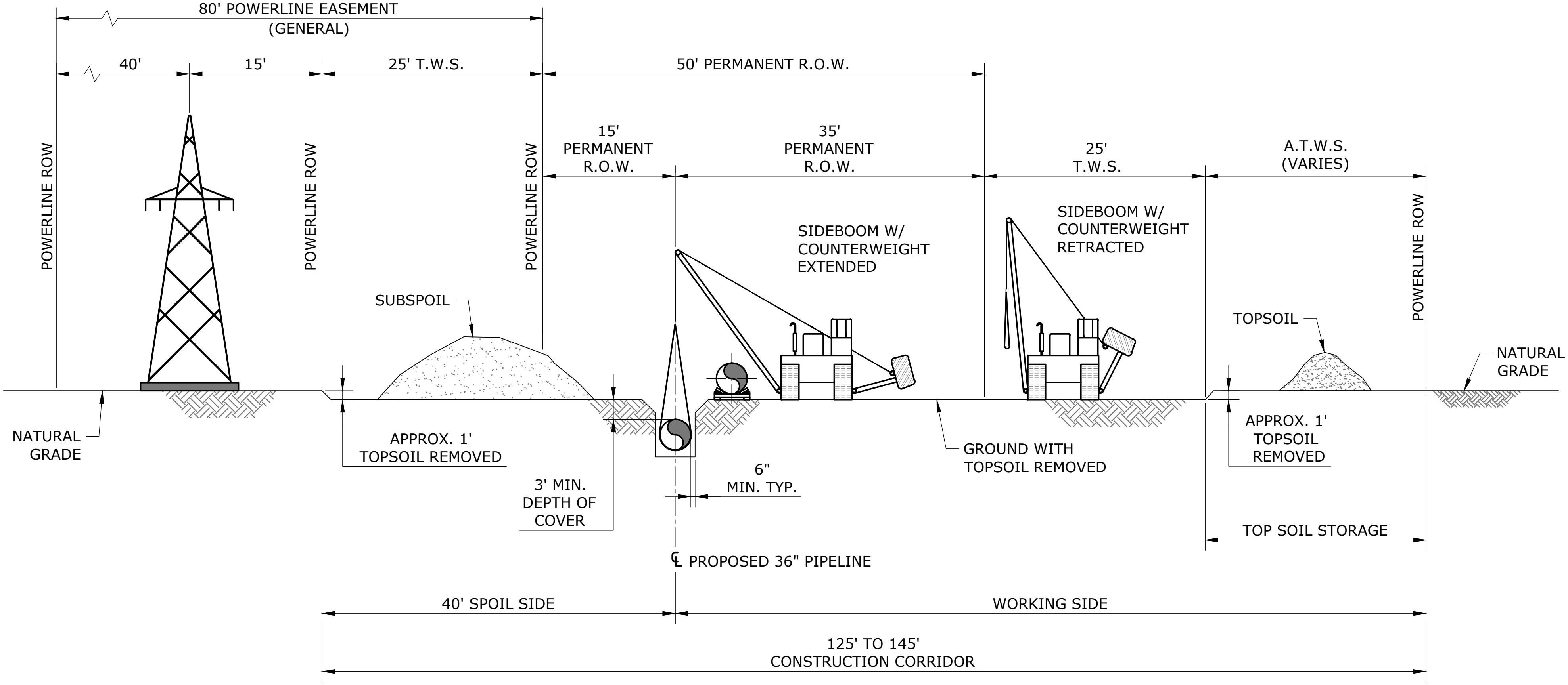
LOC.: WOOD COUNTY, OHIO

DWG. NO. S4NX–P–8014–B

NEXUS GAS TRANSMISSION

FOR63995 October 29, 2015 2:31pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8014-B_0.DWG

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 #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

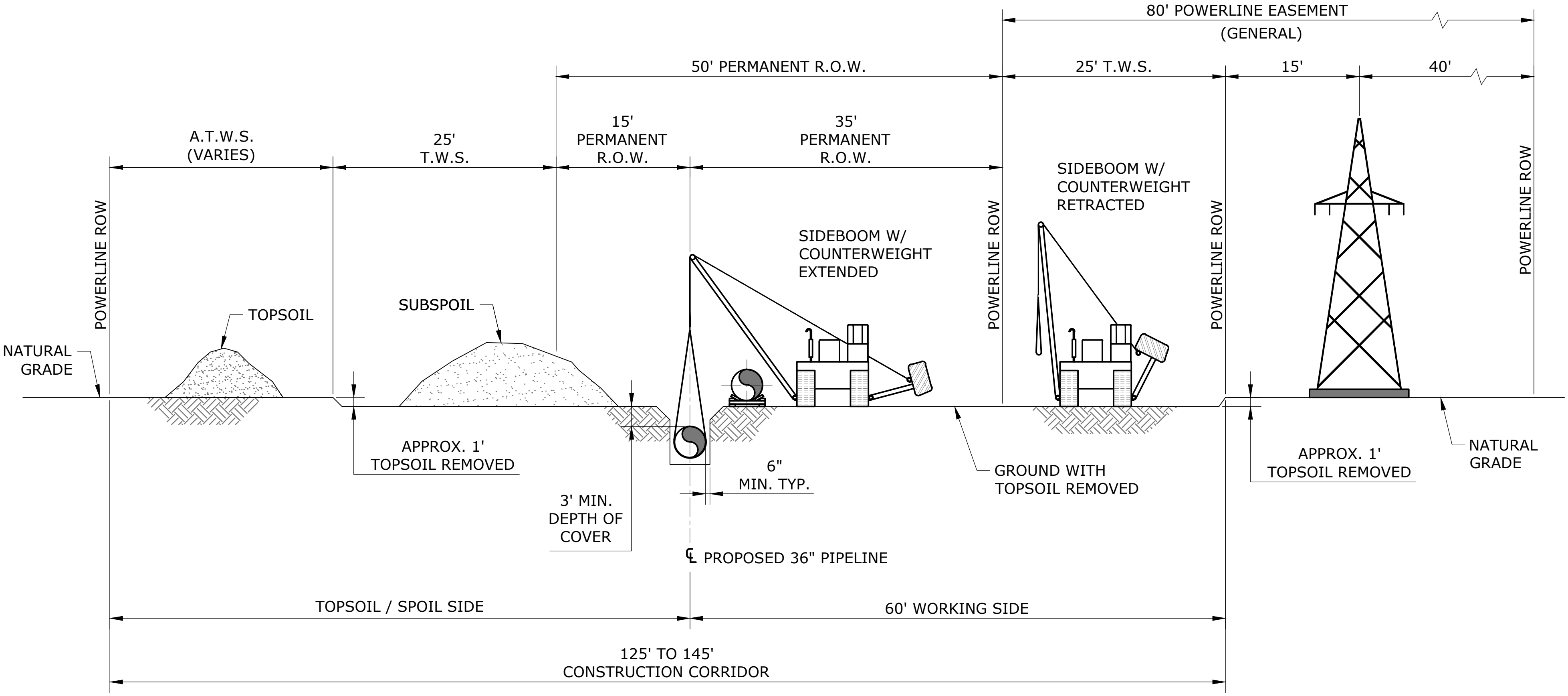
DWG. NO. S4NX-P-8015-A

NEXUS GAS TRANSMISSION

FOR63995 October 28, 2015 7:36pm

Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8015-A_0.DWG

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	NEXUS GAS TRANSMISSION
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

FOR63995 October 28, 2015 7:37pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8015-B_0.DWG

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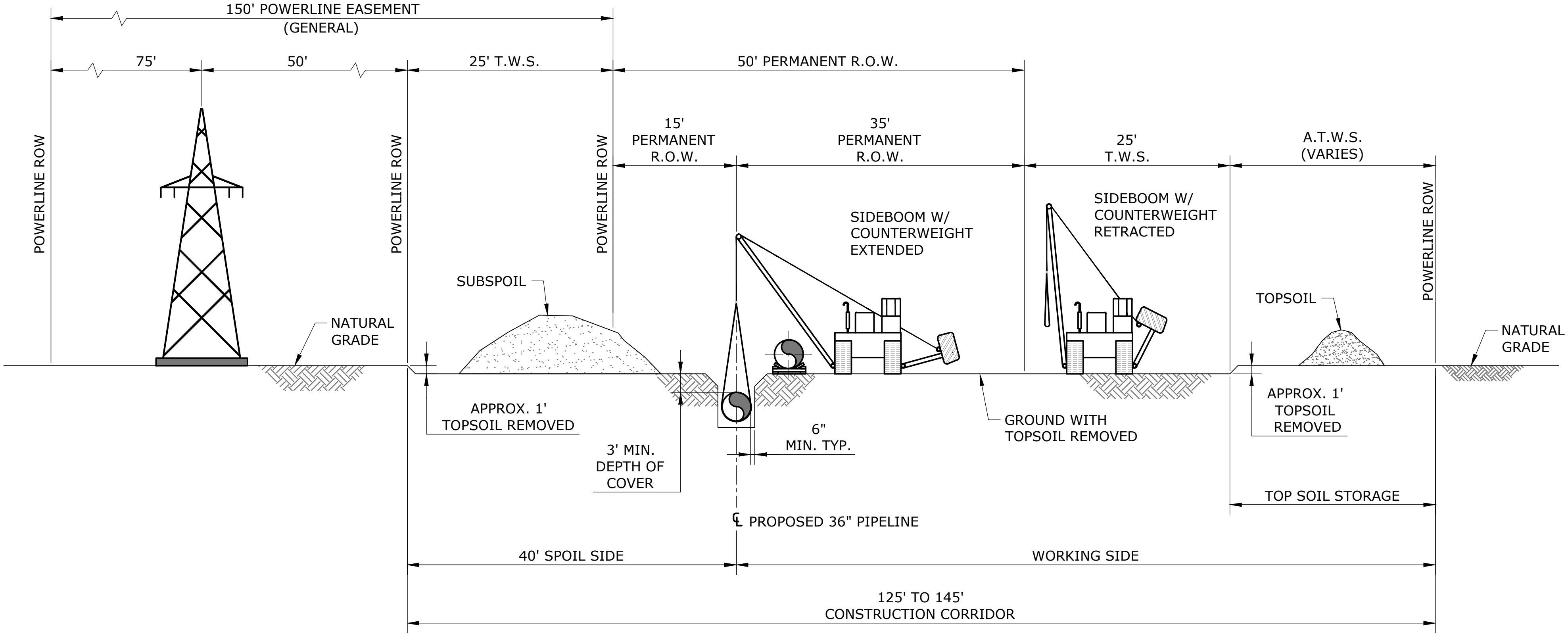


TYPICAL 125' TO 145' CONSTRUCTION CORRIDOR WITH 150' POWERLINE EASEMENT

N.T.S.

FOR63995 October 28, 2015 7:38pm
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8016-A_0.DWG

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

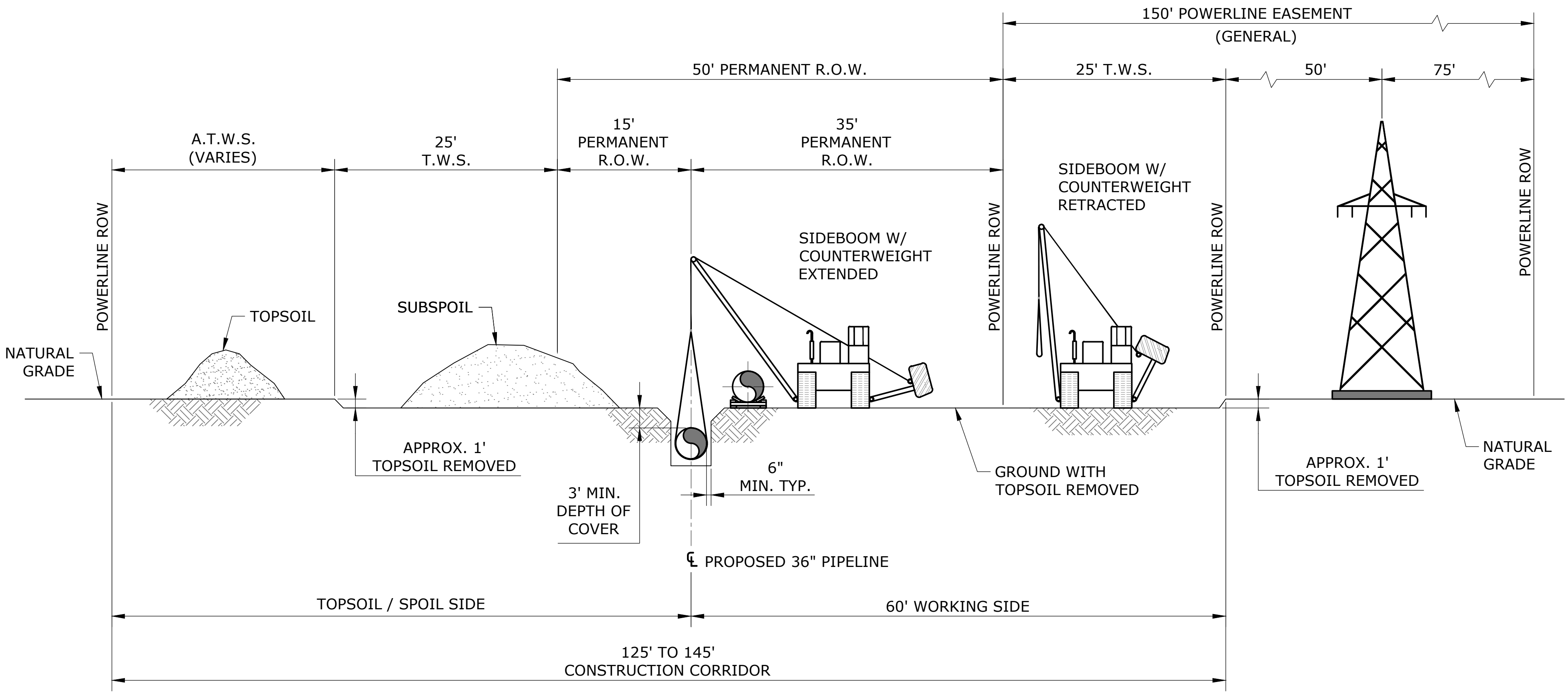
LOC.: FULTON COUNTY, OHIO

DWG. NO. S4NX-P-8016-A

NEXUS GAS TRANSMISSION

IG.#

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

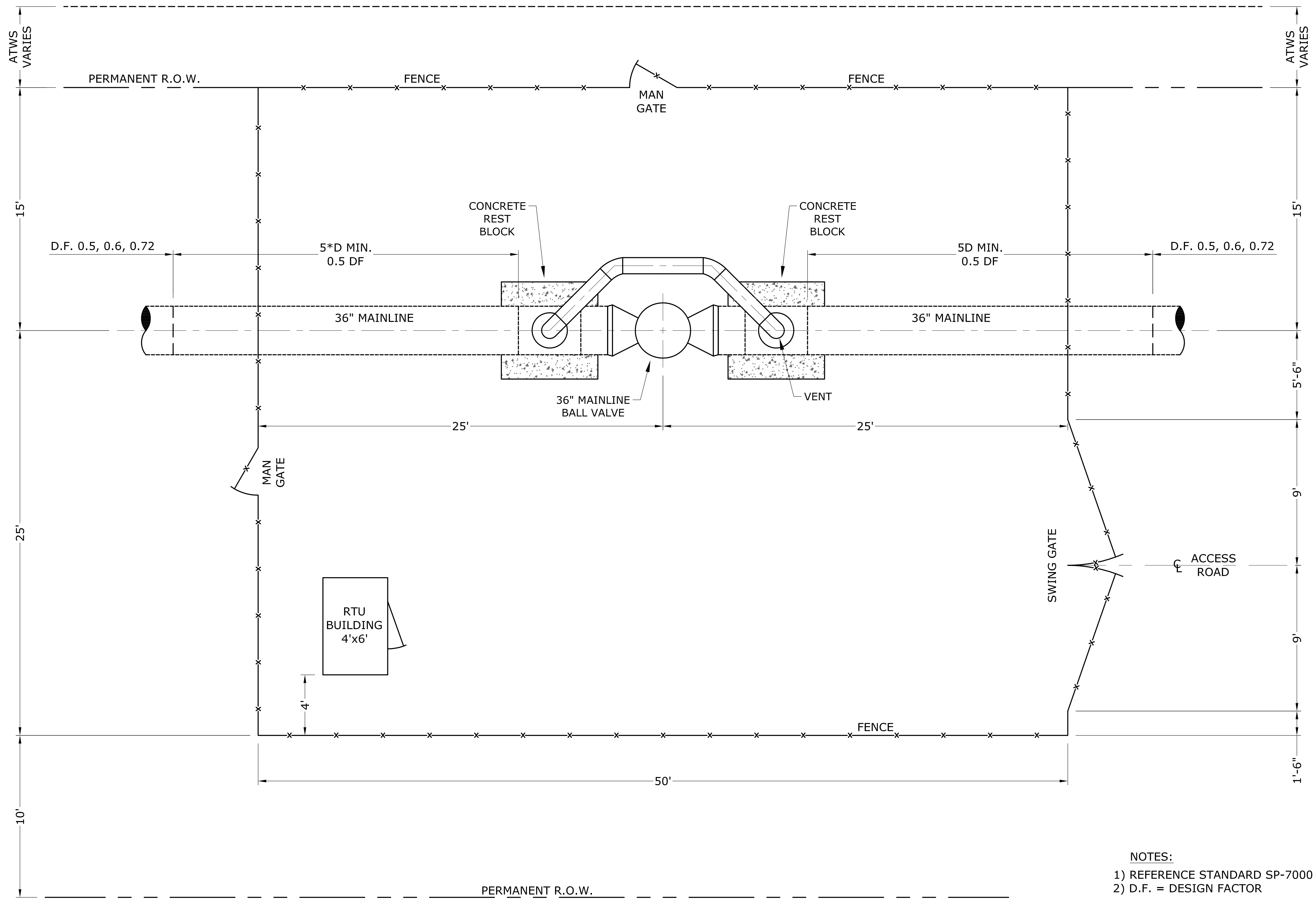
TITLE: NEXUS GAS TRANSMISSION PROJECT
TYPICAL MAINLINE CONSTRUCTION METHOD #10B
SOUTH OR WEST OF POWERLINE EASEMENT

LOC.: FULTON COUNTY, OHIO

DWG. NO. S4NX-P-8016-B

NEXUS GAS TRANSMISSION

IG.#



NOTES:
1) REFERENCE STANDARD SP-7000 BLOCK VALVE ASSEMBLY.
2) D.F. = DESIGN FACTOR

	O	ISSUED FOR FERC FILING	29Oct15
IG.#	REV.#	DESCRIPTION	DATE

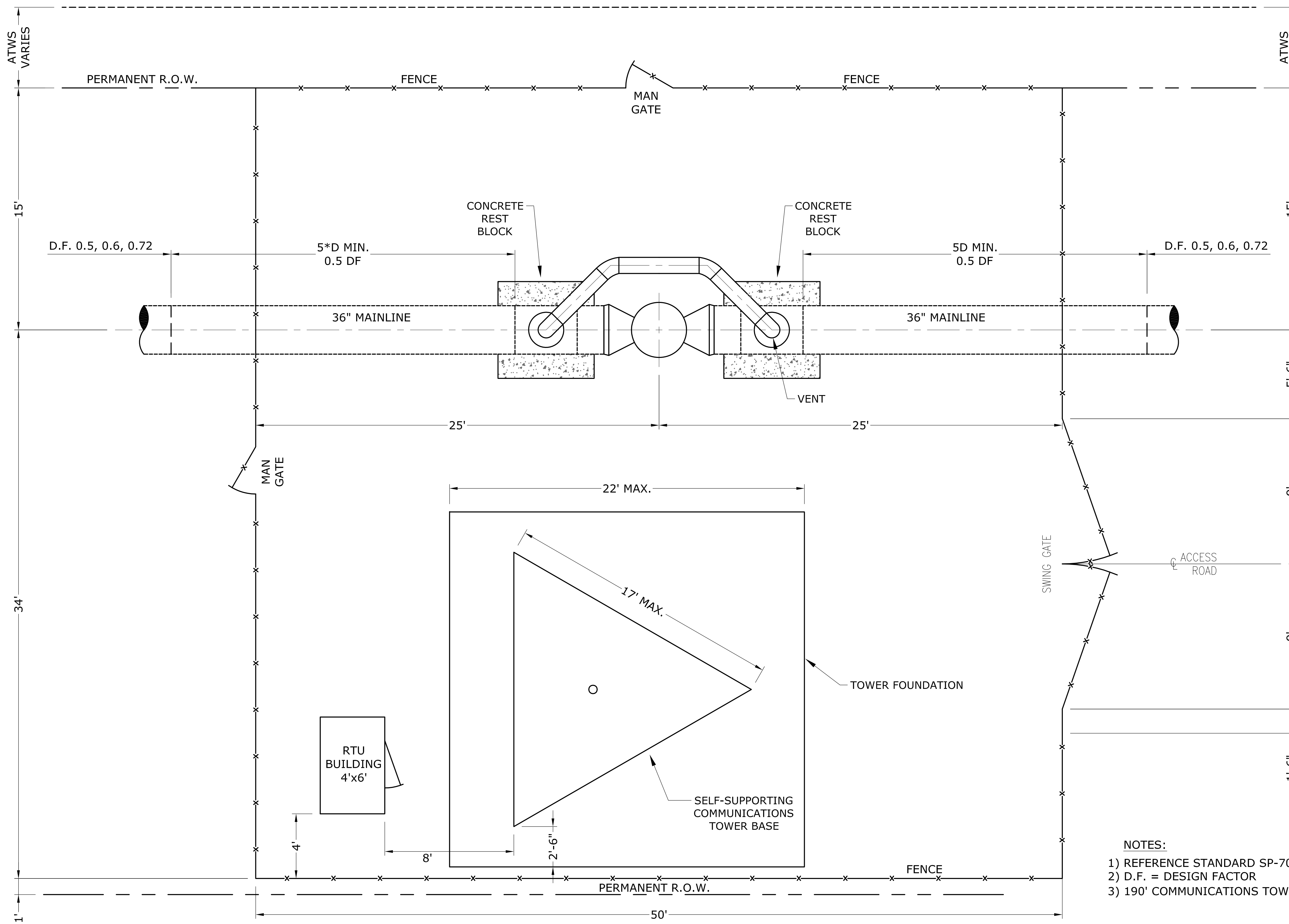
PROJ. ENG.	KG	26Oct15
CHECKED BY:	DC	26Oct15
DRAWN BY:	RVE	26Oct15
SCALE:	NTS	DATE

TITLE: NEXUS GAS TRANSMISSION PROJECT
TYPICAL 36" MAINLINE VALVE
GENERAL PLOT PLAN

LOC.: OHIO / MICHIGAN REV.: O
YR.: 2017 W.O. DWG.NO. S4NX-P-8017

NEXUS[SM] GAS TRANSMISSION

Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8017_0.DWG
8:18am
October 29, 2015
FOR63995



NOTES:

1) REFERENCE STANDARD SP-7000 BLOCK VALVE ASSEMBLY.
2) D.F. = DESIGN FACTOR
3) 190' COMMUNICATIONS TOWER PLANNED FOR MLV 16.

0	ISSUED FOR FERC FILING	29Oct15
REV.#	DESCRIPTION	DATE

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

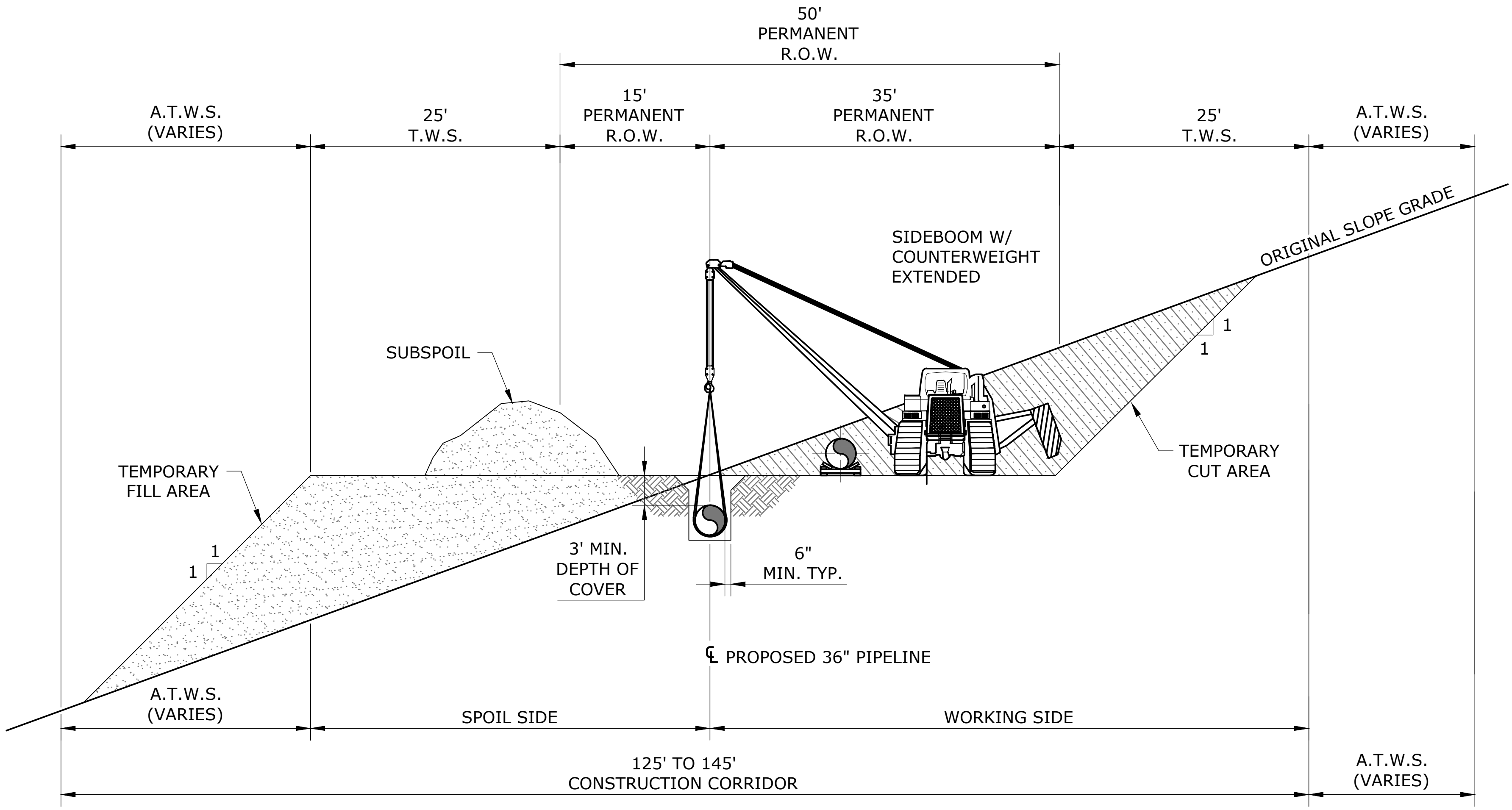
LOC.: OHIO / MICHIGAN — REV.: 0

YR.: 2017 — W.O. — DWG.NO. S4NX-P-8018

NEXUS SM
GAS TRANSMISSION

IG.#

Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8018_0.DWG 8:22am October 29, 2015 FOR63995



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

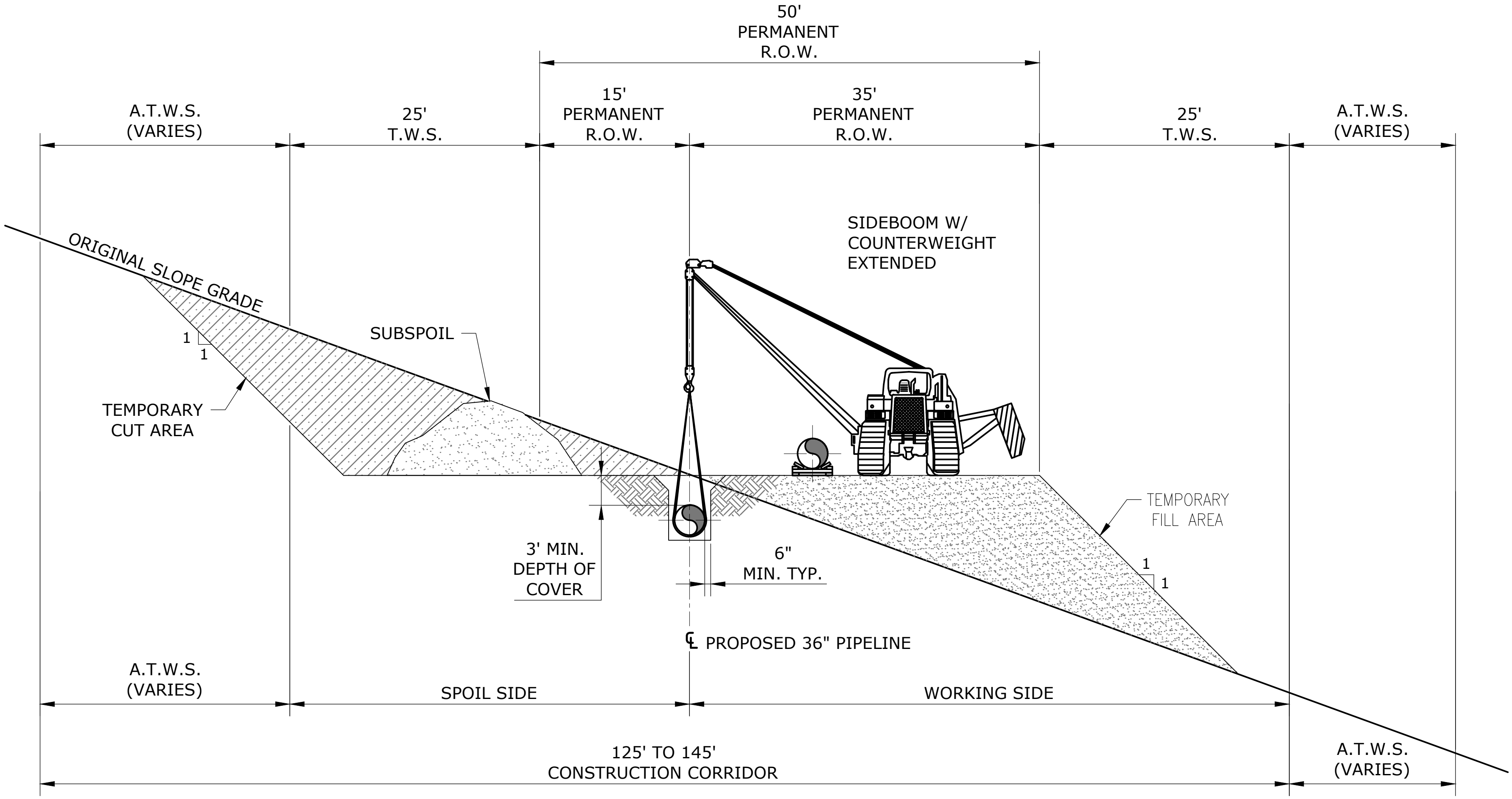
PROJ. ENG. KG	15Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL SIDE SLOPE CONSTRUCTION – RIGHT SIDE –
CHECKED BY: DC	15Oct15	YR.: 2017	
DRAWN BY: RVE	15Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: OHIO / MICHIGAN

DWG. NO. S4NX–P–8019

NEXUS GAS TRANSMISSION SM

FOR63995 October 29, 2015 8:23am
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8019_0.DWG

IG.#



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

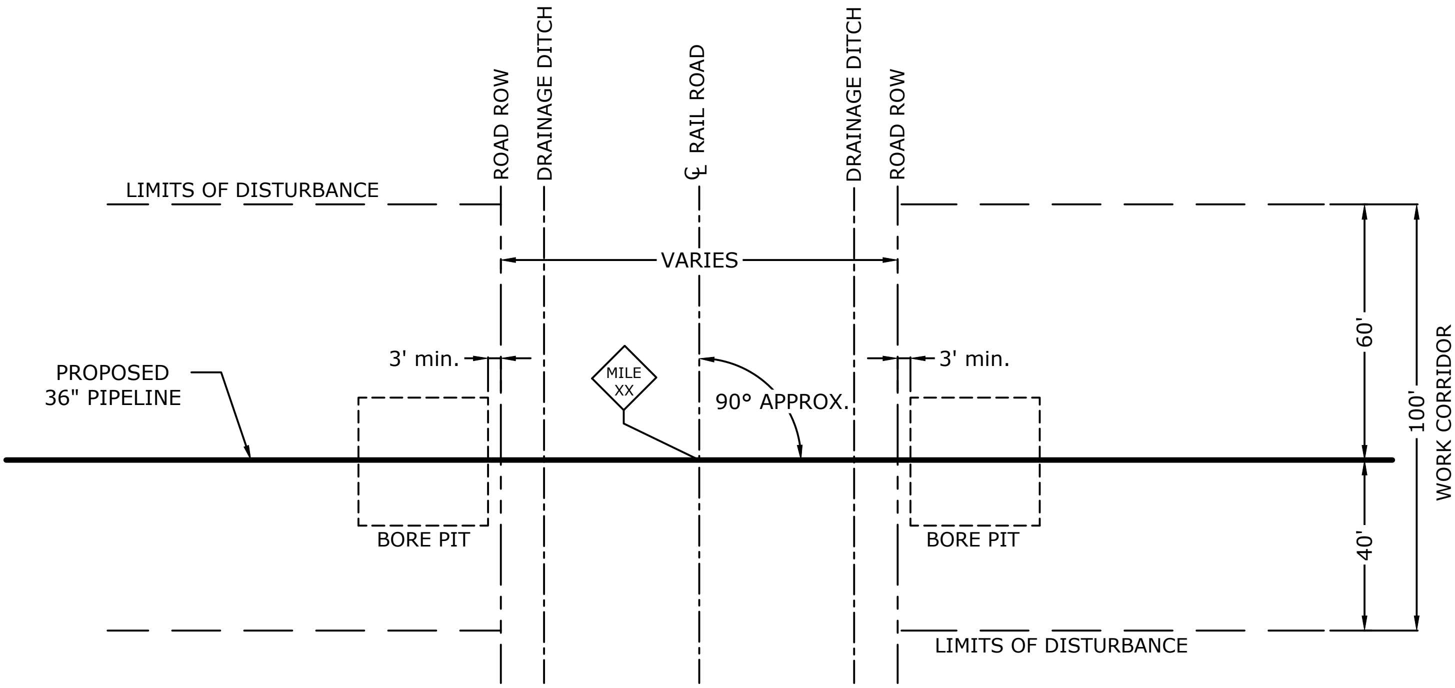
DWG. NO. S4NX–P–8020

NEXUS SM GAS TRANSMISSION

IG.#

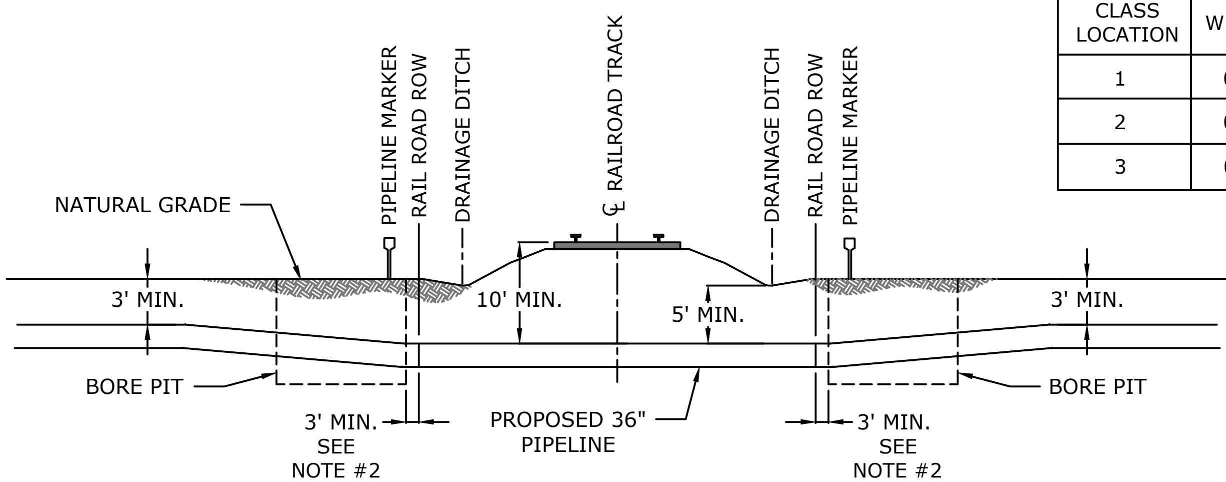
FOR63995 October 29, 2015 8:24am

Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8020_0.DWG



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 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

NEXUS GAS TRANSMISSION

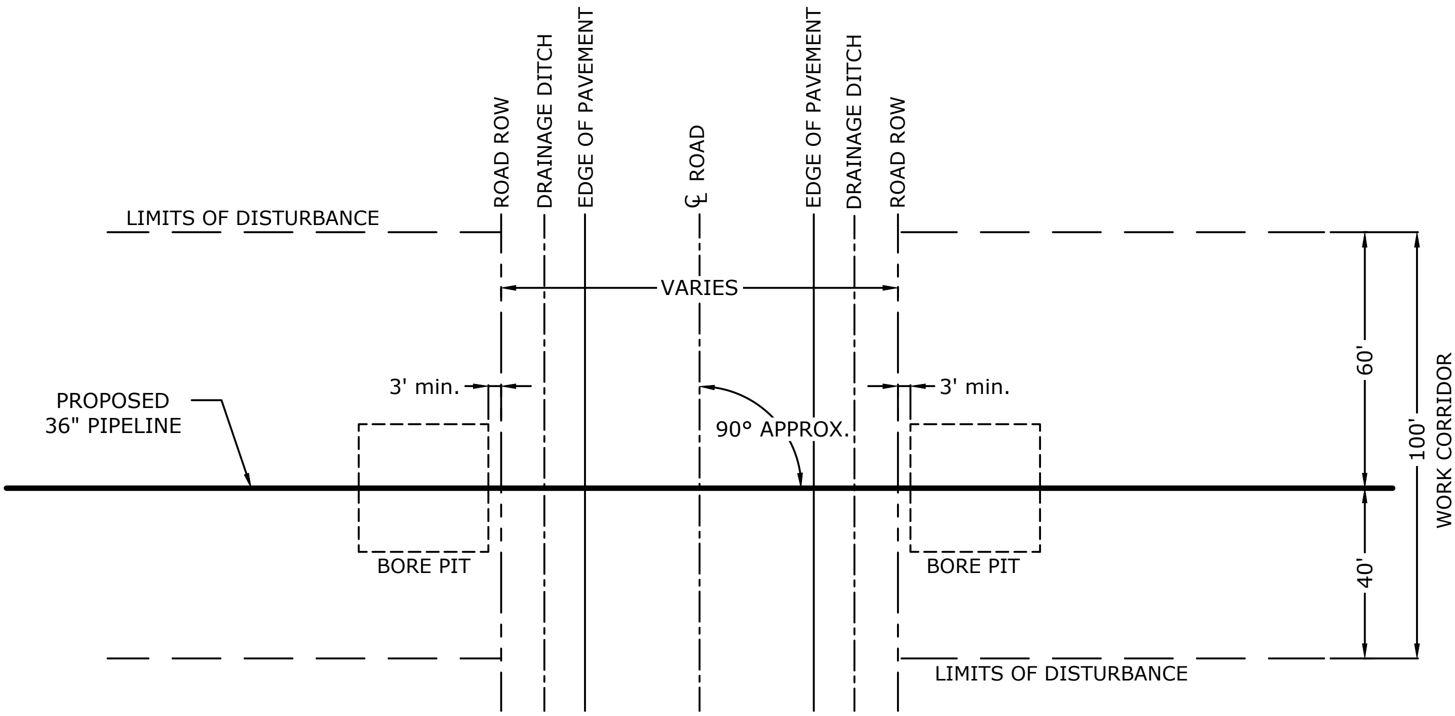
TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL BORE RAILROAD CROSSING CONTROL MEASURE DETAIL

LOC.: OHIO / MICHIGAN

PROJ. ENG.	KG	21Oct15
CHECKED BY:	DC	21Oct15
DRAWN BY:	RVE	21Oct15
SCALE:	NTS	YR.: 2017
W.O.		REV.: 0
DWG. NO.	S4NX-P-8021	

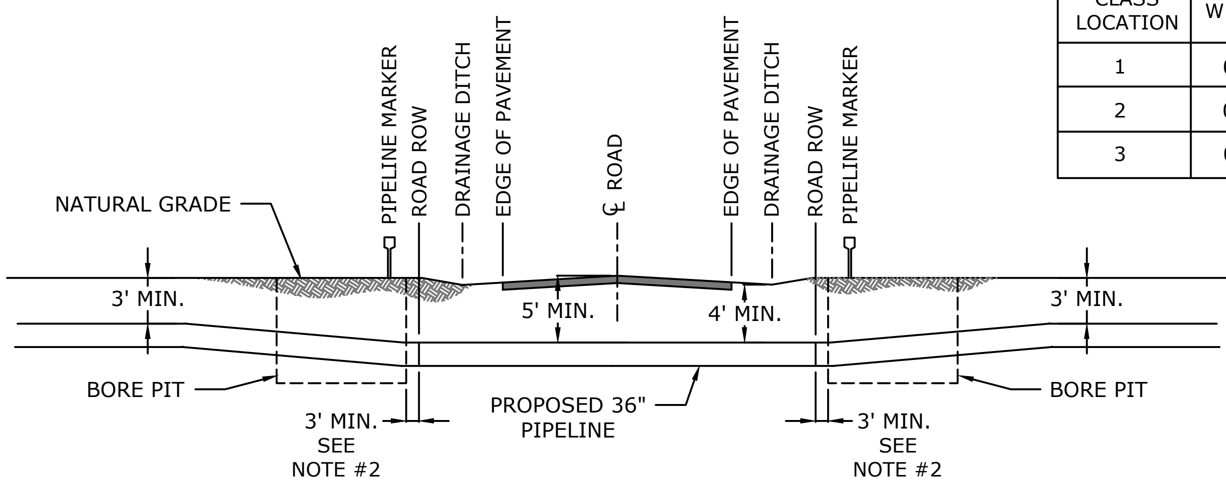
ELI22282 Filename: K:\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8021_0.DWG October 29, 2015 10:53am

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.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

NEXUS GAS TRANSMISSION

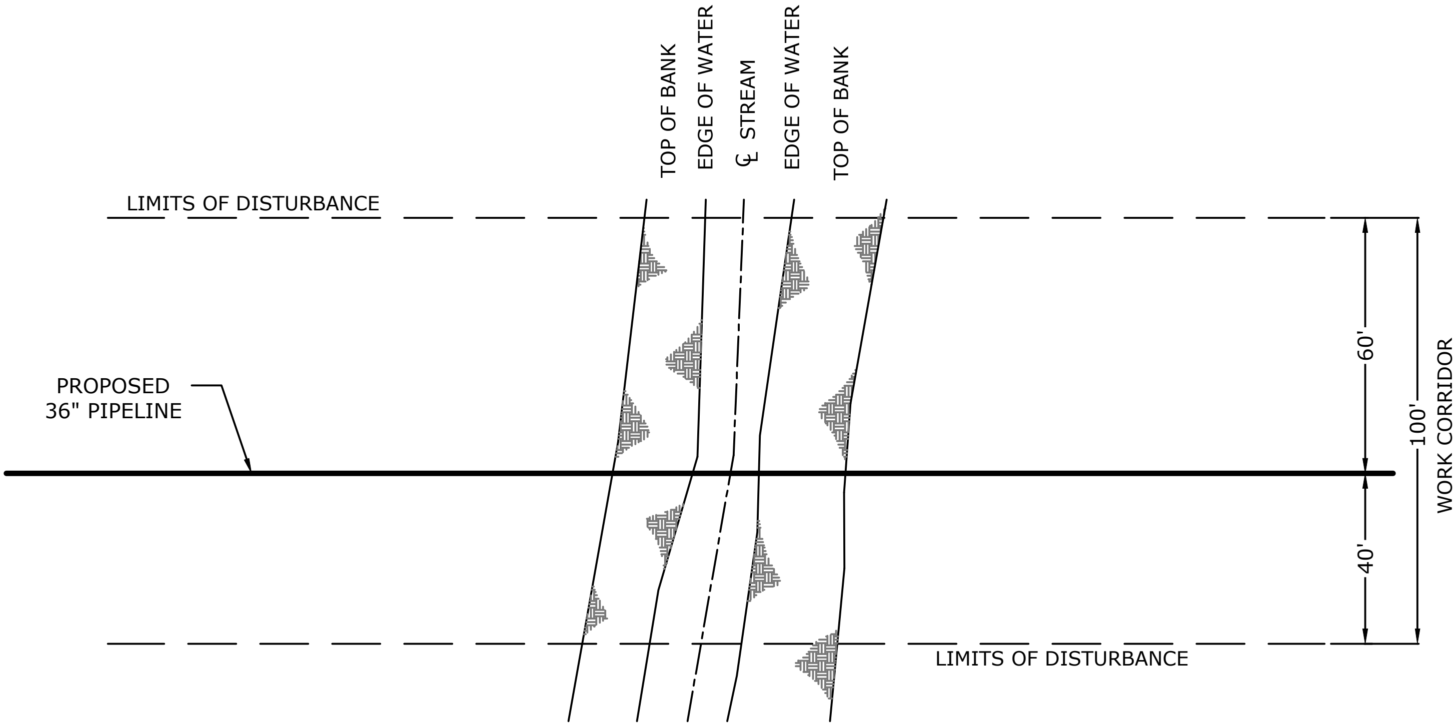
TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL BORED ROAD CROSSING CONTROL MEASURE DETAIL

PROJ. ENG.	KG	15Oct15
CHECKED BY:	DC	15Oct15
DRAWN BY:	RVE	15Oct15
SCALE: NTS		YR.: 2017
W.O.		REV.: 0

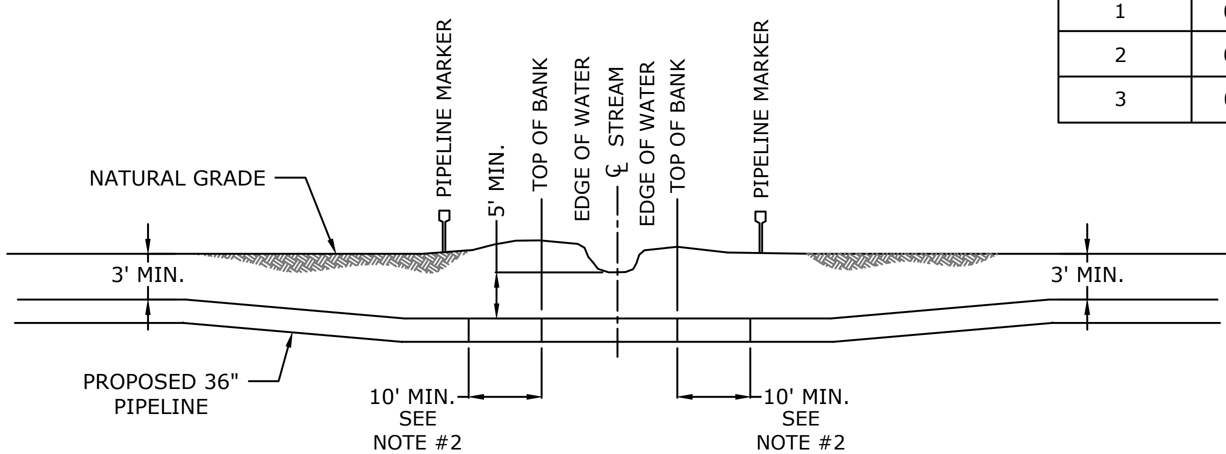
LOC.: OHIO / MICHIGAN

DWG. NO. S4NX-P-8022

IG.#



PLAN
NTS



PROFILE
NTS

WALL THICKNESS	
CLASS LOCATION	W.T. (IN)
1	0.515
2	0.618
3	0.741

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.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

NEXUS GAS TRANSMISSION

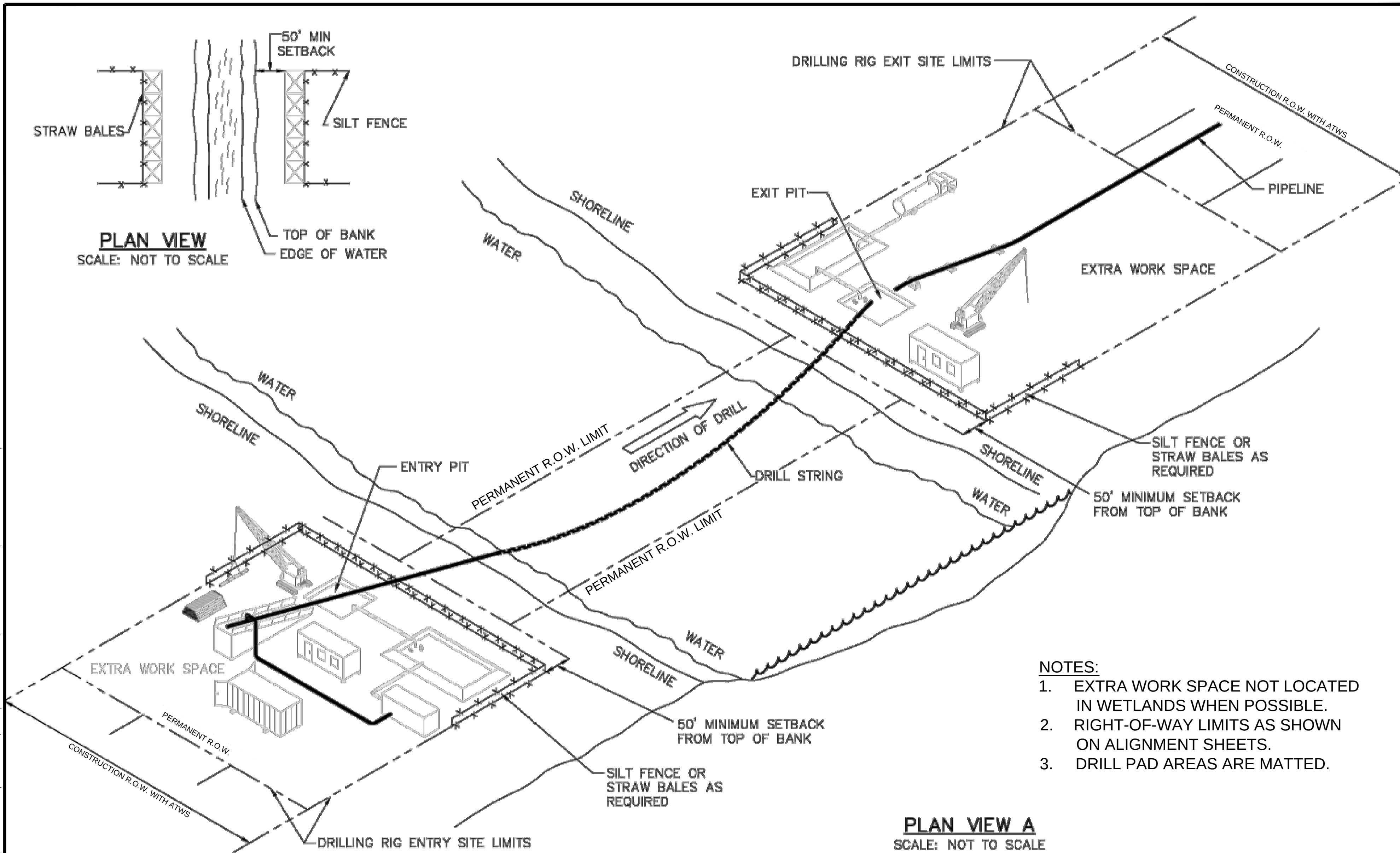
TITLE: NEXUS GAS TRANSMISSION PROJECT
TYPICAL STREAM CROSSING
CONTROL MEASURE DETAIL

PROJ. ENG.	KG	28Aug15
CHECKED BY:	DC	28Aug15
DRAWN BY:	RVE	28Aug15
SCALE:	NTS	YR.: 2017
W.O.		REV.: 0

LOC.: OHIO / MICHIGAN

DWG. NO. S4NX-P-8023

IG.#



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

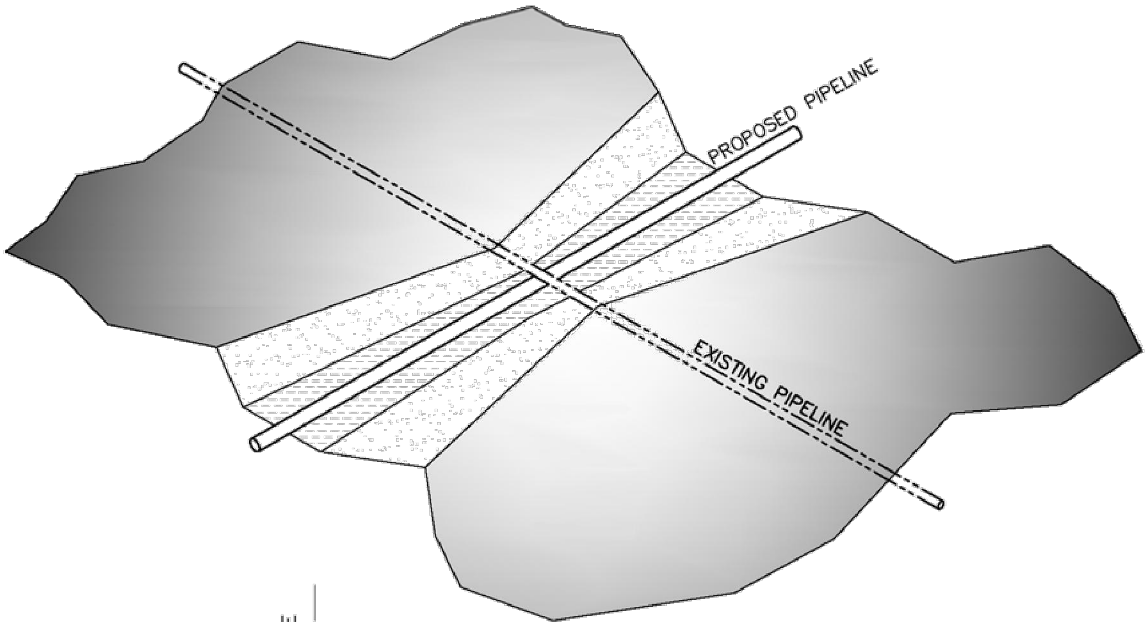
REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

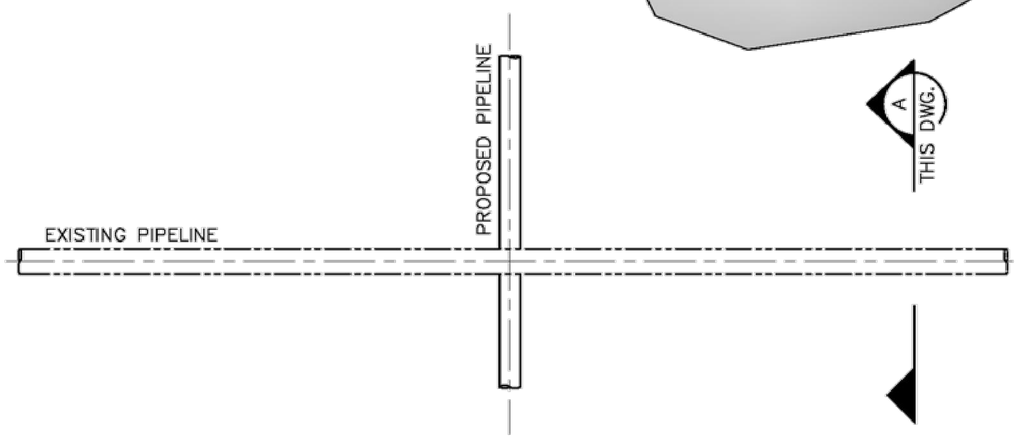
PROJ. ENG. KG	29Oct15		TITLE: NEXUS GAS TRANSMISSION PROJECT TYPICAL WATER BODY CONSTRUCTION DETAIL WITH HDD PLAN
CHECKED BY: DF	29Oct15	YR.: 2017	
DRAWN BY: RVE	29Oct15	W.O.	
SCALE: NTS	DATE	REV.: 0	LOC.: OHIO / MICHIGAN

DWG. NO. S4NX-P-8024

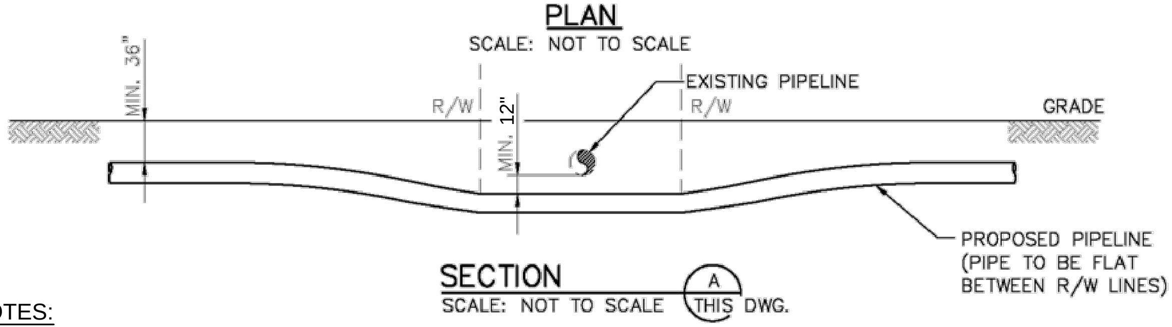
NEXUS GAS TRANSMISSION SM

ONSHORE PIPELINE CROSSING UNDER EXISTING PIPELINE





PLAN
SCALE: NOT TO SCALE



SECTION
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

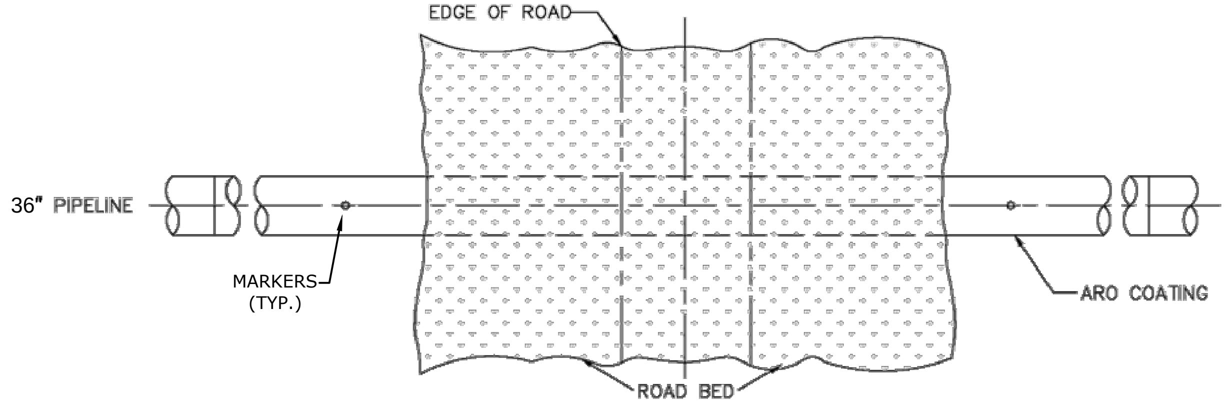
NEXUS SM
GAS TRANSMISSION

TITLE:
NEXUS GAS TRANSMISSION PROJECT
TYPICAL FOREIGN PIPELINE CROSSING
CONSTRUCTION DETAIL

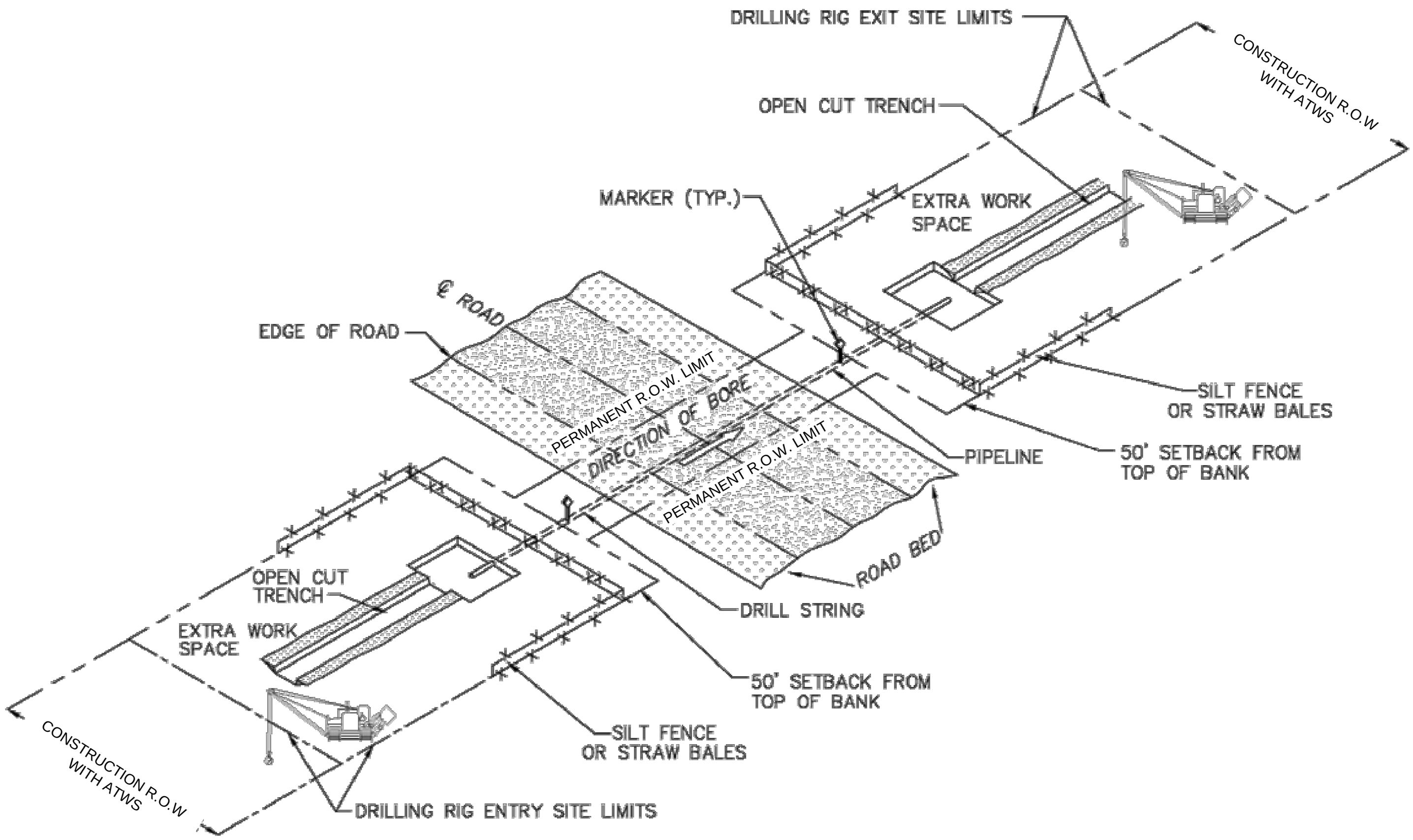
LOC.: OHIO / MICHIGAN

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	

LLI22282 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

NEXUS GAS TRANSMISSION

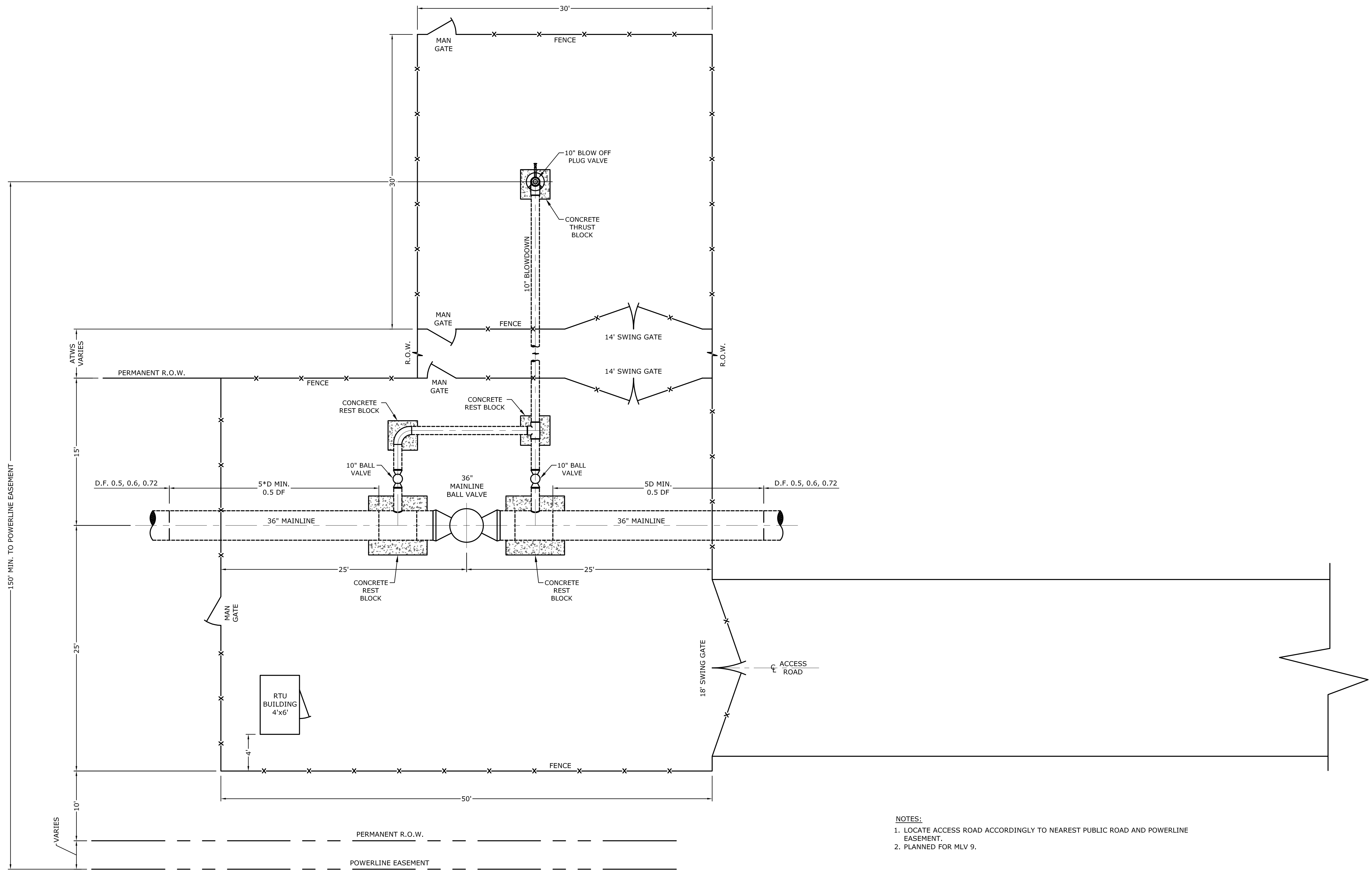
TITLE:
NEXUS GAS TRANSMISSION PROJECT
TYPICAL BORED ROAD CROSSING
CONSTRUCTION DETAIL

PROJ. ENG.	KG	29Oct15
CHECKED BY:	DF	29Oct15
DRAWN BY:	RVE	29Oct15
SCALE:	NTS	YR.: 2017
W.O.		REV.: 0

LOC.: OHIO / MICHIGAN

DWG. NO. S4NX-P-8026

IG.#



NOTES:

1. LOCATE ACCESS ROAD ACCORDINGLY TO NEAREST PUBLIC ROAD AND POWERLINE EASEMENT.
2. PLANNED FOR MLV 9.

REV.#	DESCRIPTION	DATE
O	ISSUED FOR FERC FILING	29Oct15

PROJ. ENG.	KG	08Oct15
CHECKED BY:	DC	08Oct15
DRAWN BY:	RVE	08Oct15
SCALE:	NTS	DATE

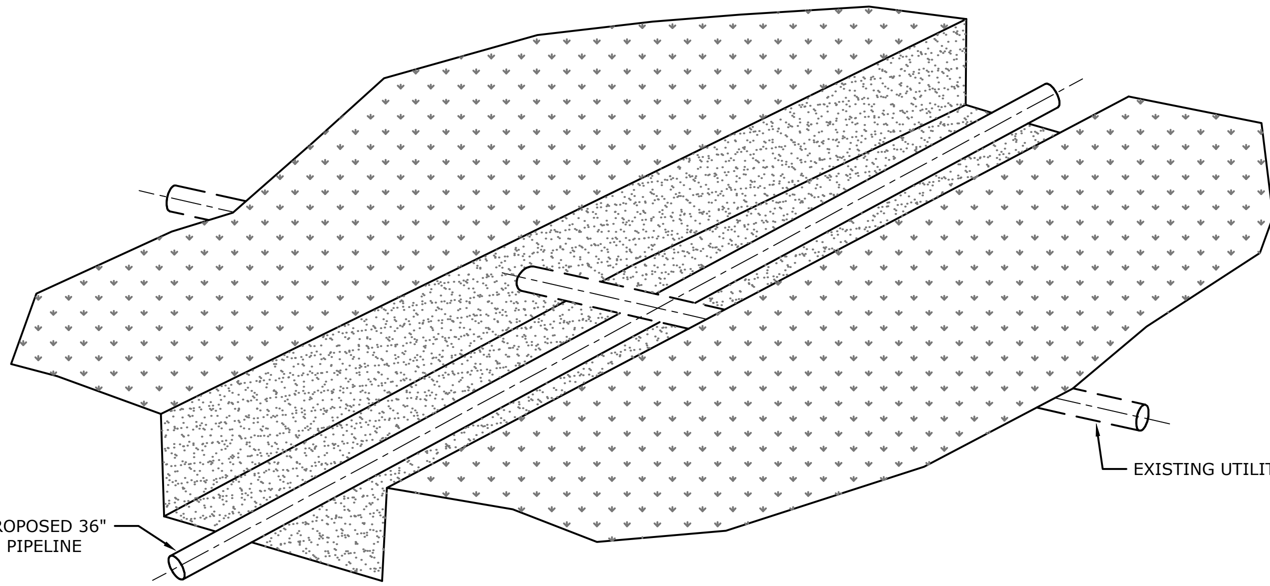
TITLE: NEXUS GAS TRANSMISSION PROJECT
TYPICAL 36" MAINLINE VALVE PLOT PLAN WITH REMOTE BLOW-OFF LOCATION – GENERAL PLOT PLAN

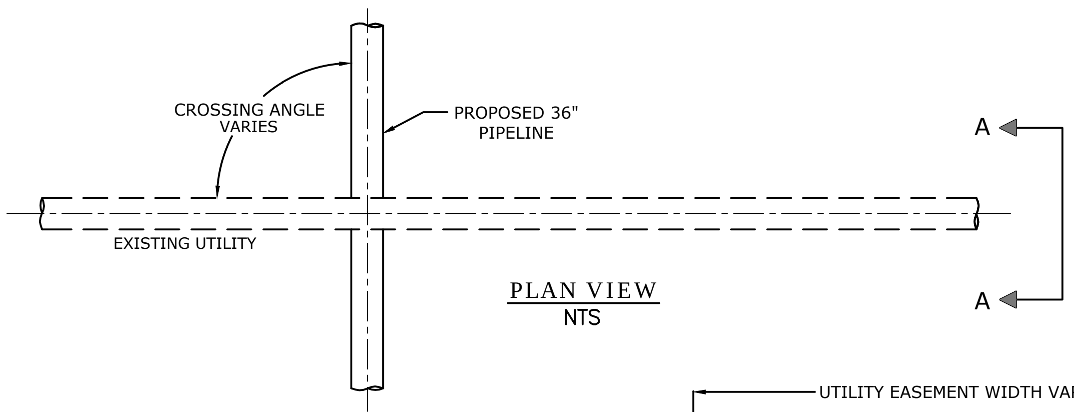
LOC.: OHIO / MICHIGAN | REV.: O
YR.: 2017 | W.O. | DWG.NO. S4NX-P-8027

NEXUS SM GAS TRANSMISSION

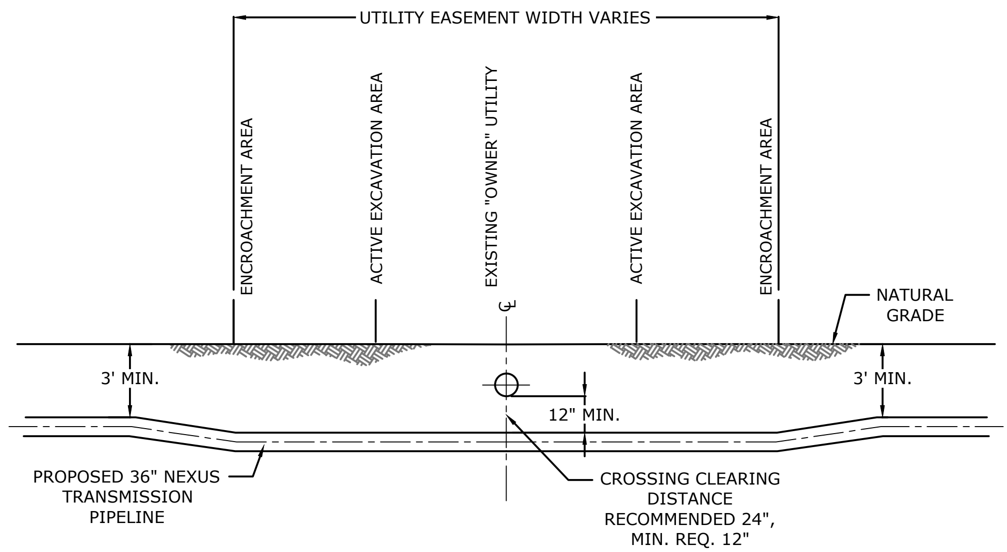
IG.#

FOR63995 October 29, 2015 8:28am Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8027_0.DWG





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.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

NEXUS GAS TRANSMISSION

TITLE: NEXUS GAS TRANSMISSION PROJECT
TYPICAL PIPELINE CONSTRUCTION DETAIL
CROSSING WITH EXISTING UTILITY

PROJ. ENG.	KG	2Sept15
CHECKED BY:	PW	2Sept15
DRAWN BY:	RVE	2Sept15
SCALE:	NTS	YR.: 2017
W.O.		REV.: 0

LOC.: OHIO / MICHIGAN

DWG. NO. S4NX-P-8029

IG.#

EL122282 October 29, 2015 10:52am
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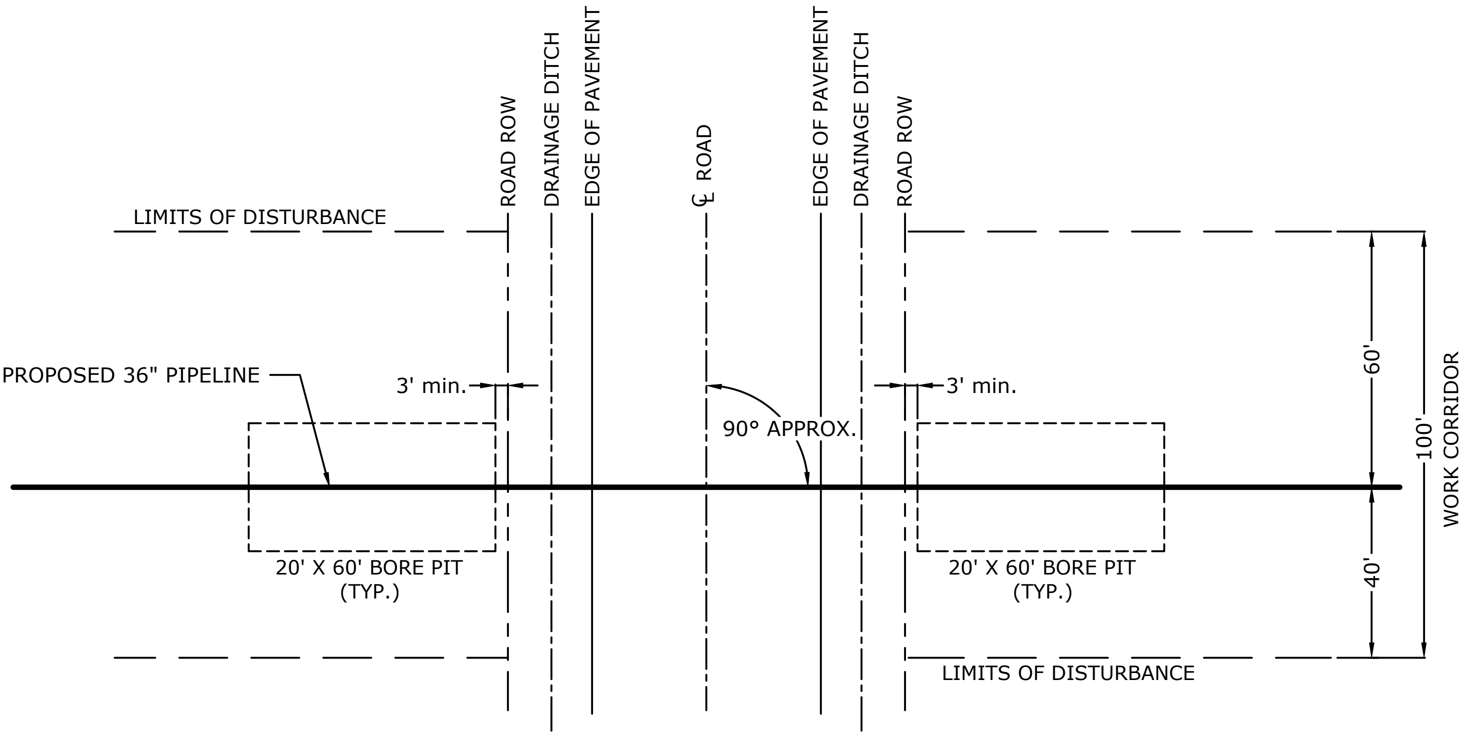
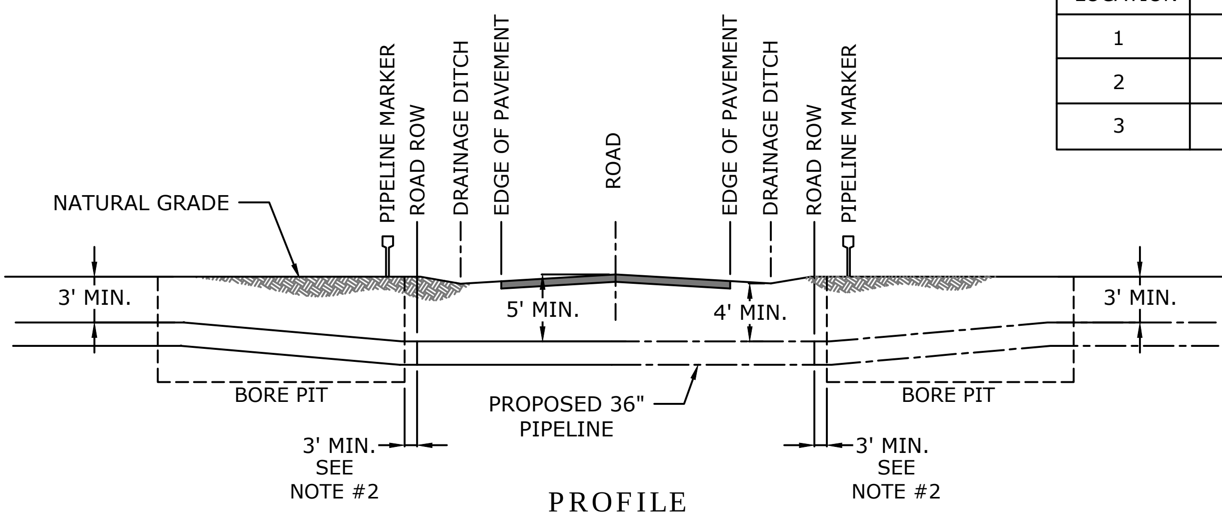


PLAN
NTS

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.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

NEXUS GAS TRANSMISSION

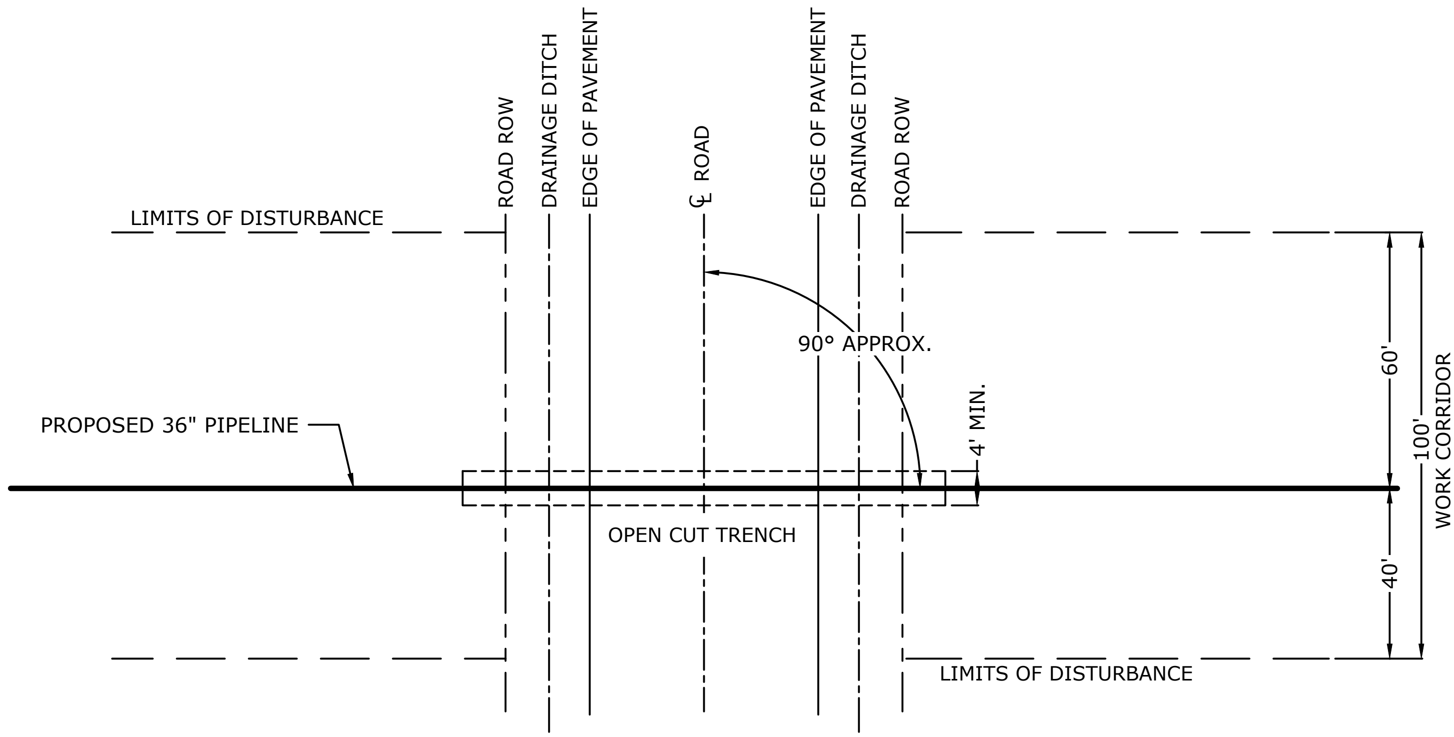
TITLE:
NEXUS GAS TRANSMISSION PROJECT
TYPICAL BORED ROAD CROSSING
COUNTY/ TOWNSHIP ROAD

LOC.: OHIO / MICHIGAN

PROJ. ENG.	KG	15Oct15
CHECKED BY:	DC	15Oct15
DRAWN BY:	RVE	15Oct15
SCALE:	NTS	YR.: 2017
W.O.		REV.: 0
DWG. NO.	S4NX-P-8030	

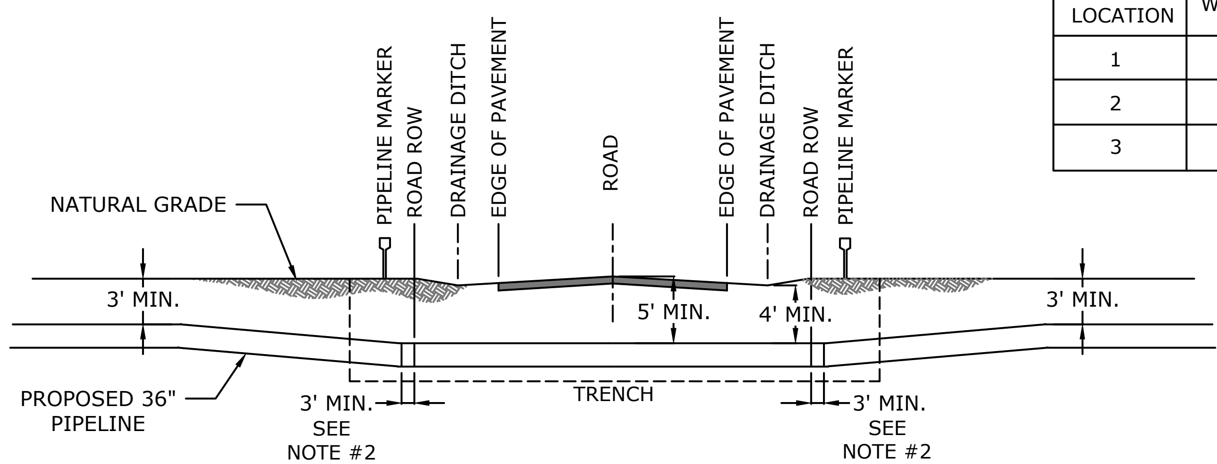
FOR63995 October 29, 2015 8:30am
Filename: \\HOPPFIL014\HO_S4NX\CAD\295_PIPELINE\TYPICAL_DETAILS\ISSUED FOR FERC\S4NX-P-8030_0.DWG

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.

REV.	DESCRIPTION	DATE
0	ISSUED FOR FERC FILING	29Oct15

NEXUS GAS TRANSMISSION

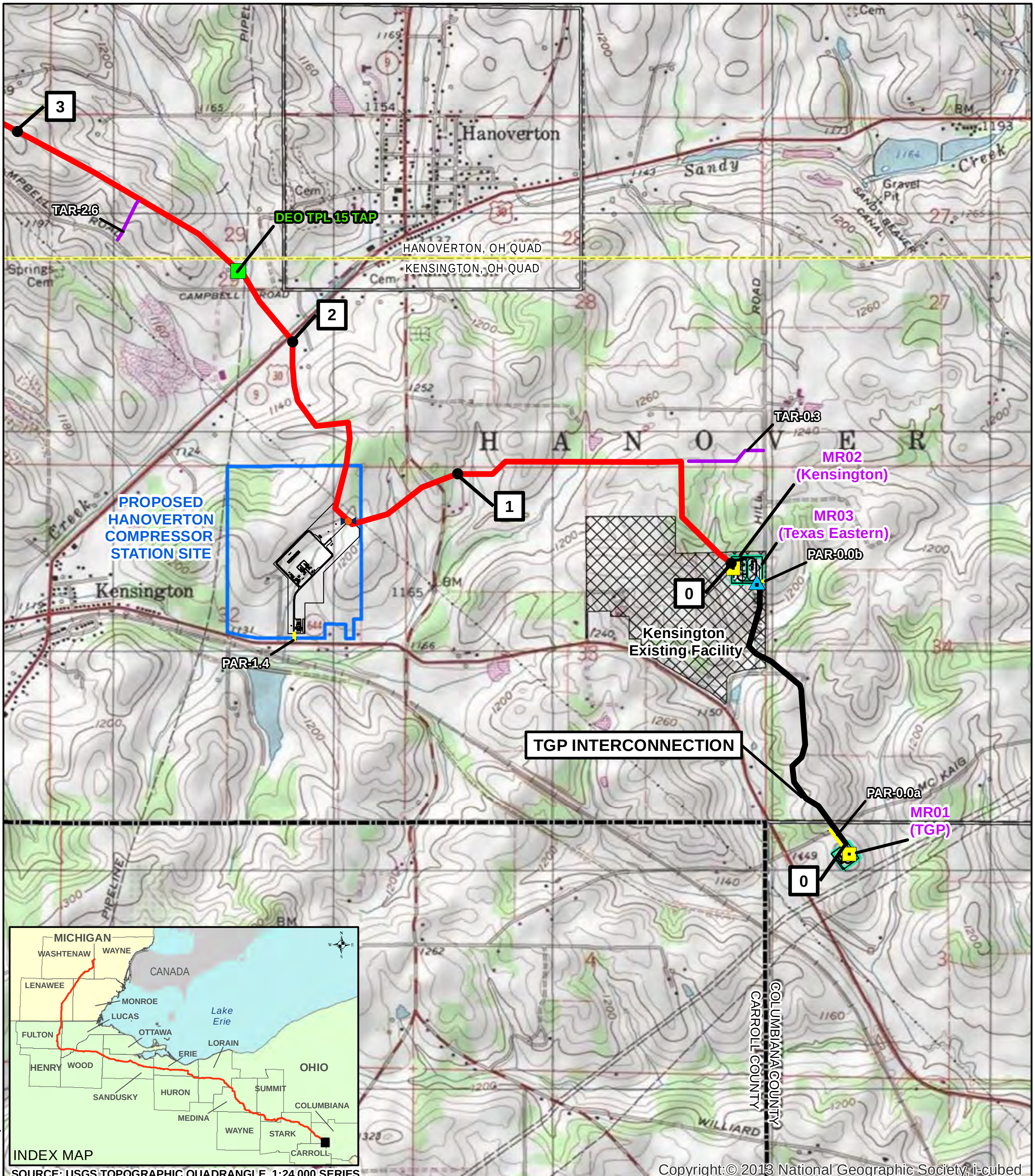
TITLE: NEXUS GAS TRANSMISSION PROJECT
TYPICAL "OPEN CUT" ROAD CROSSING
COUNTY/TOWNSHIP ROAD

LOC.: OHIO / MICHIGAN

PROJ. ENG.	KG	15Oct15
CHECKED BY:	DC	15Oct15
DRAWN BY:	RVE	15Oct15
SCALE: NTS		YR.: 2017
W.O.		REV.: 0
DWG. NO.	S4NX-P-8031	

IG.#

8.5- x 11-inch USGS Quadrangle Map Excerpts



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

- 1 MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

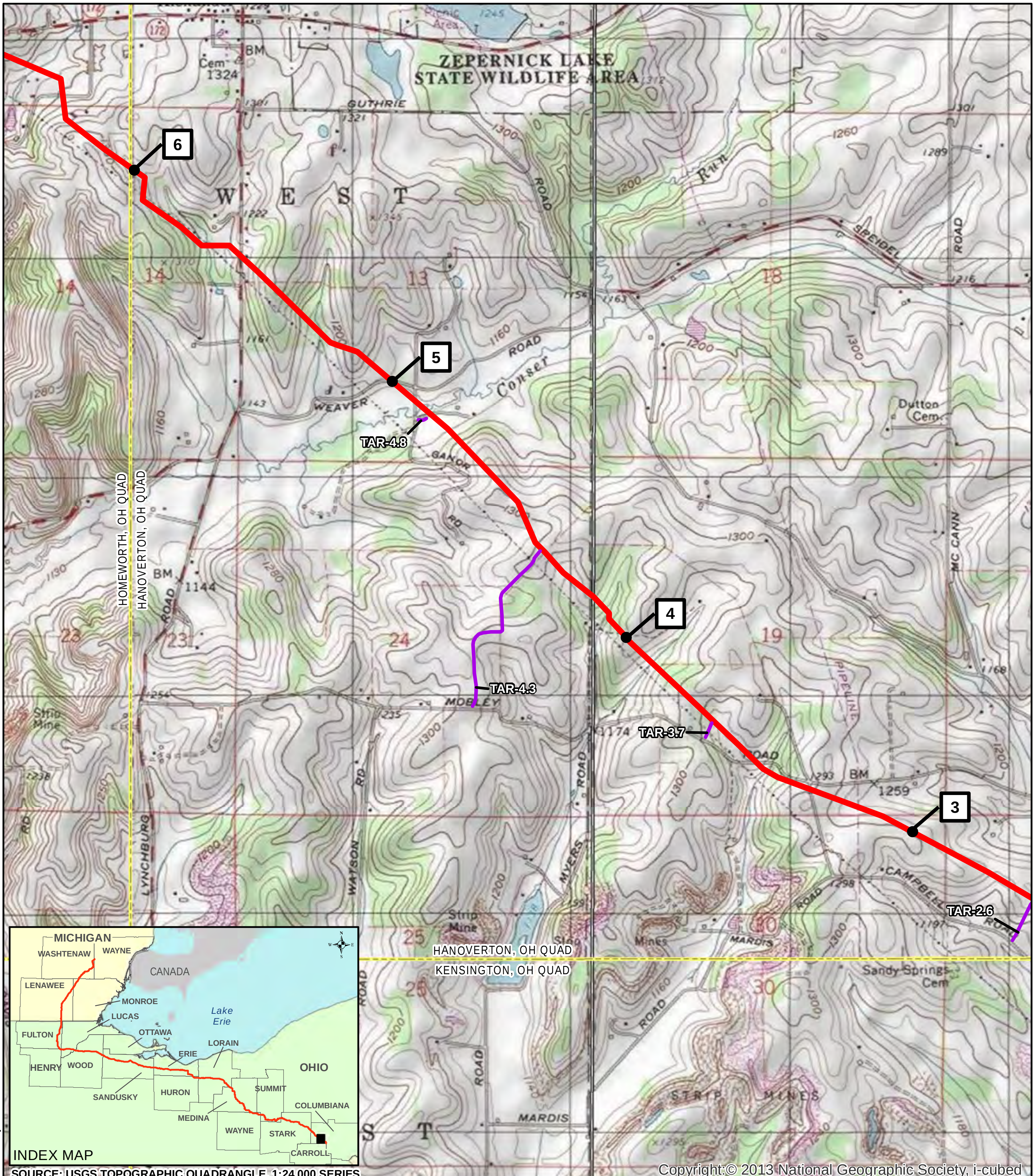
0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT PROPOSED PIPELINE - USGS QUAD MAP			
LOC.: CARROLL COUNTY, OH; COLUMBIANA COUNTY, OH			
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-1	MAP 1 of 81 · REV. B

I.G.

NEXUS GAS TRANSMISSION



Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

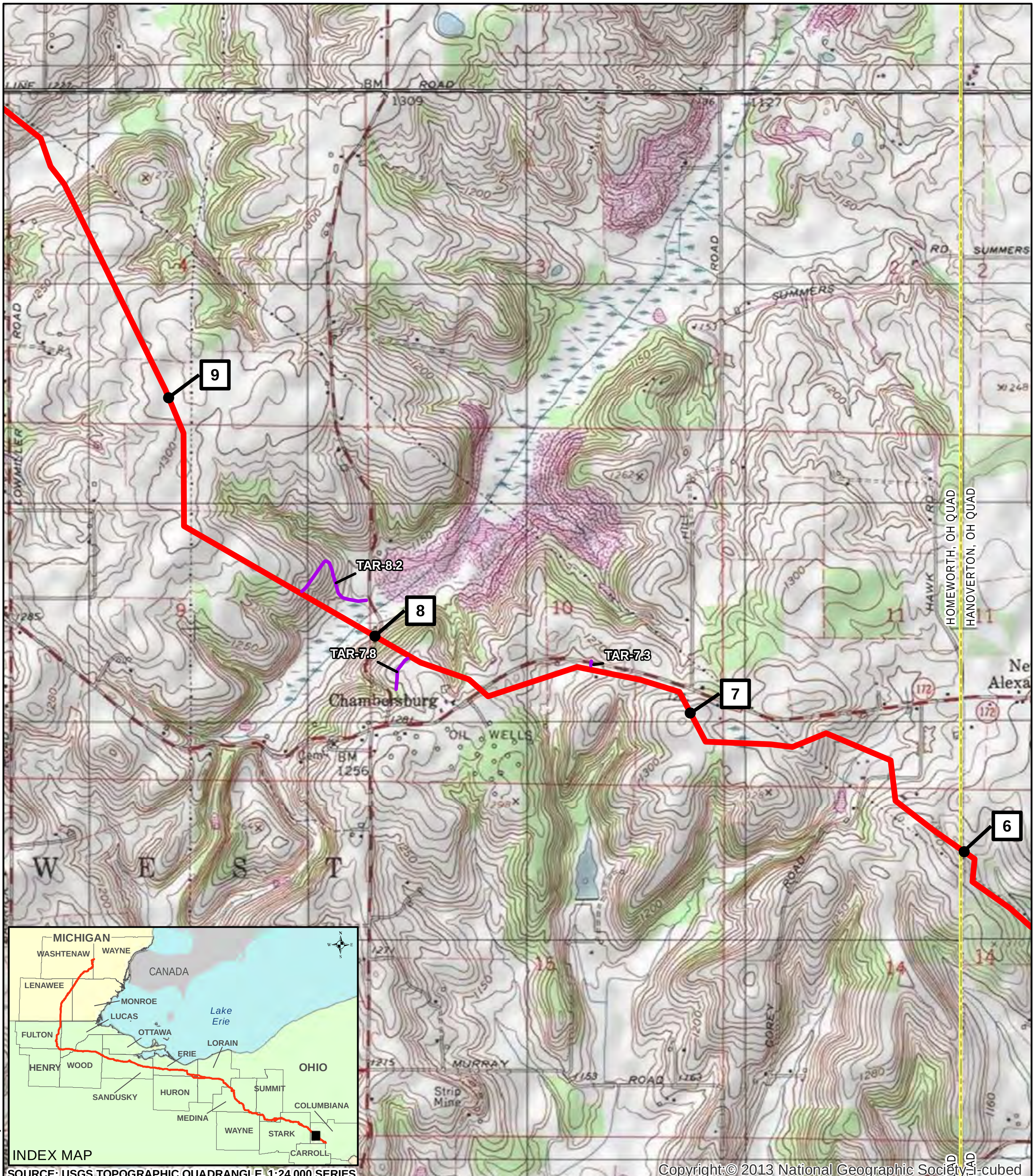
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: COLUMBIANA COUNTY, OH			
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-2	MAP 2 of 81 / REV. B

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: COLUMBIANA COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-3	MAP 3 of 81	REV. B

I.G.

NEXUS GAS TRANSMISSION

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1 MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: COLUMBIANA COUNTY, OH; STARK COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-4	MAP 4 of 81	REV. B

I.G.

Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

1 MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: COLUMBIANA COUNTY; OH, STARK COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-5	MAP 5 of 81	REV. B

I.G.

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1 MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

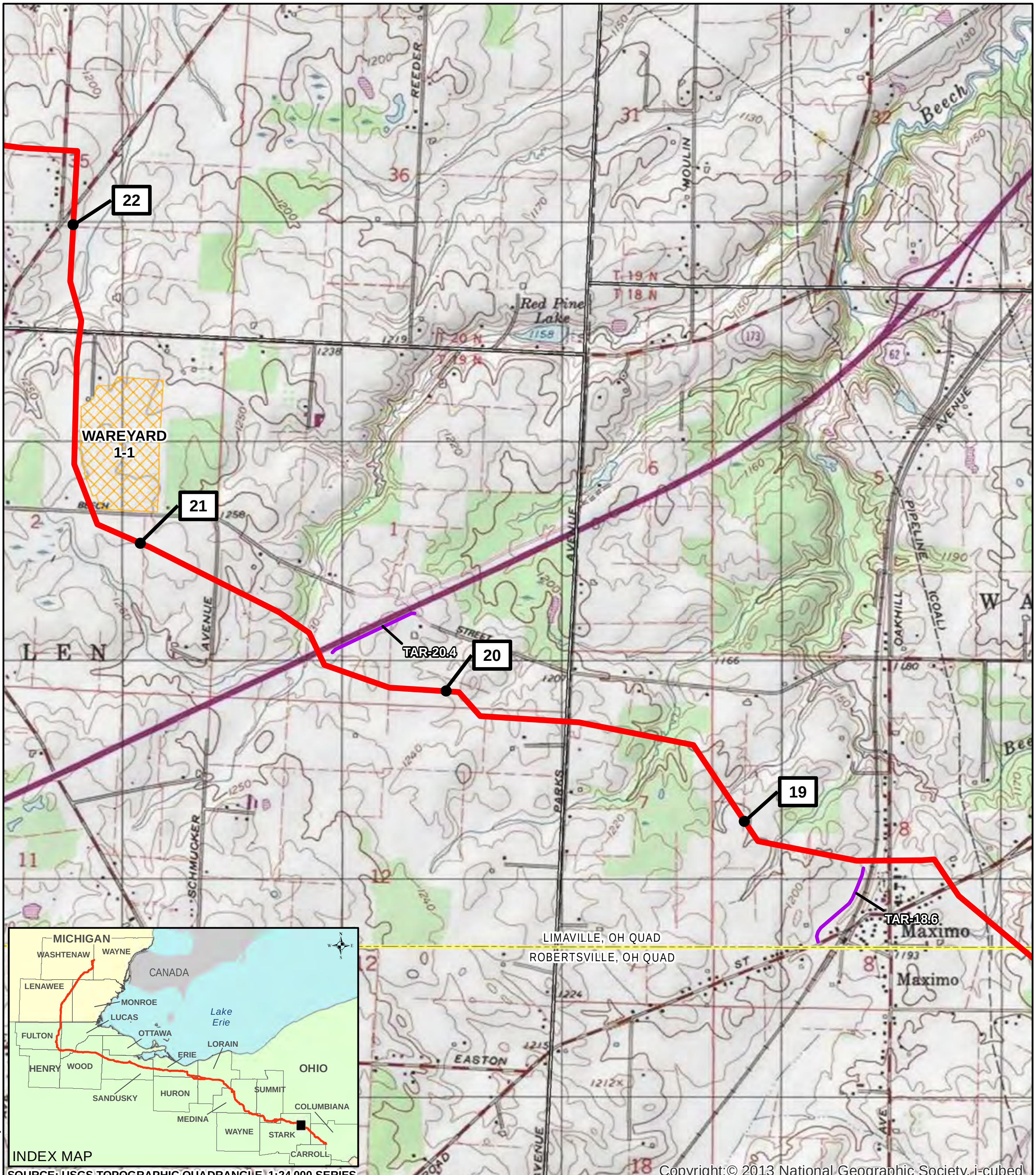
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: STARK COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-6	MAP 6 of 81 / REV. B

NEXUS GAS TRANSMISSION

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

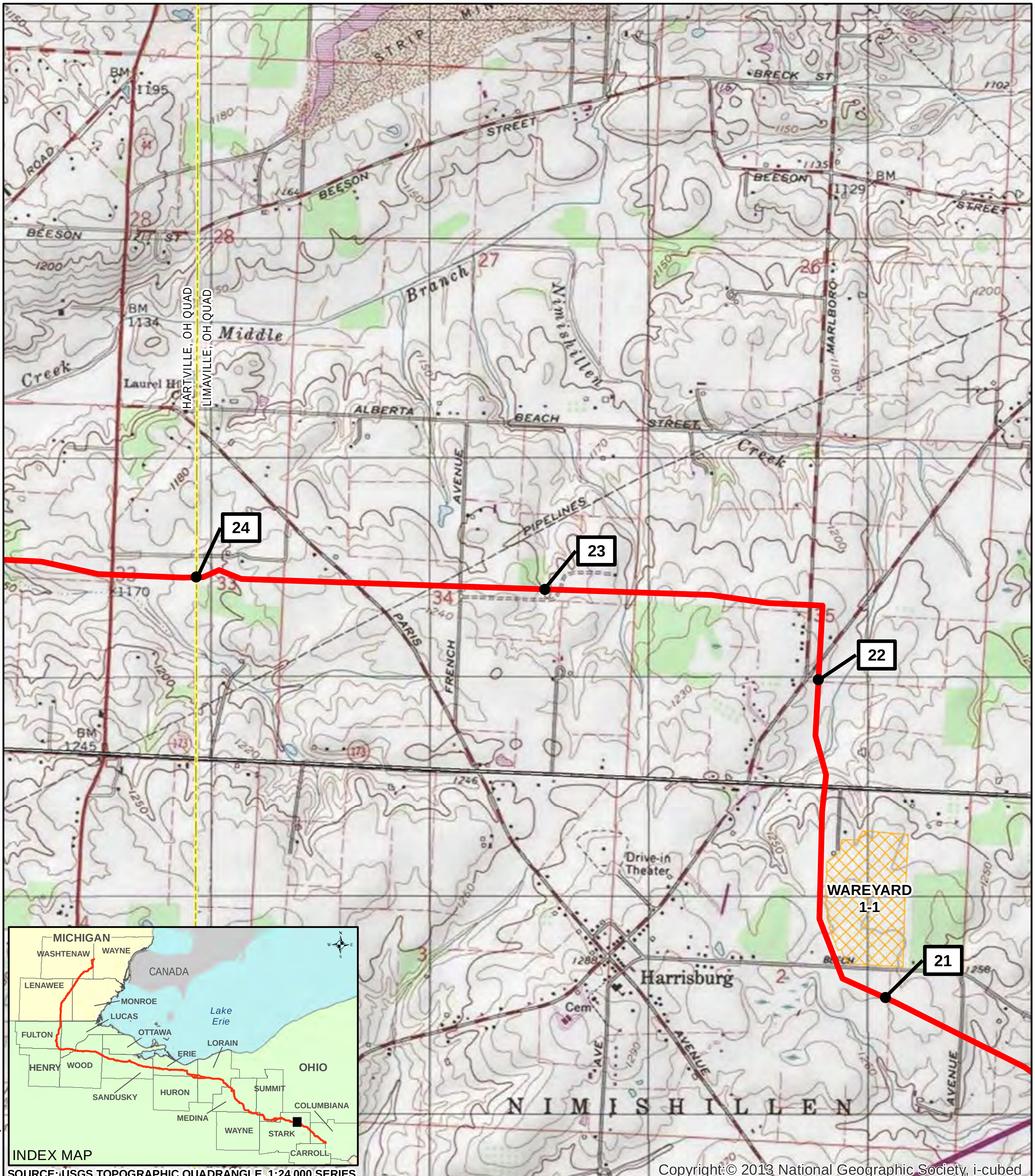
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: STARK COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-7	MAP 7 of 81 REV. B

I.G.

NEXUS GAS TRANSMISSION



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

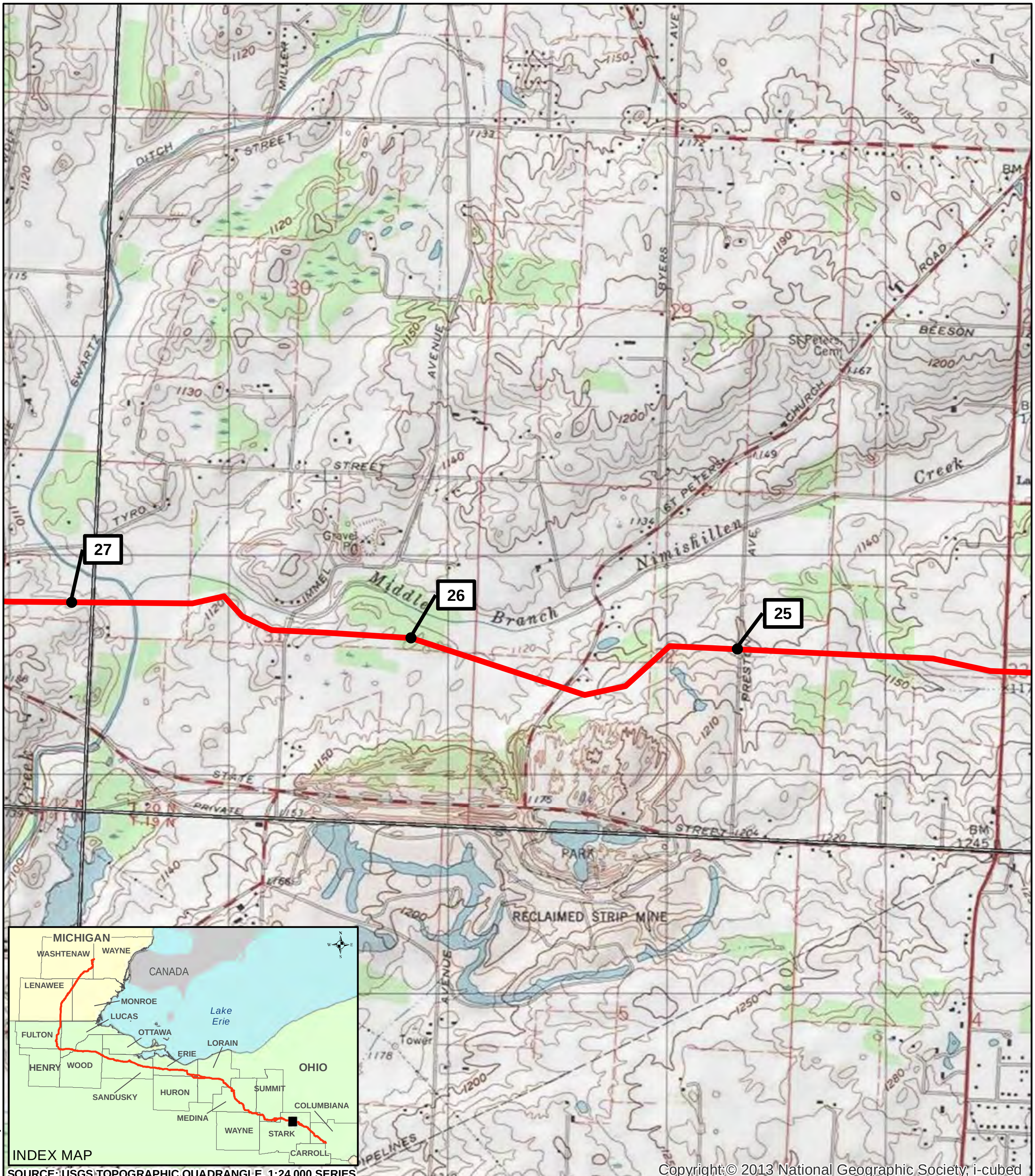
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: STARK COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-8	MAP 8 of 81	REV. B

I.G.

NEXUS SM GAS TRANSMISSION



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: STARK COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-9	MAP 9 of 81 — REV. B

I.G.

NEXUS℠ GAS TRANSMISSION

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

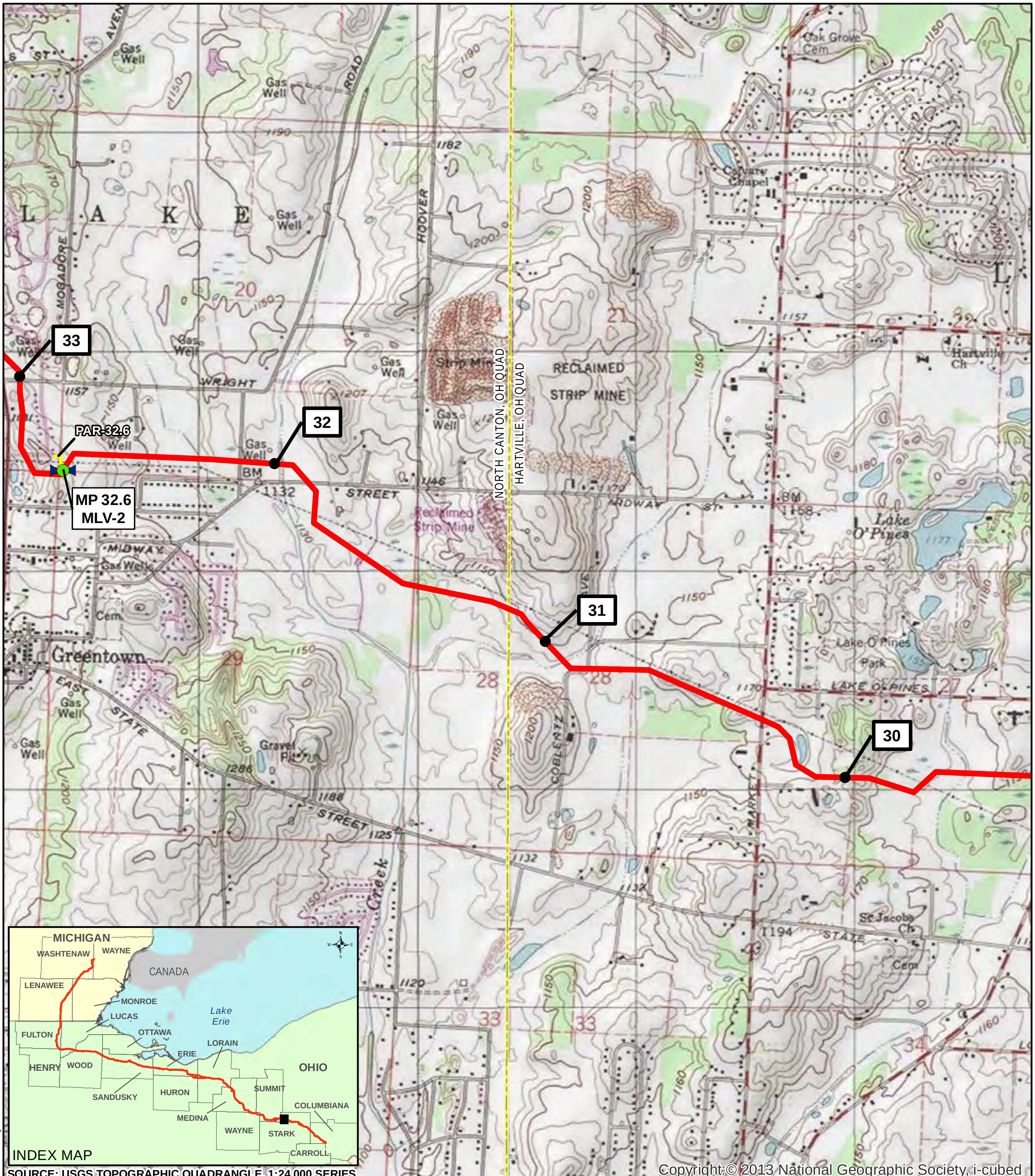
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: STARK COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-10	MAP 10 of 81 / REV. B

I.G.

NEXUS SM
GAS TRANSMISSION



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1 MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

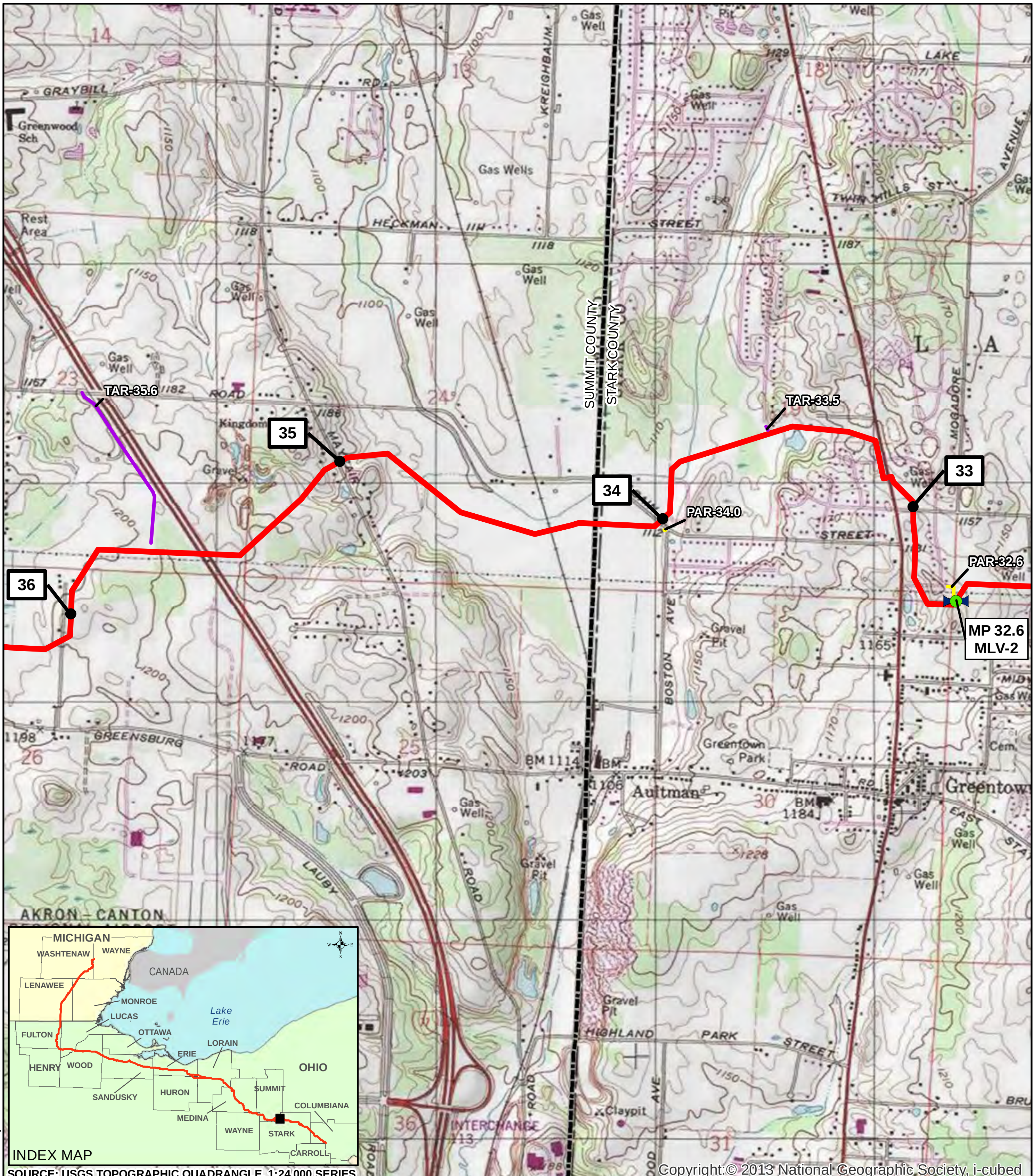
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: STARK COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-11	MAP 11 of 81	REV. B

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

- MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

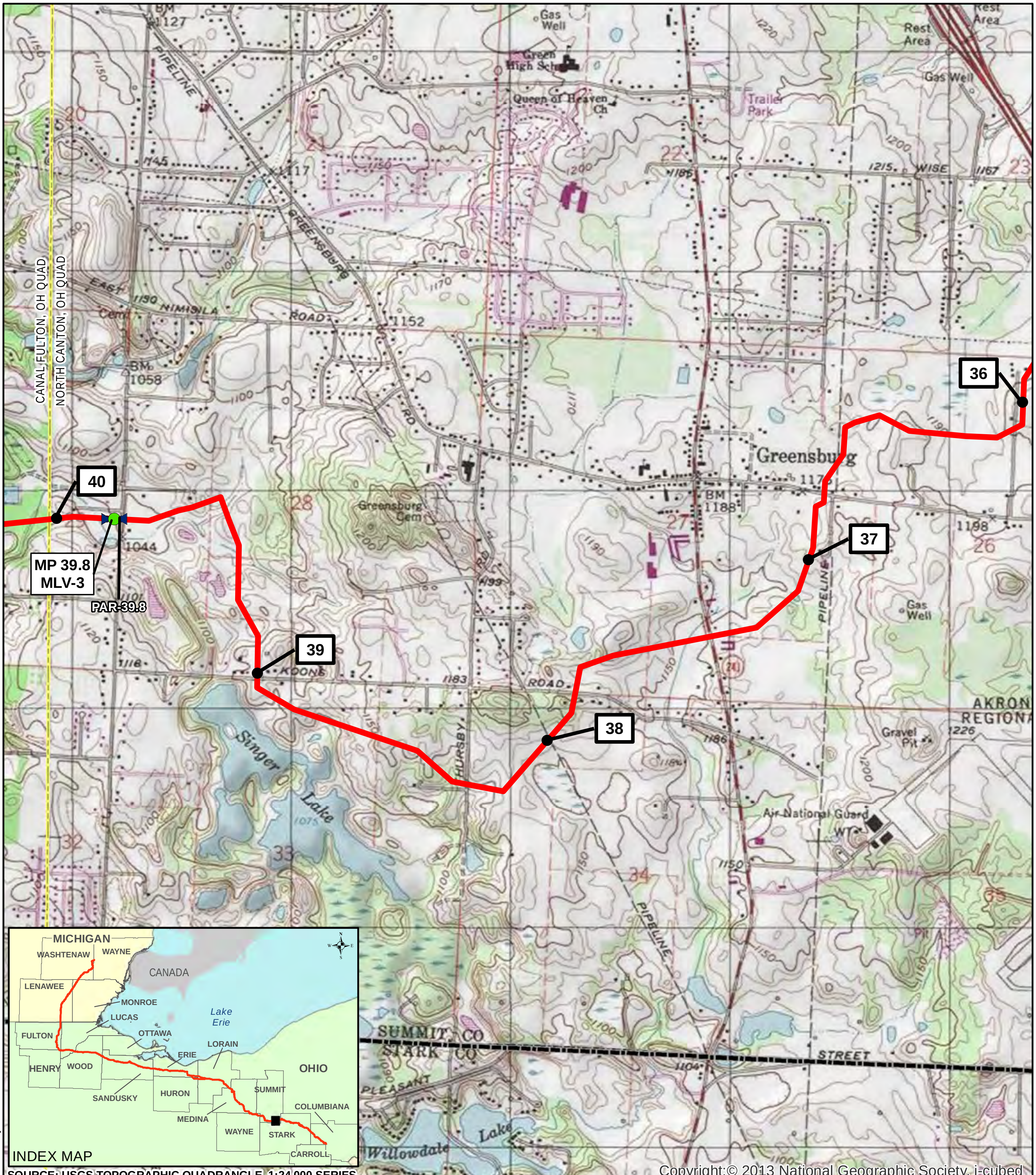
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: STARK COUNTY, OH; SUMMIT COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-12	MAP 12 of 81	REV. B

NEXUS GAS TRANSMISSION

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

- 1 MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: SUMMIT COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-13	MAP 13 of 81	REV. B

I.G.

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1 MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

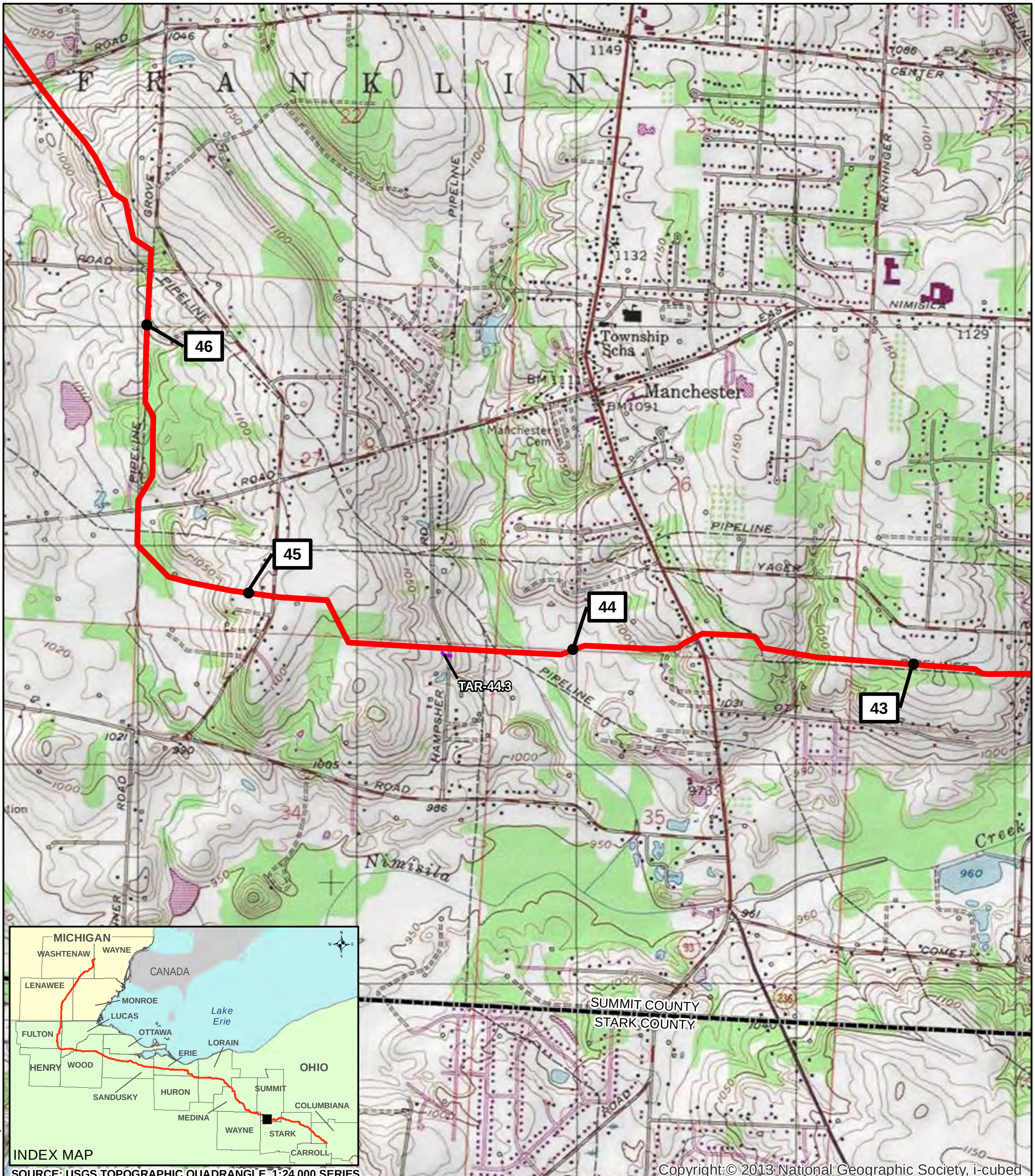
LOC.: SUMMIT COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-14	MAP 14 of 81	REV. B

I.G.

NEXUS GAS TRANSMISSION

Coordinate System: NAD 1983 UTM Zone 17N Foot US



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

1 MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

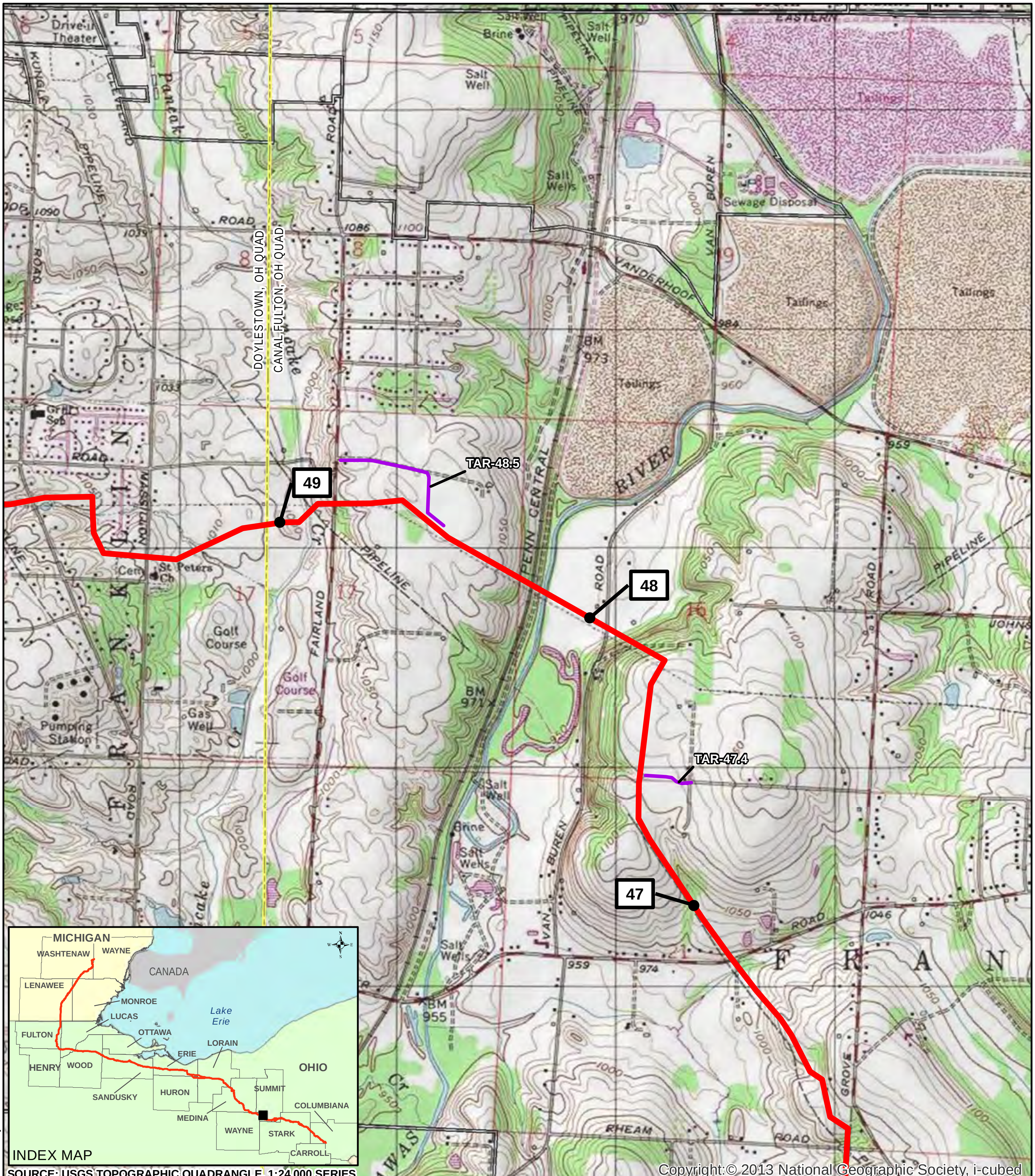
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: SUMMIT COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-15	MAP 15 of 81	REV. B

NEXUS GAS TRANSMISSION

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

- MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: SUMMIT COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-16	MAP 16 of 81	REV. B

I.G.

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: SUMMIT COUNTY, OH; WAYNE COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-17	MAP 17 of 81 / REV. A

I.G.

NEXUS GAS TRANSMISSION

Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

1 MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

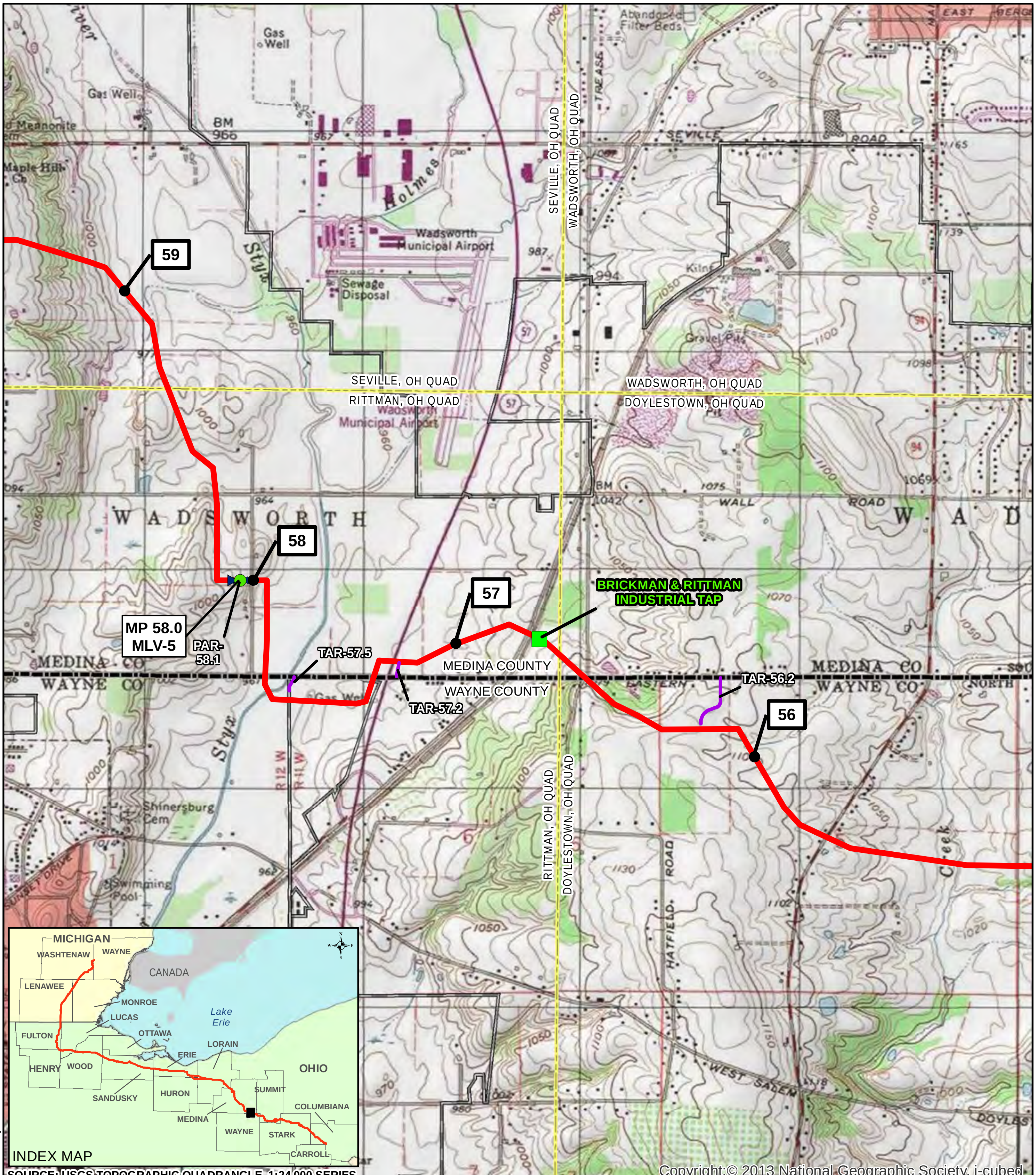
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: WAYNE COUNTY, OH			
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-18	MAP 18 of 81 / REV. B

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

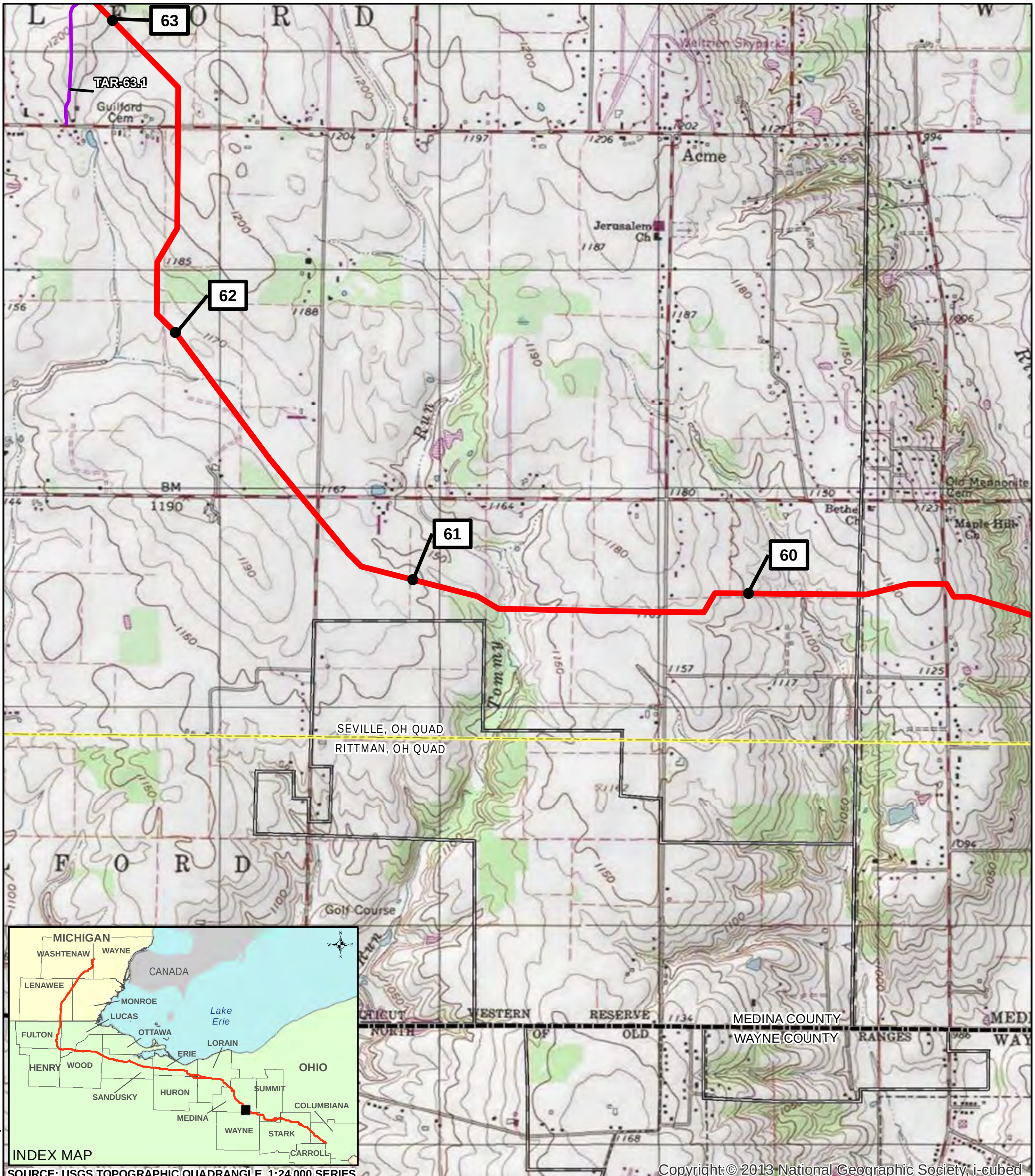
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: WAYNE COUNTY, OH; MEDINA COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-19	MAP 19 of 81	REV. B

NEXUS GAS TRANSMISSION

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

1 MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

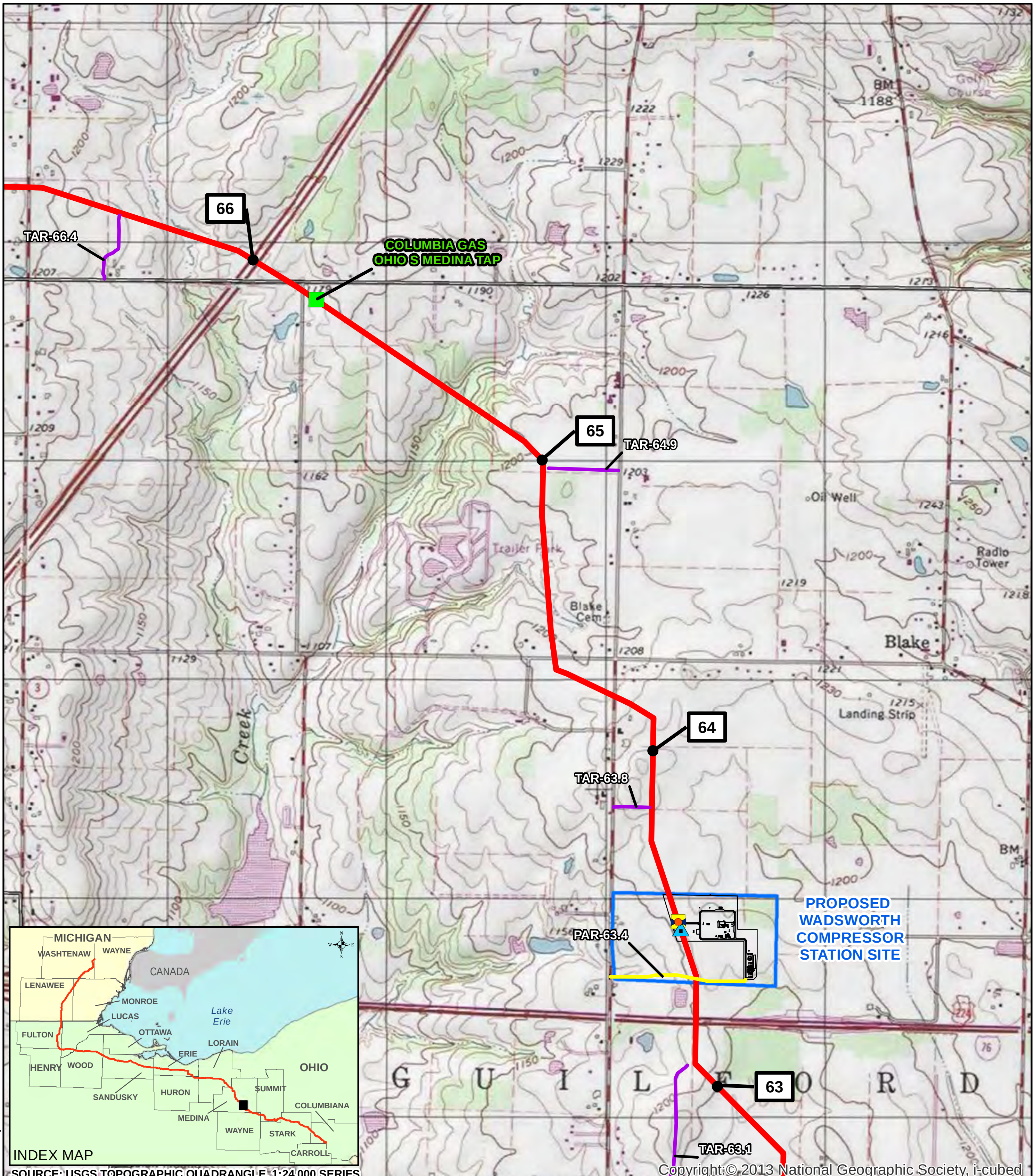
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: MEDINA COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-20	MAP 20 of 81 / REV. B

NEXUS GAS TRANSMISSION

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

1 MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

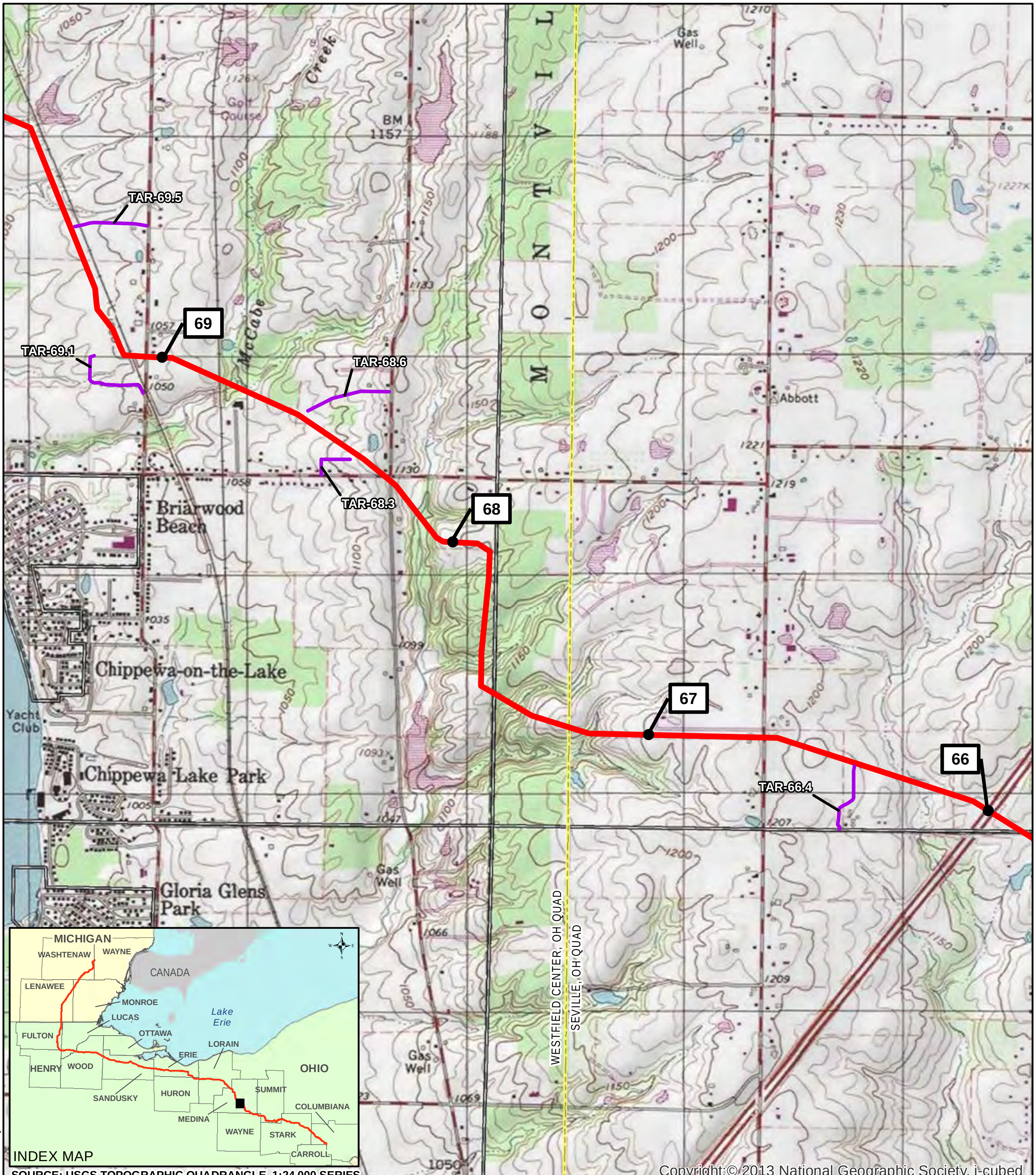
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: MEDINA COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-21	MAP 21 of 81	REV. B

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1 MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

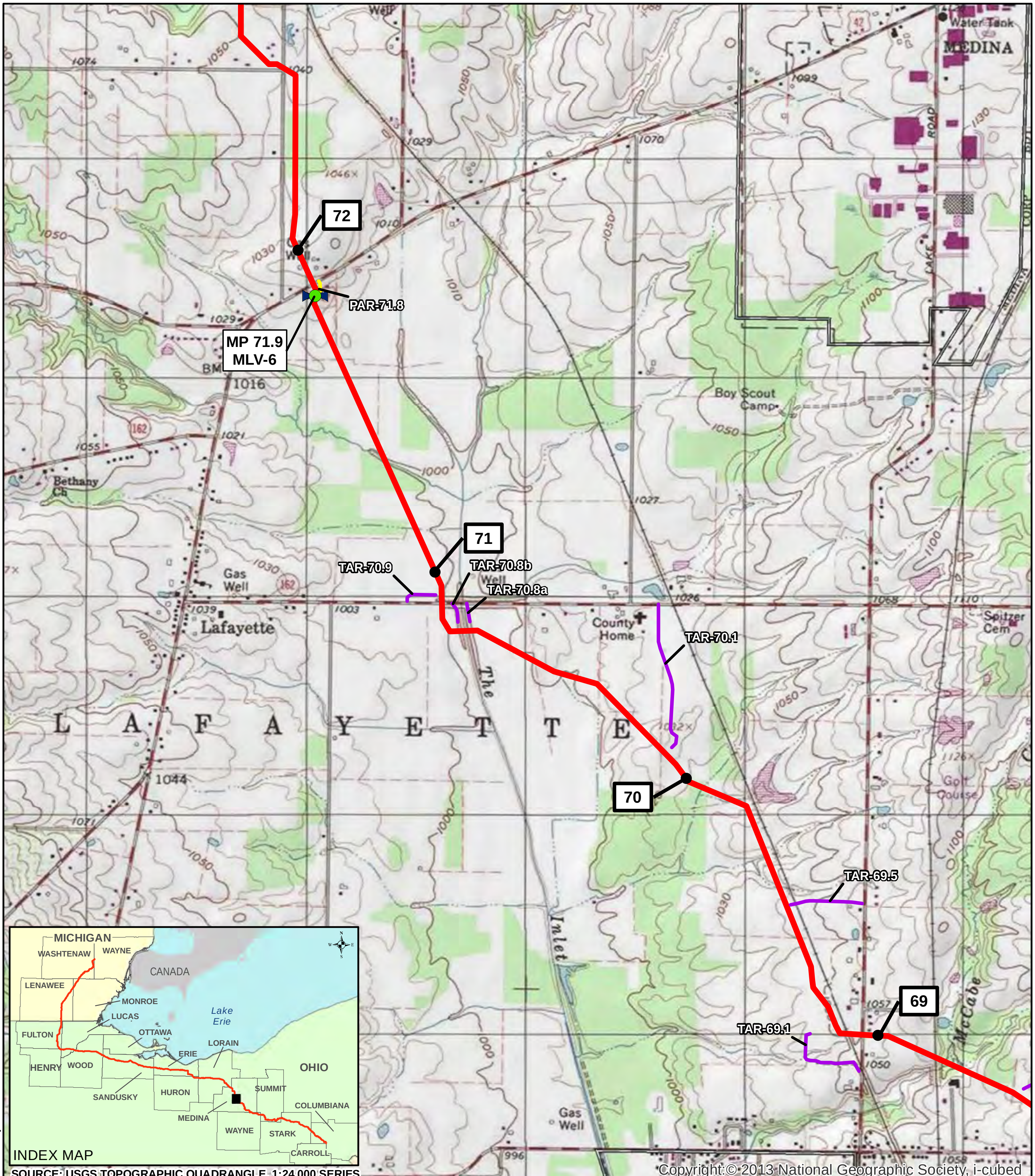
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: MEDINA COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-22	MAP 22 of 81 / REV. B

NEXUS GAS TRANSMISSION

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

- 1 MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

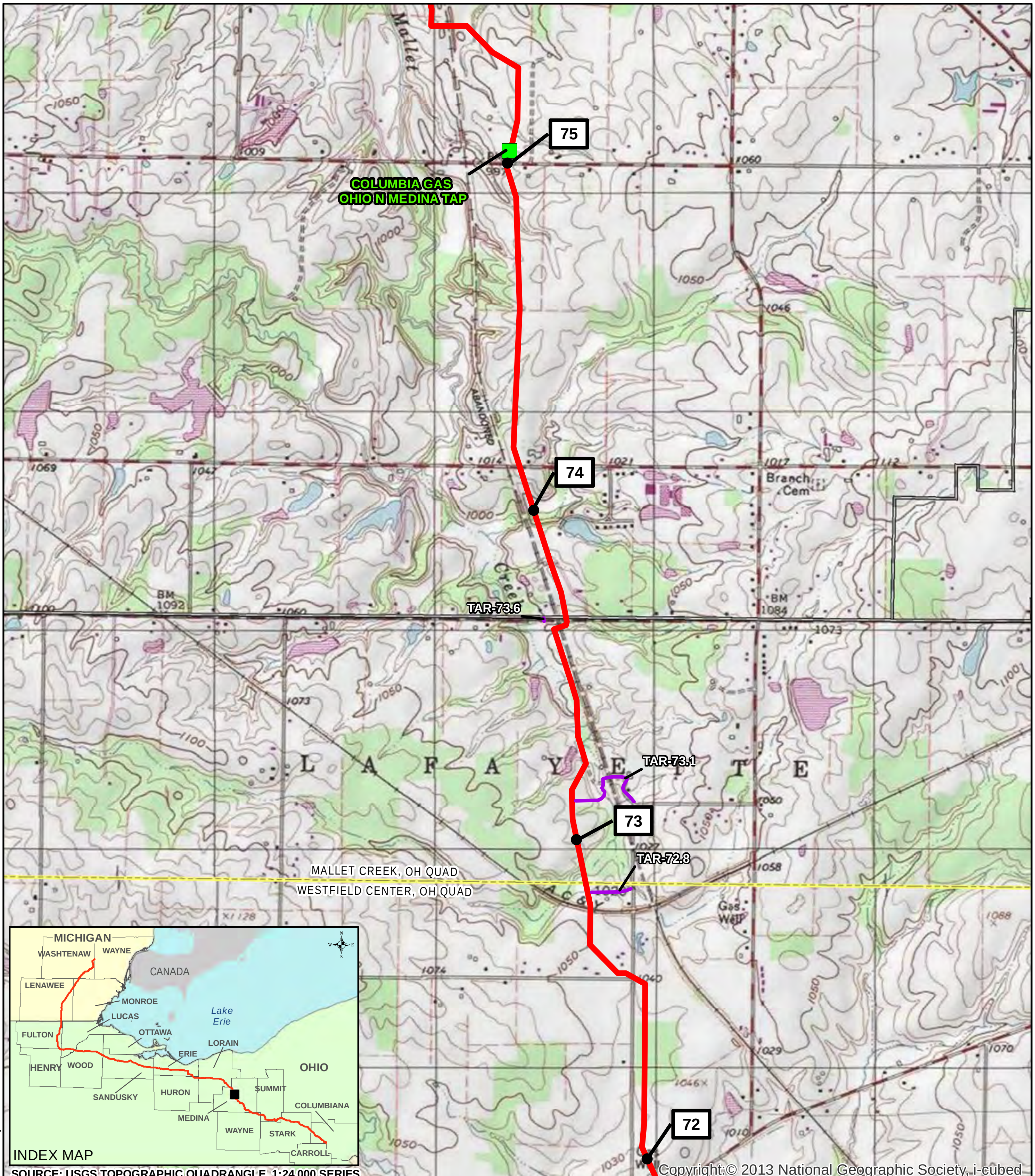
0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT PROPOSED PIPELINE - USGS QUAD MAP				
LOC.: MEDINA COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-23	MAP 23 of 81	REV. B

I.G.

NEXUS SM
GAS TRANSMISSION



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

- 1 MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

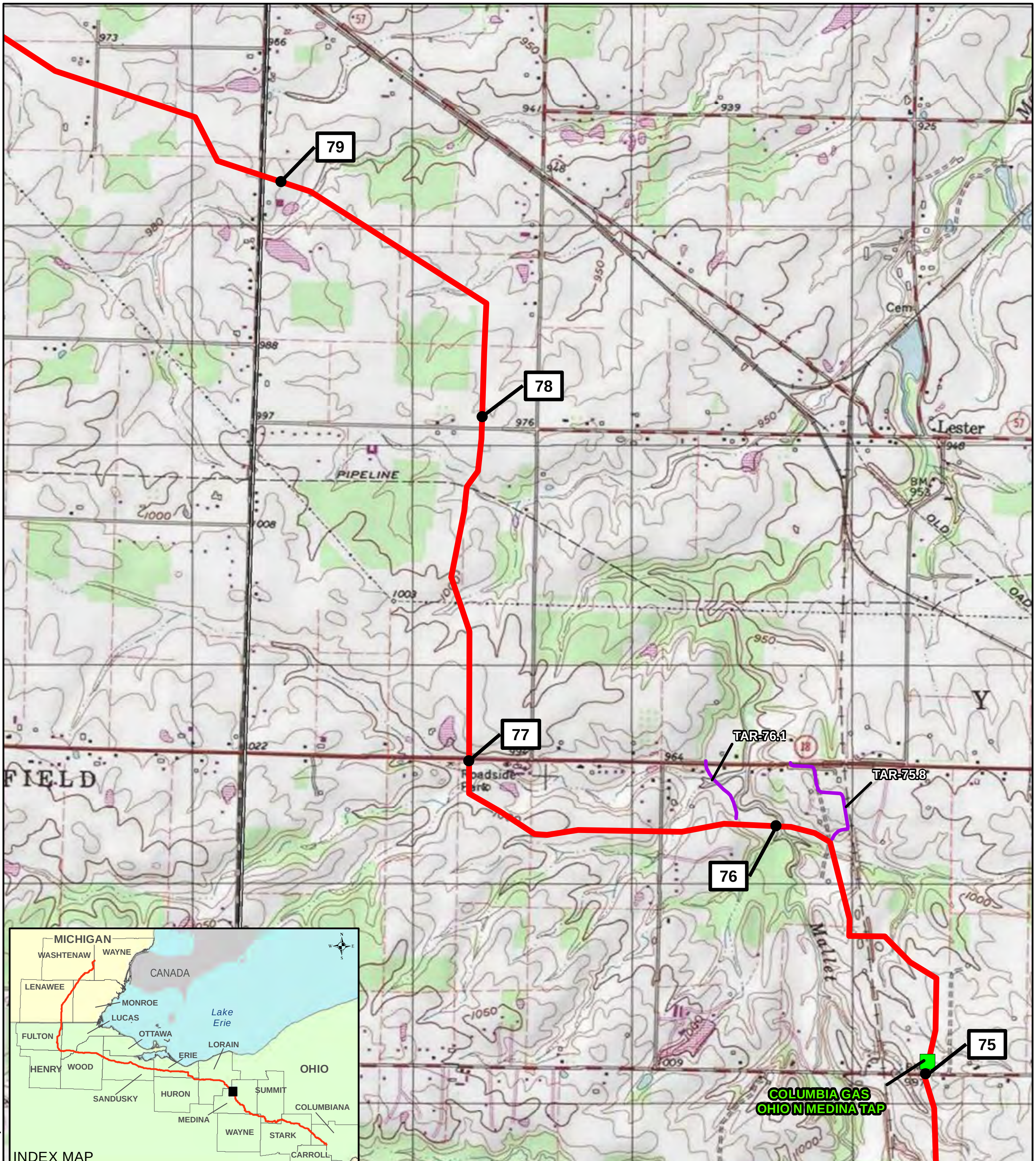
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: MEDINA COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-24	MAP 24 of 81	REV. B

I.G.



Copyright:© 2013 National Geographic Society, i-cubed

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

- MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

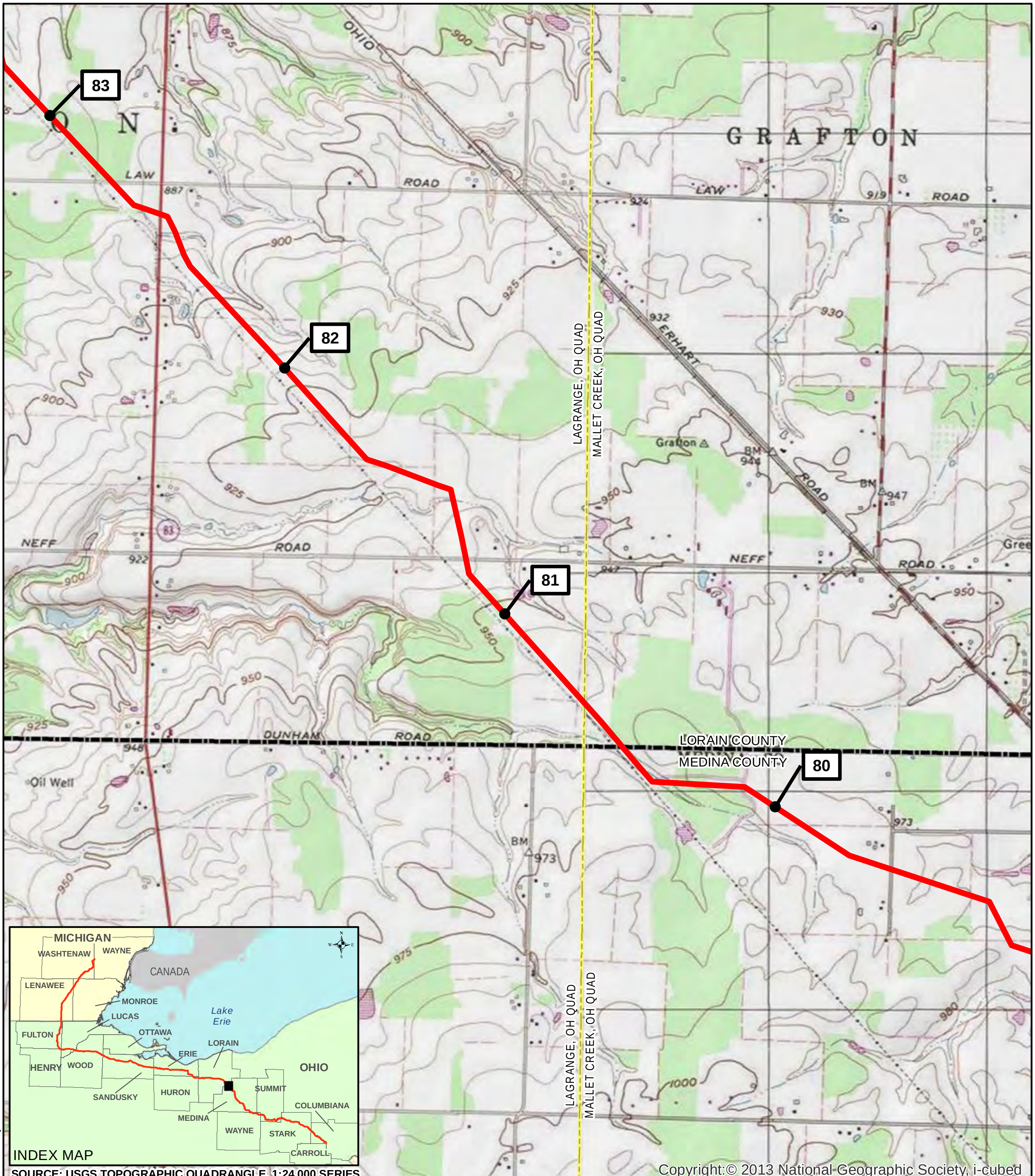
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: MEDINA COUNTY, OH			
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-25	MAP 25 of 81 / REV. B

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

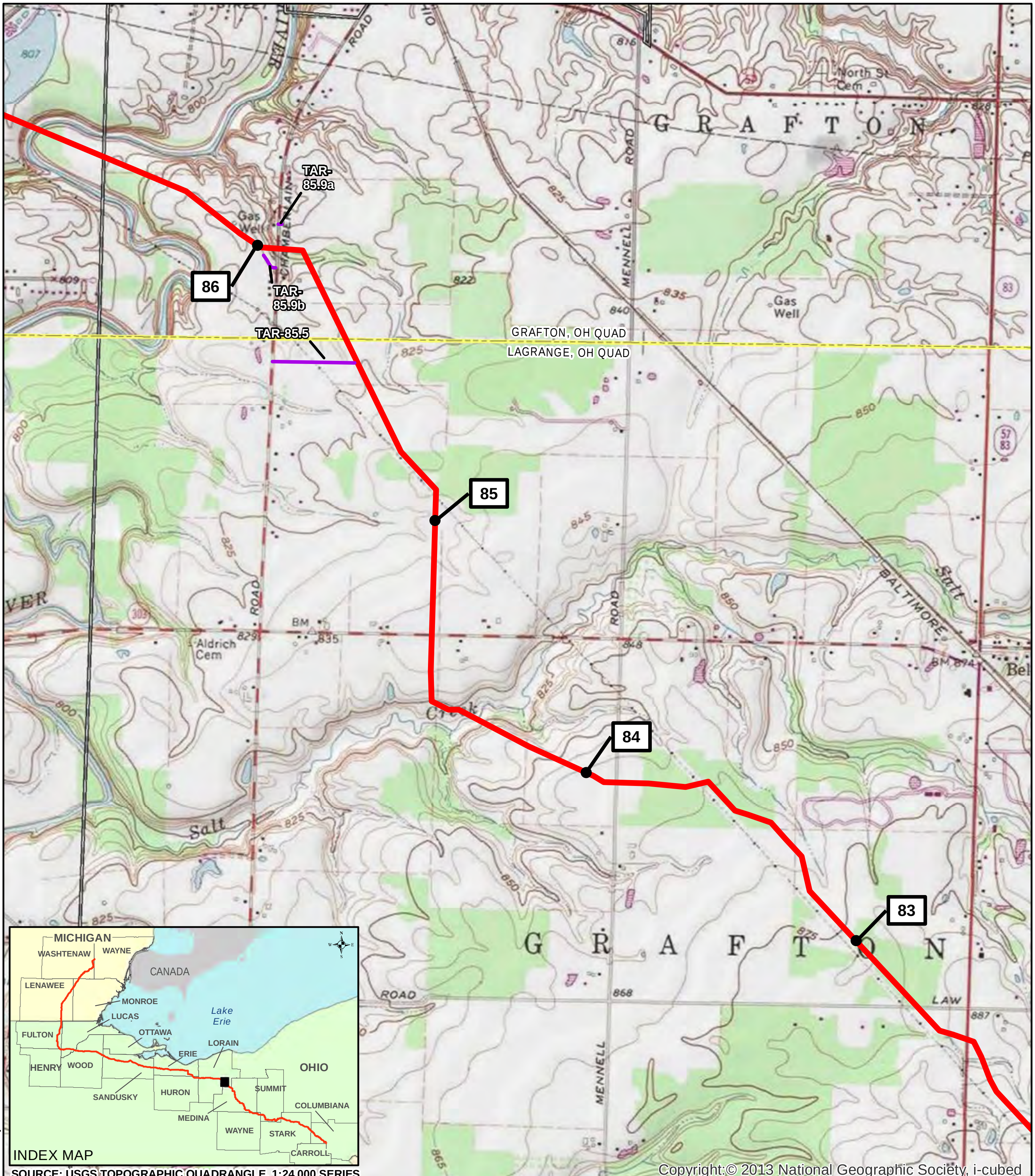
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: MEDINA COUNTY, OH; LORAIN COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-26	MAP 26 of 81 — REV. B

I.G.

NEXUS GAS TRANSMISSION



Coordinate System: NAD 1983 UTM Zone 17N Foot US

- 1 MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

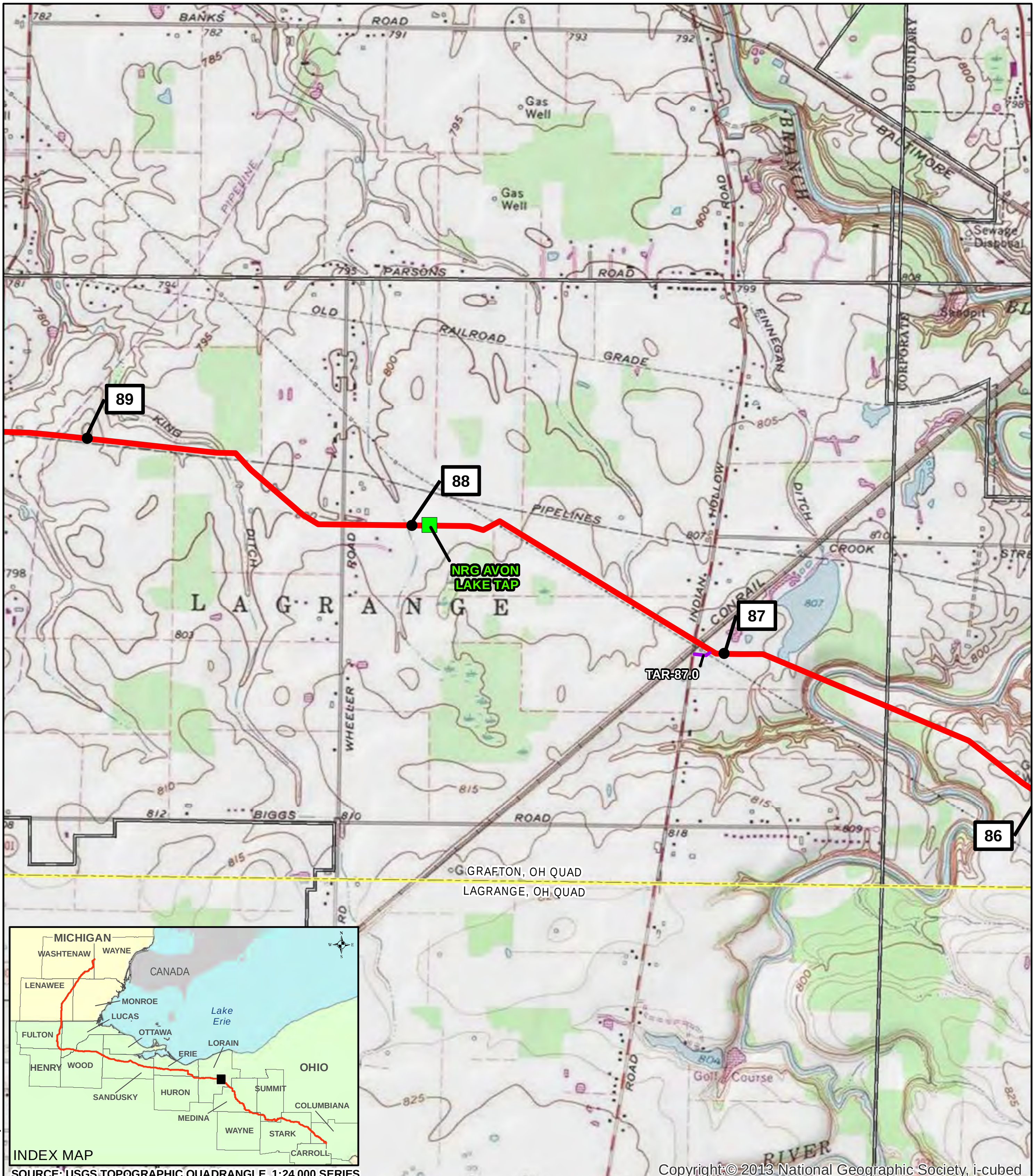
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS℠ GAS TRANSMISSION

LOC.: LORAIN COUNTY, OH			
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-27	MAP 27 of 81 REV. B

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

- 1 MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

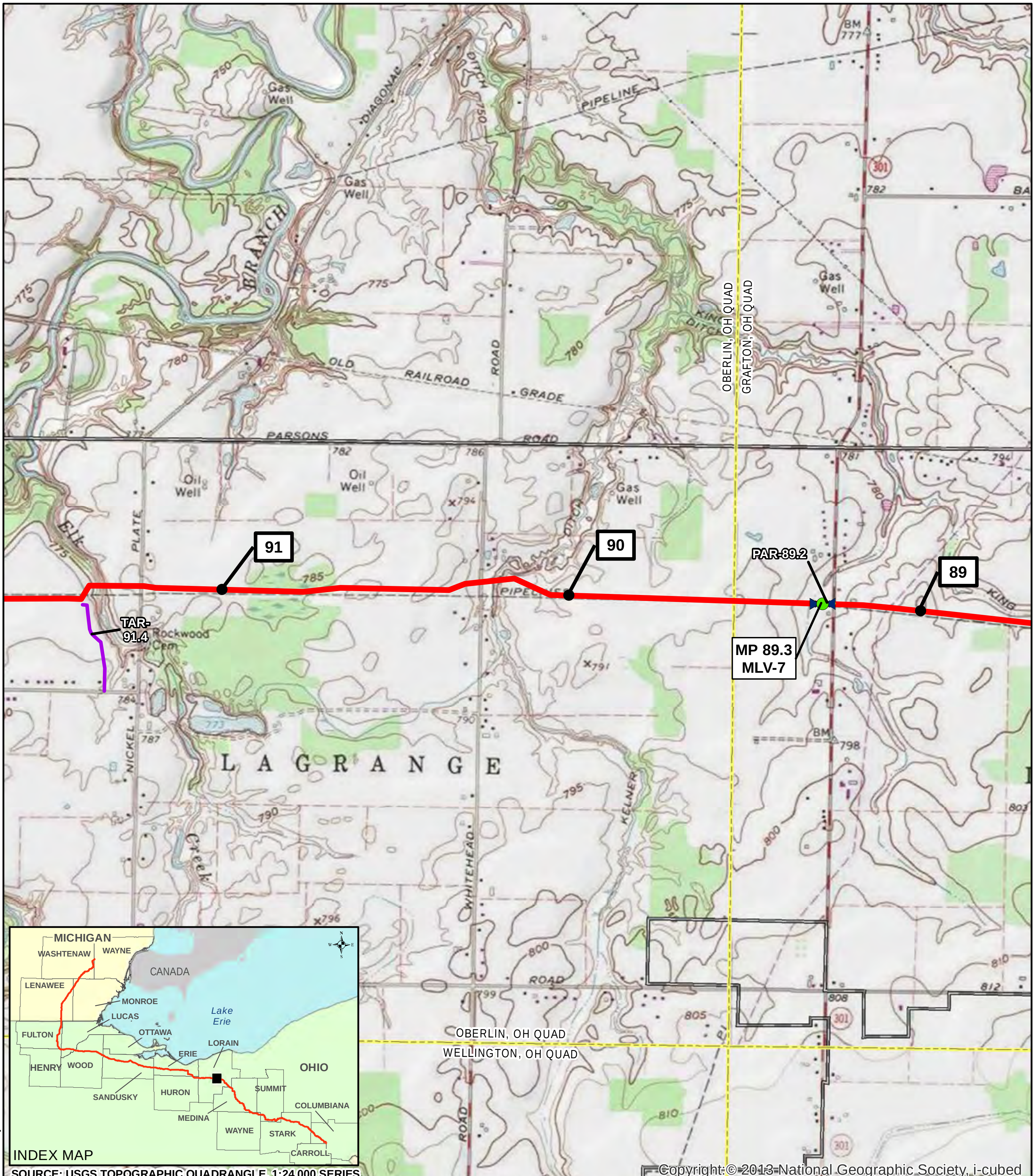
0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT PROPOSED PIPELINE - USGS QUAD MAP			
LOC.: LORAIN COUNTY, OH			
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-28	MAP 28 of 81 REV. B

NEXUS GAS TRANSMISSION

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

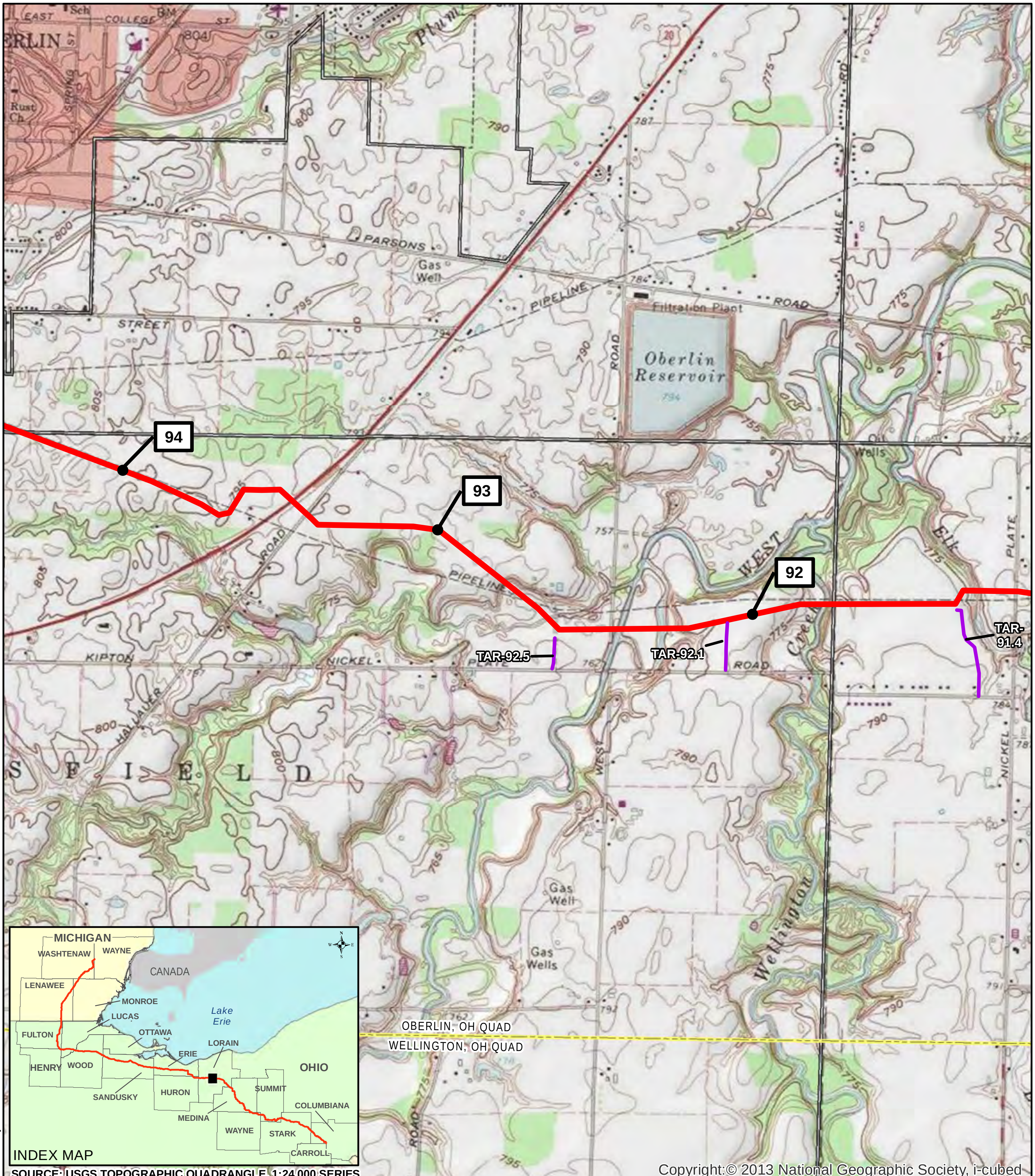
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: LORAIN COUNTY, OH			
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-29	MAP 29 of 81 — REV. B

I.G.

NEXUS GAS TRANSMISSION



Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

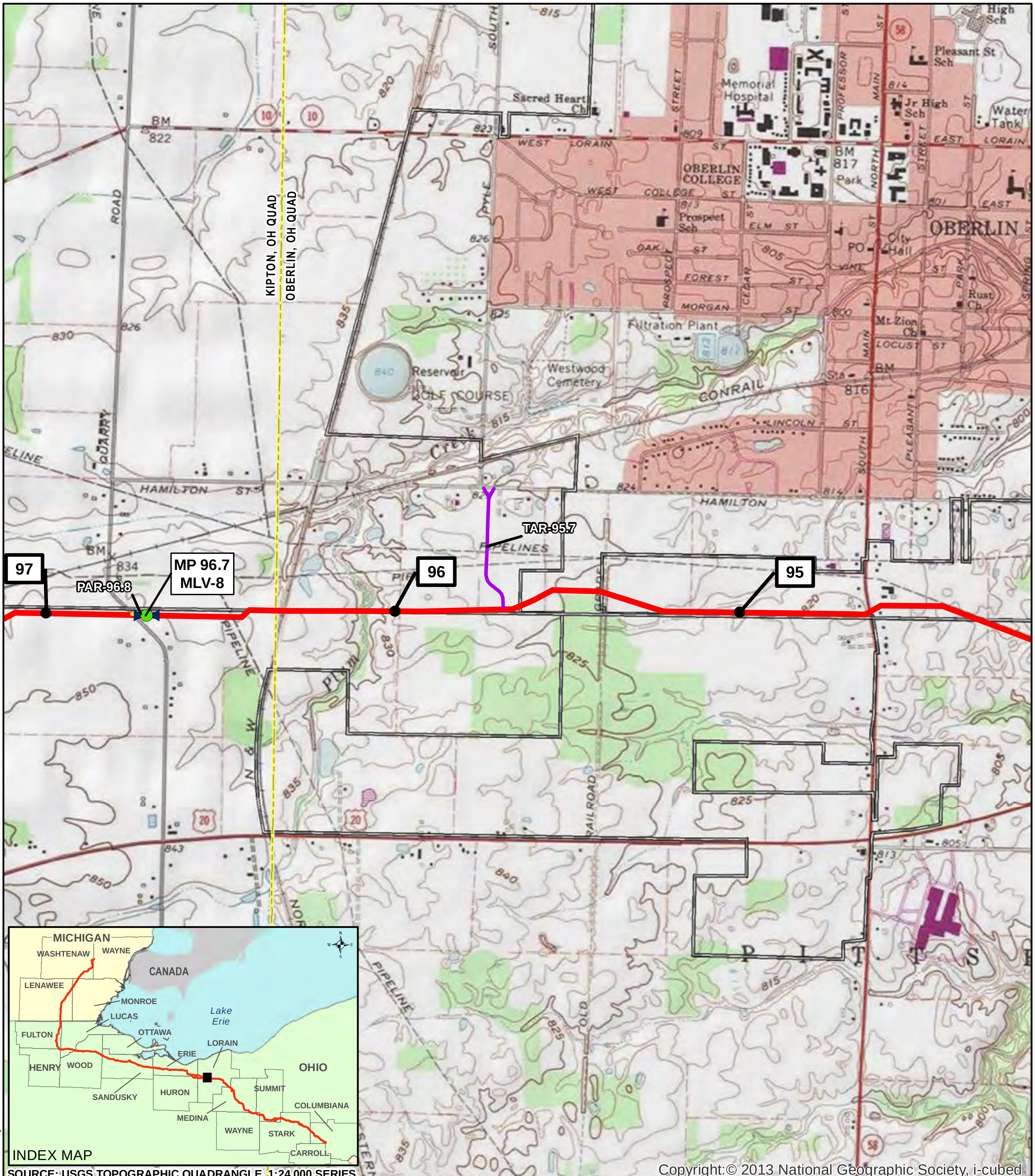
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: LORAIN COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-30	MAP 30 of 81	REV. B

I.G.

NEXUS GAS TRANSMISSION



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

- MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

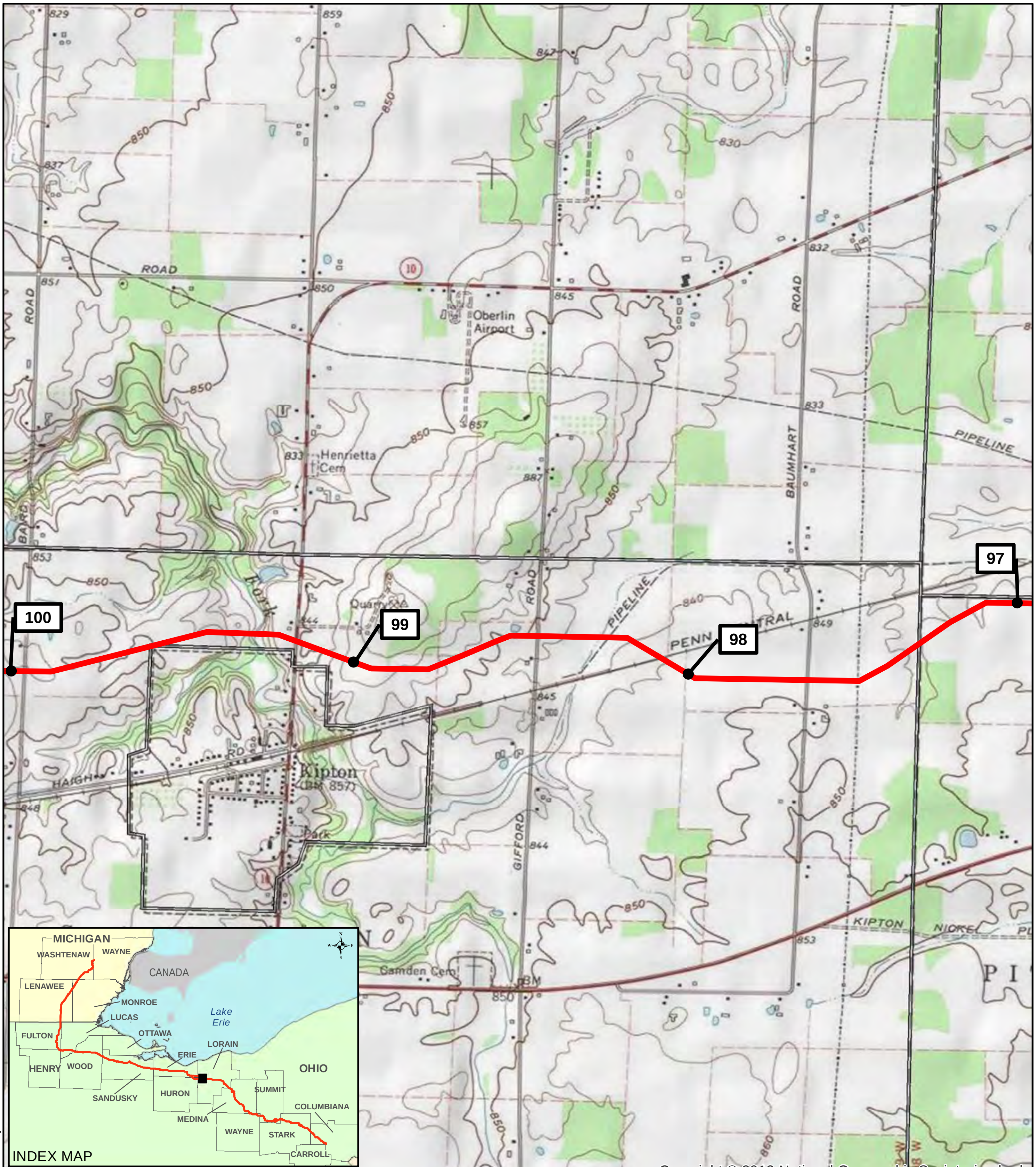
N S W E

TITLE: **NEXUS GAS TRANSMISSION PROJECT**
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: LORAIN COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-31	MAP 31 of 81	REV. B

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

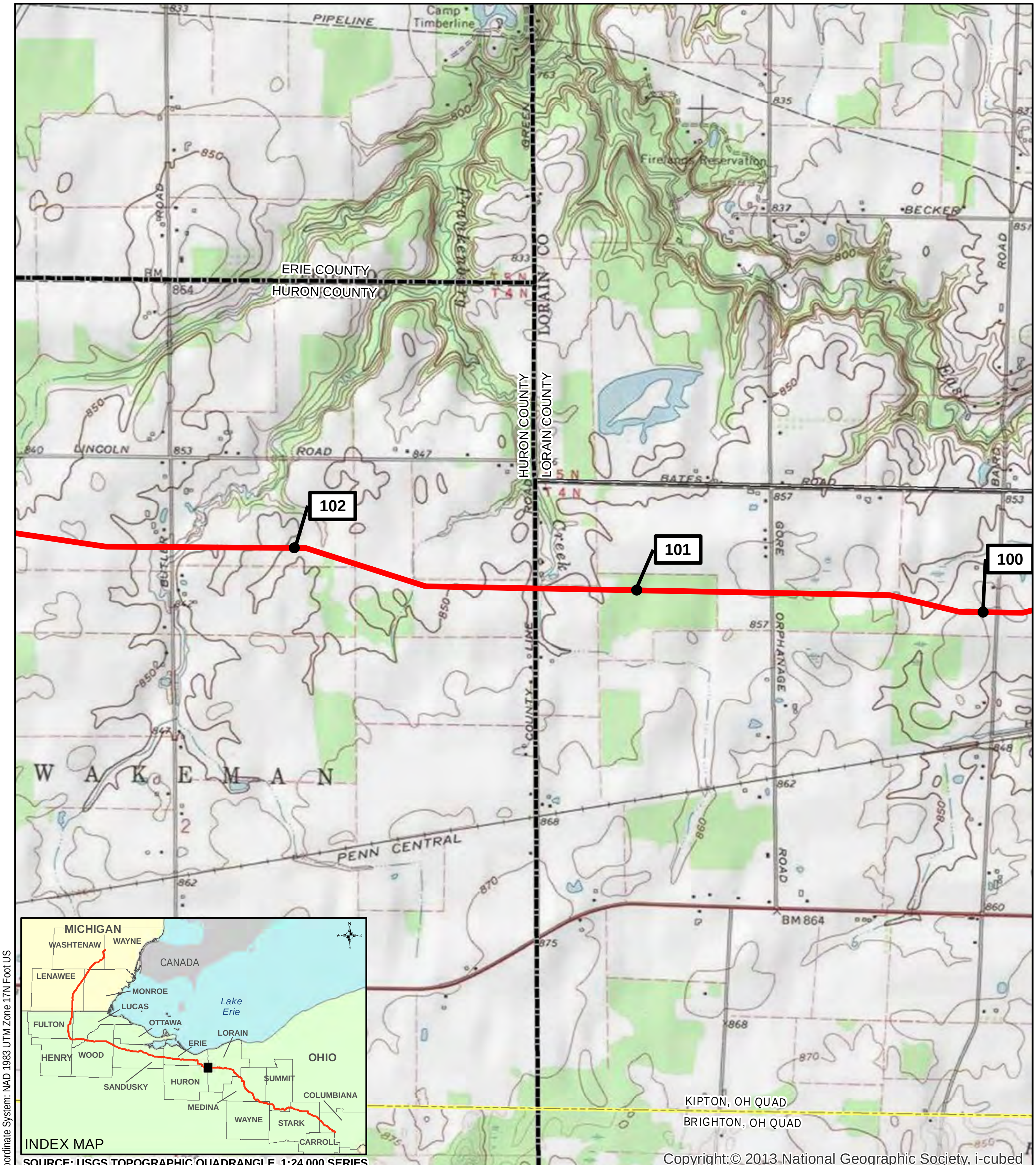
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: LORAIN COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-32	MAP 32 of 81	REV. B

I.G.



MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

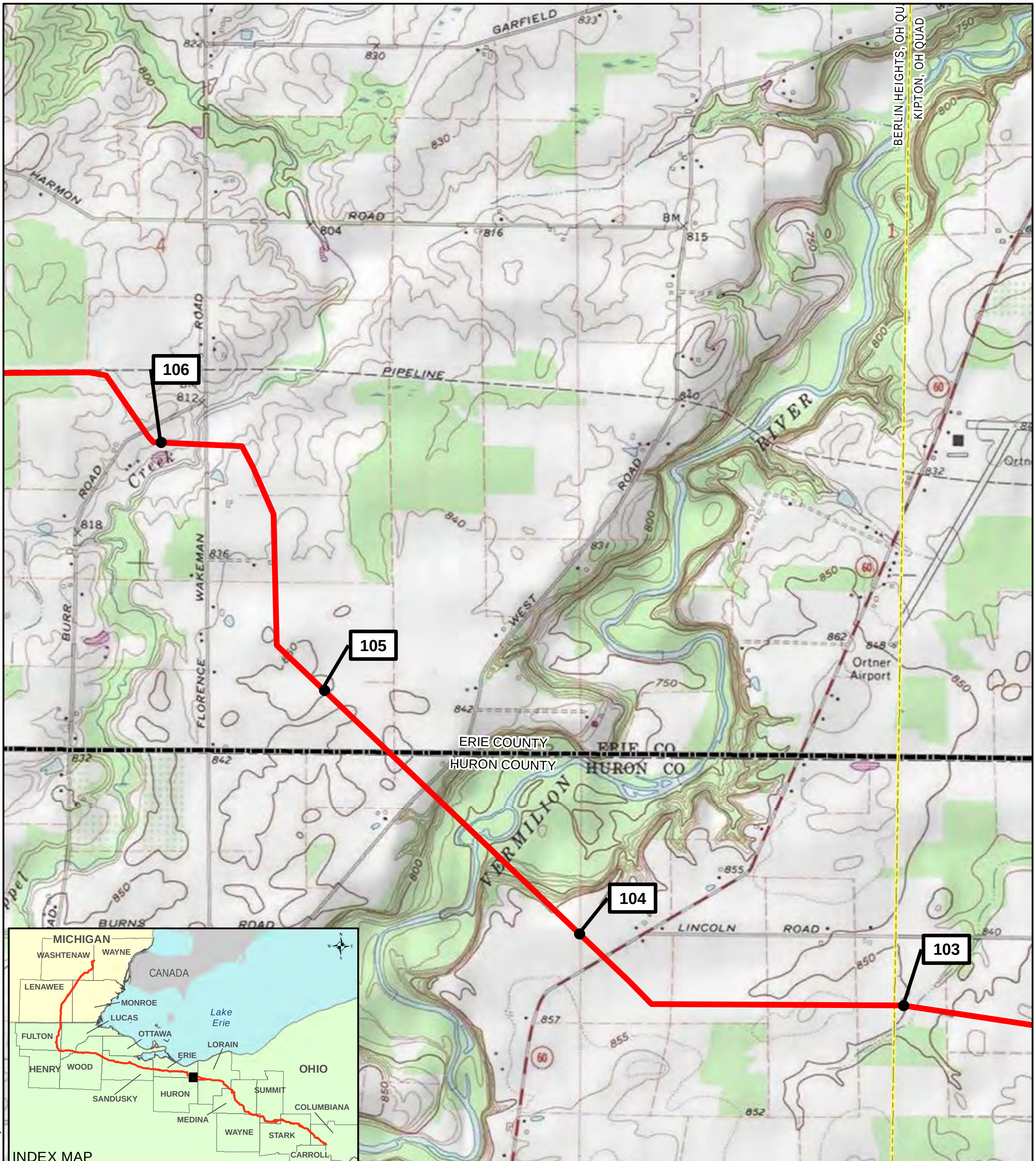
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: LORAIN COUNTY, OH; ERIE COUNTY, OH, HURON COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-33	MAP 33 of 81	REV. B

NEXUS SM
GAS TRANSMISSION

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1 MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

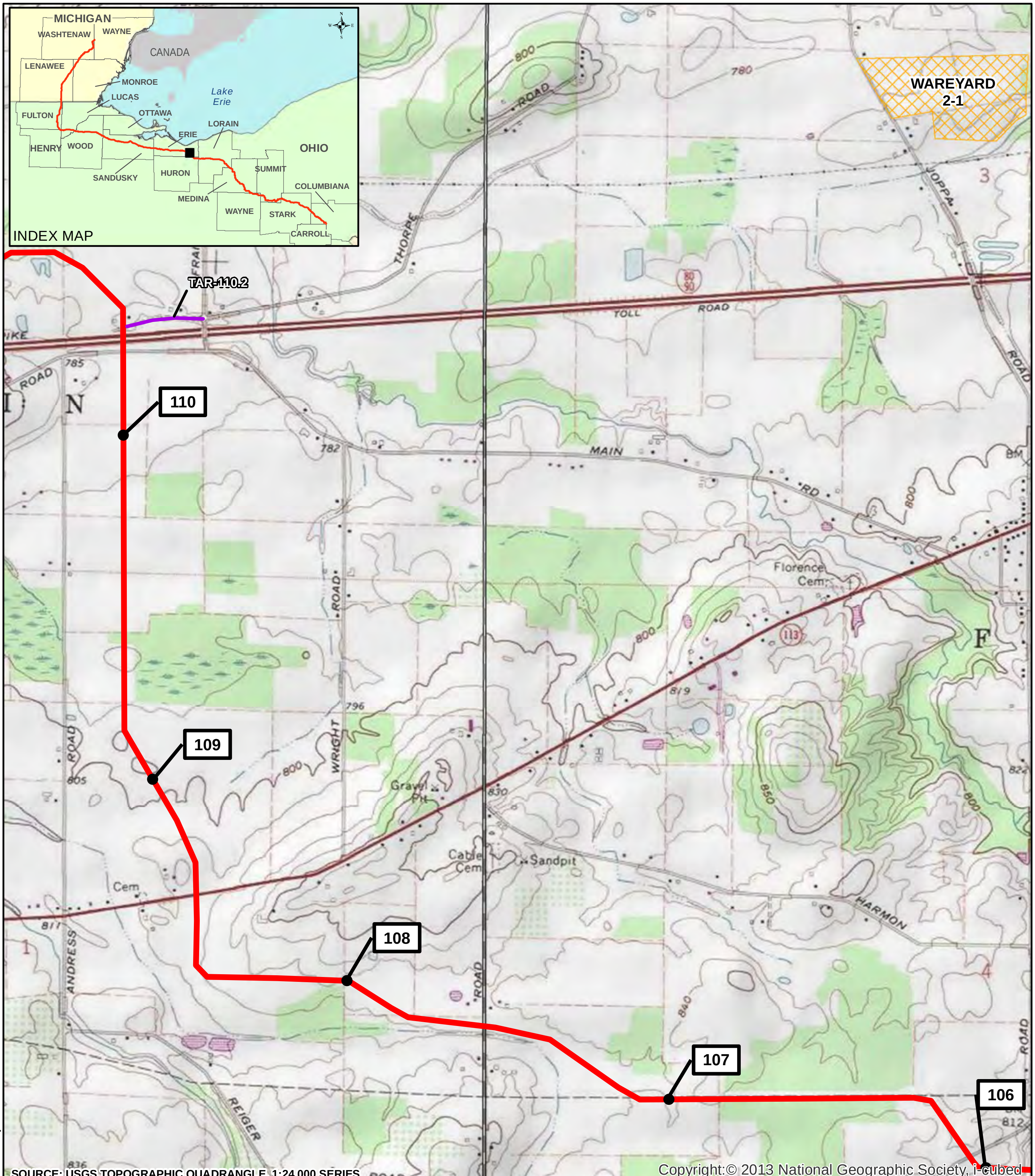
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: HURON COUNTY, OH, ERIE COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-34	MAP 34 of 81	REV. B

I.G.

NEXUS GAS TRANSMISSION



MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

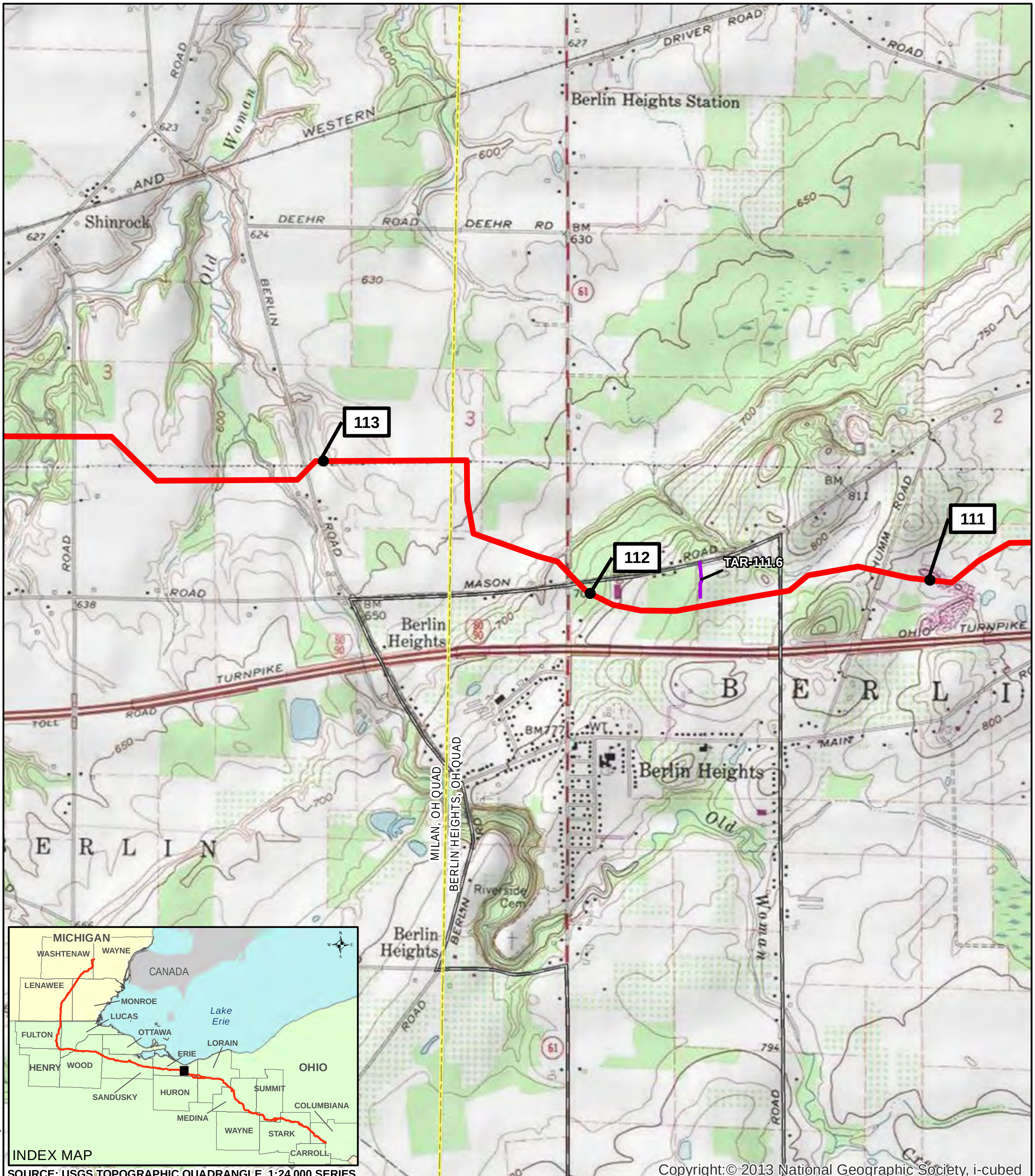
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: ERIE COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-35	MAP 35 of 81 — REV. B

NEXUS GAS TRANSMISSION

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

- 1 MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

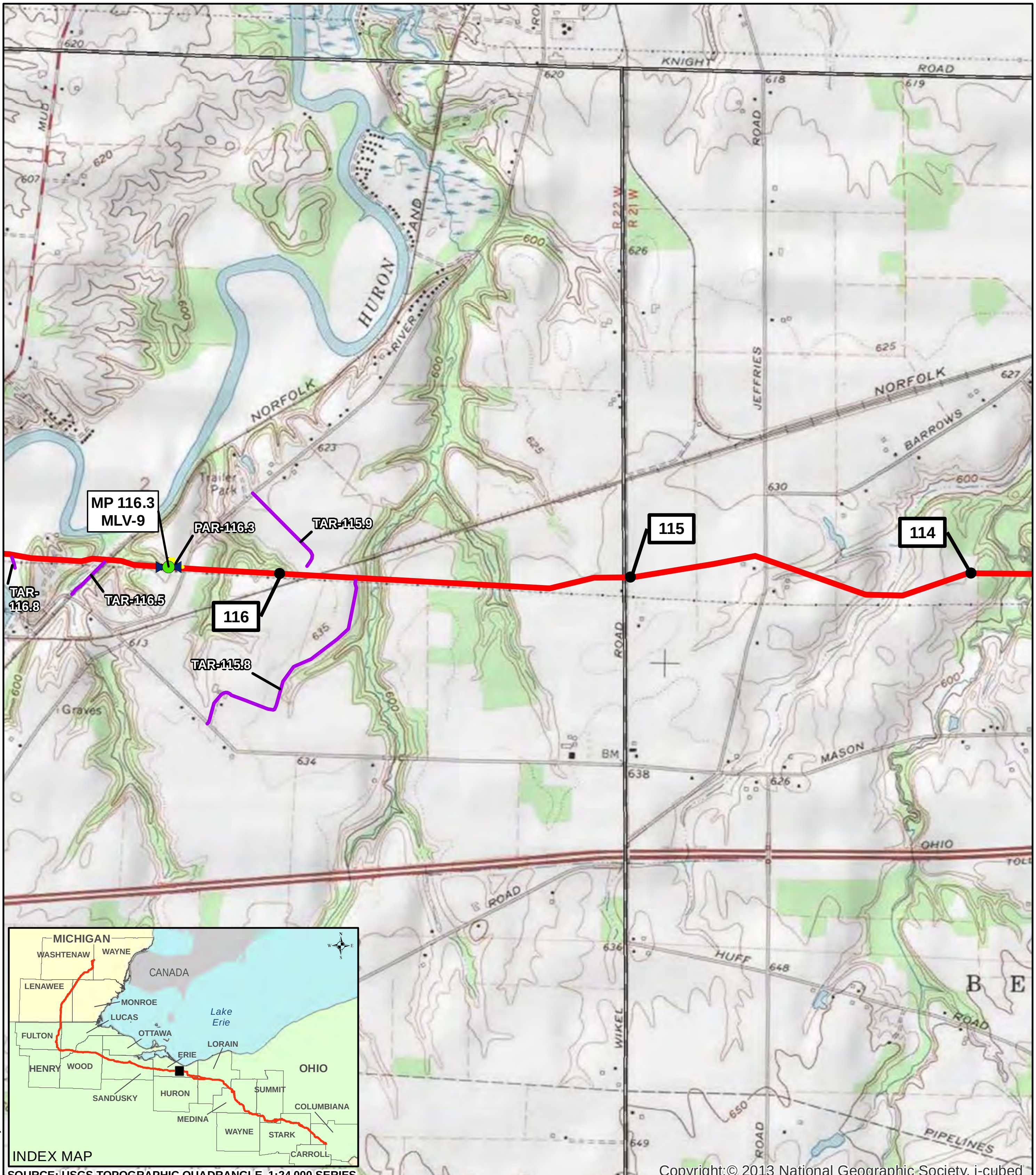
0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT PROPOSED PIPELINE - USGS QUAD MAP				
LOC.: ERIE COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-36	MAP 36 of 81	REV. B

NEXUS GAS TRANSMISSION

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

- MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

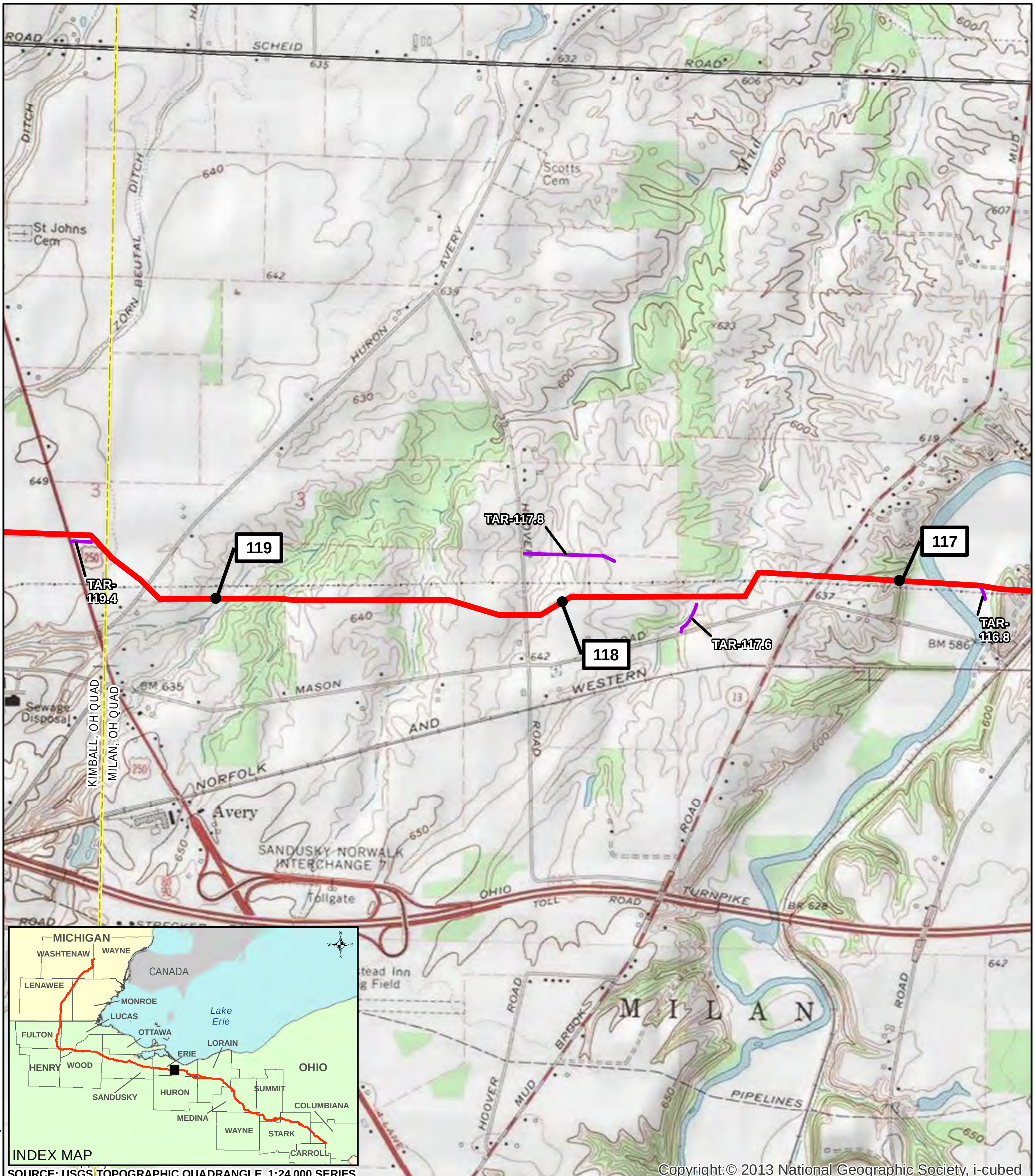
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: ERIE COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-37	MAP 37 of 81 — REV. B

NEXUS GAS TRANSMISSION

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

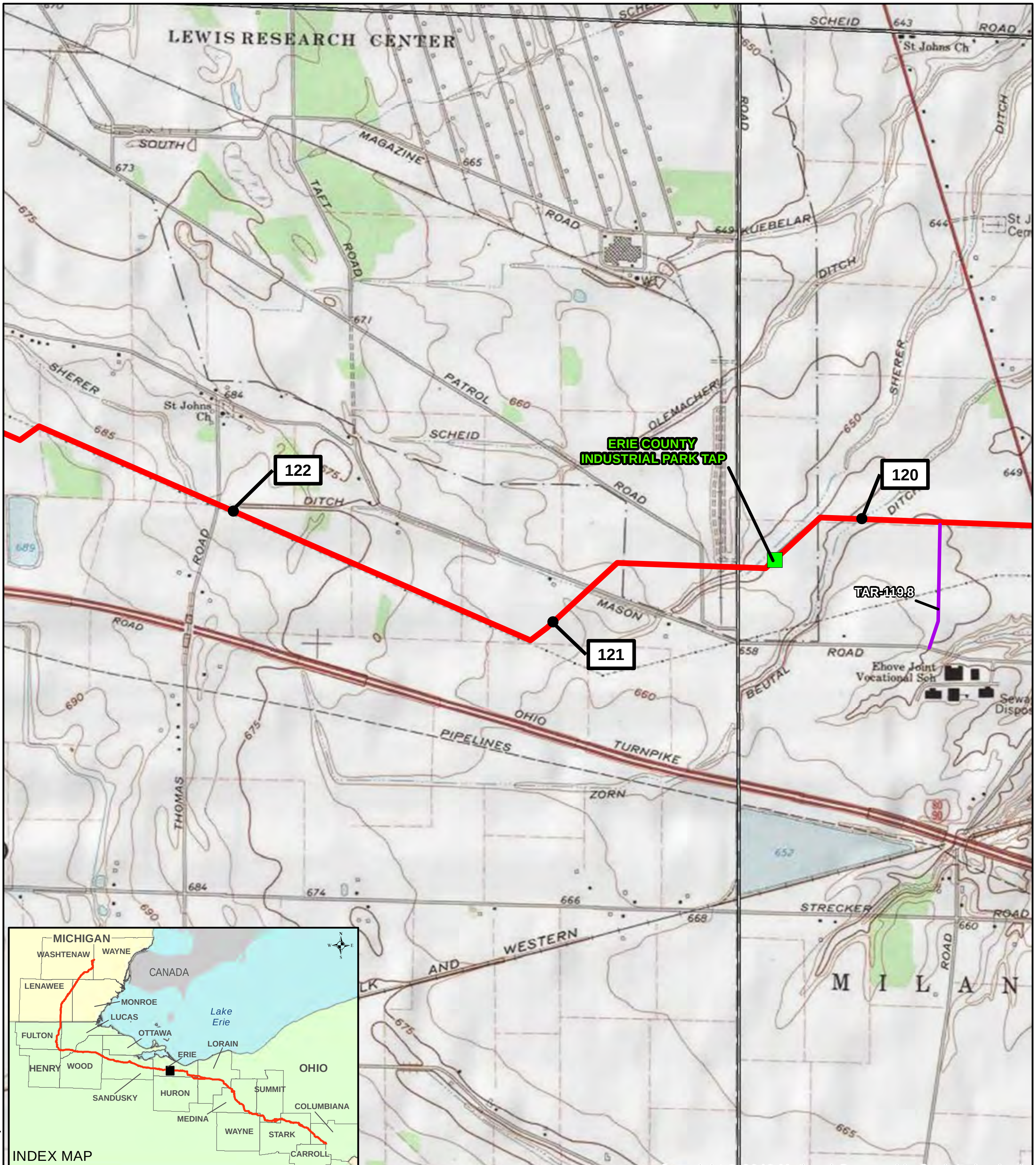
TITLE:
NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: ERIE COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-38	MAP 38 of 81 REV. B

I.G.

NEXUS SM GAS TRANSMISSION



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1 MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

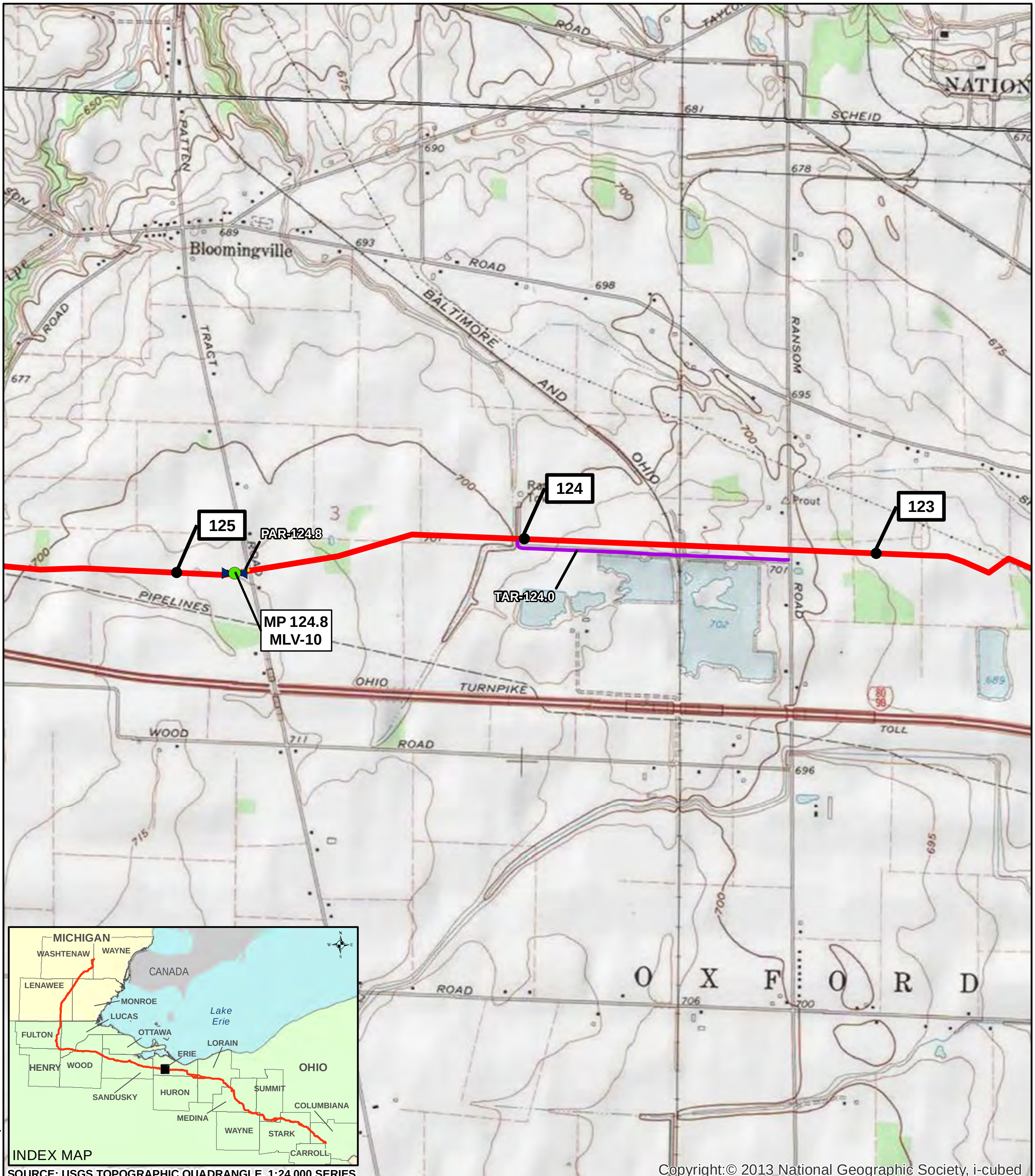
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: ERIE COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-39	MAP 39 of 81	REV. B

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

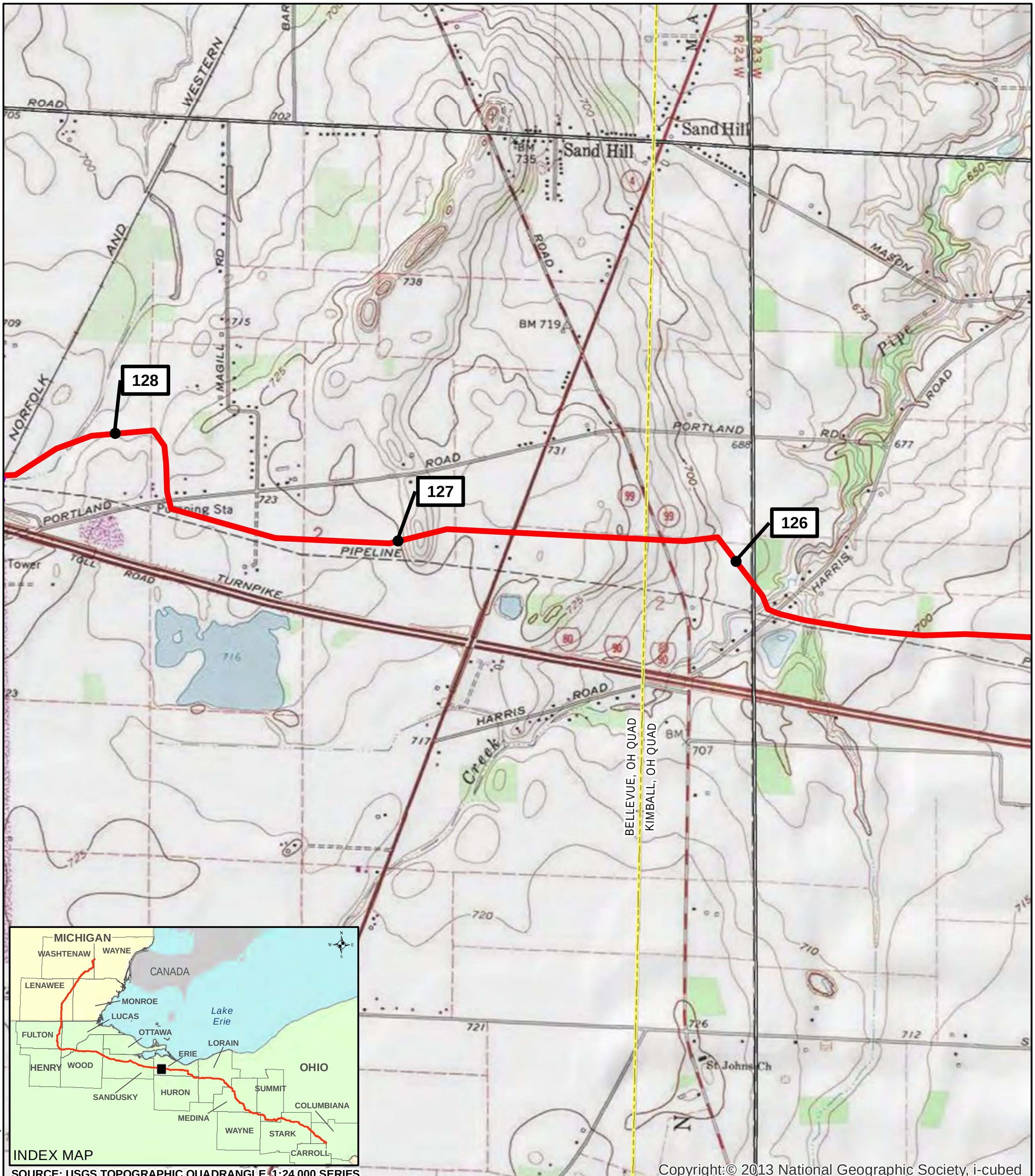
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: ERIE COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-40	MAP 40 of 81	REV. B

NEXUS GAS TRANSMISSION

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

1 MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

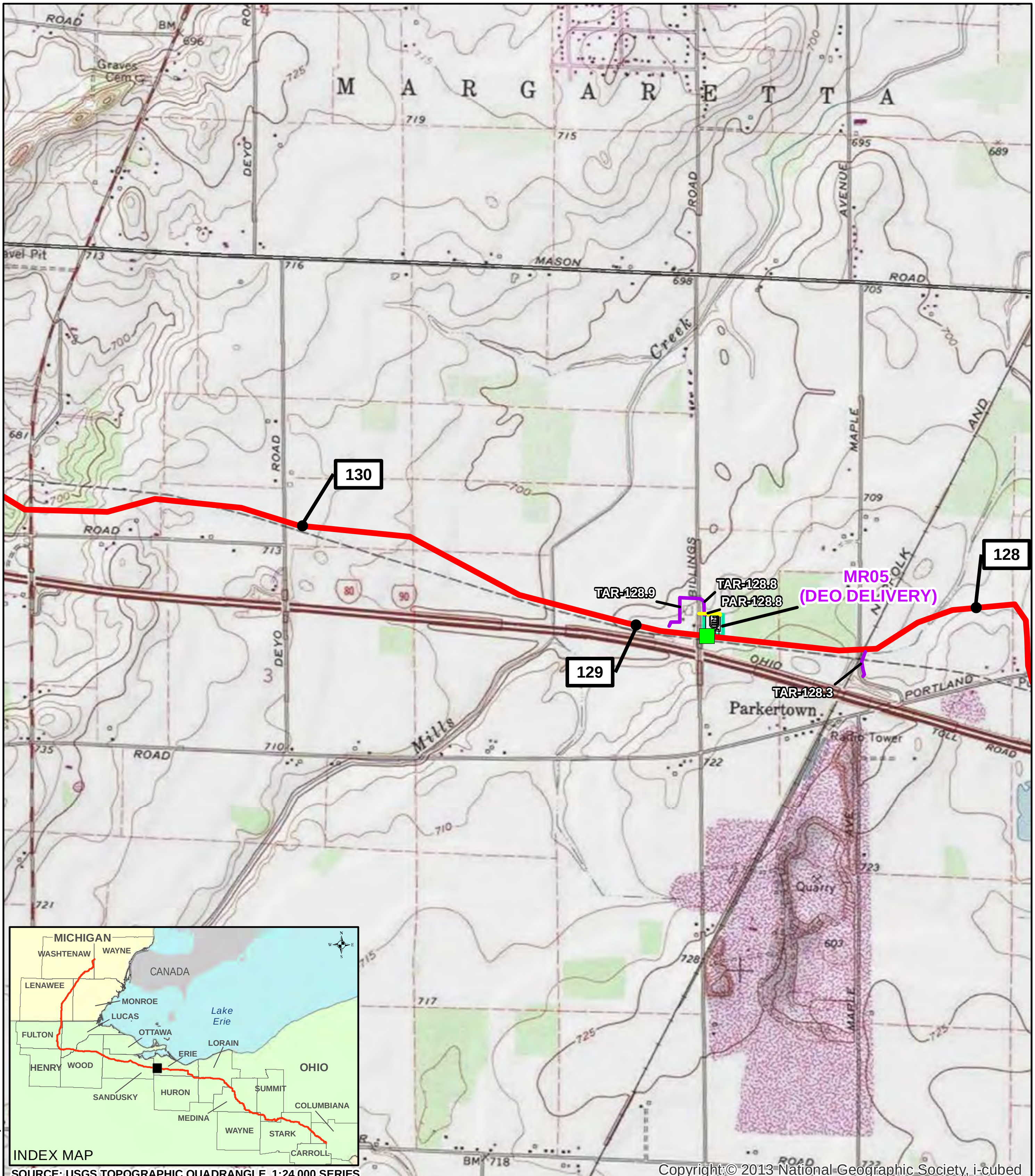
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: ERIE COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-41	MAP 41 of 81	REV. B

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1 MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

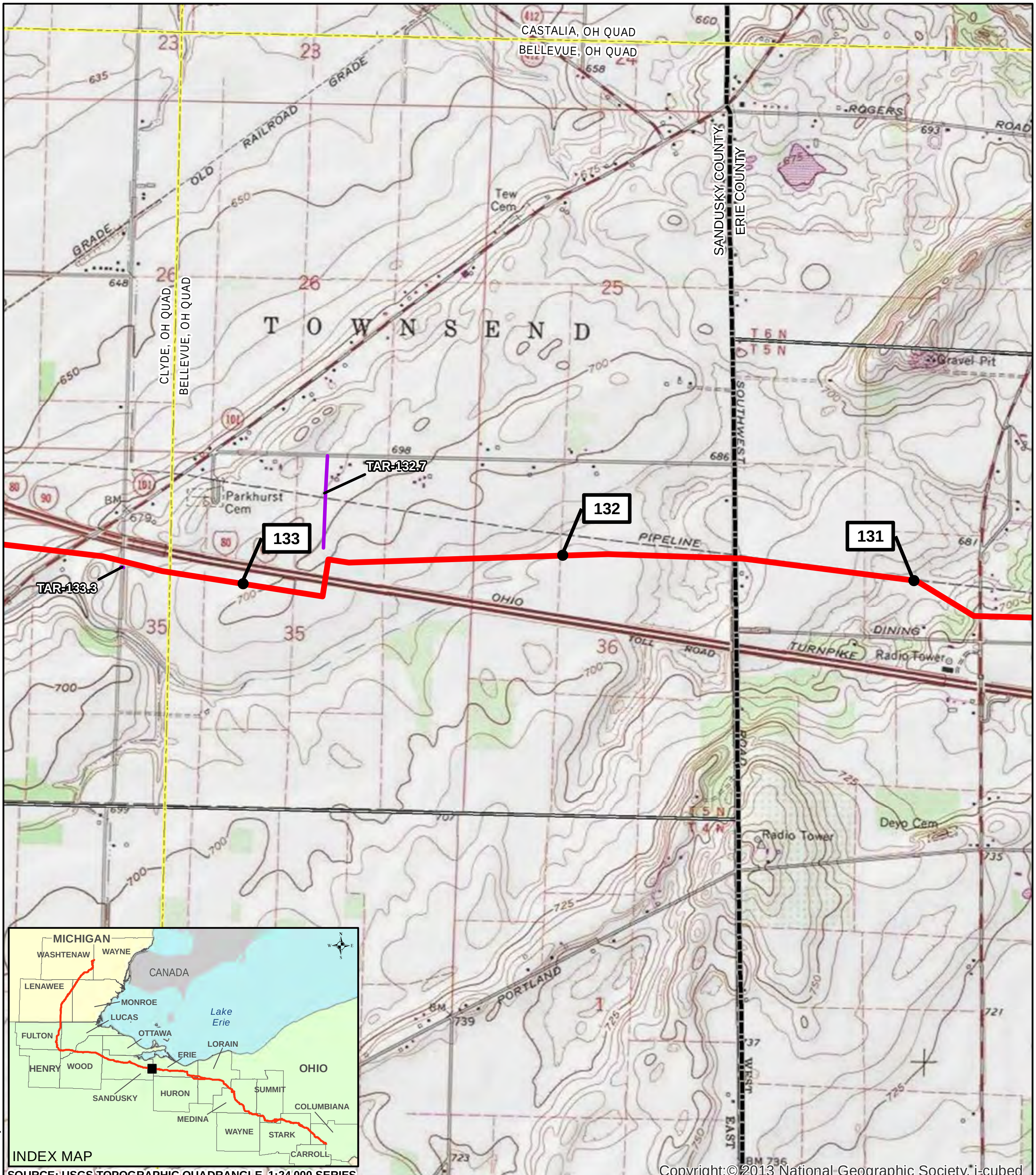
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: ERIE COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-42	MAP 42 of 81	REV. B

I.G.

NEXUS GAS TRANSMISSION



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

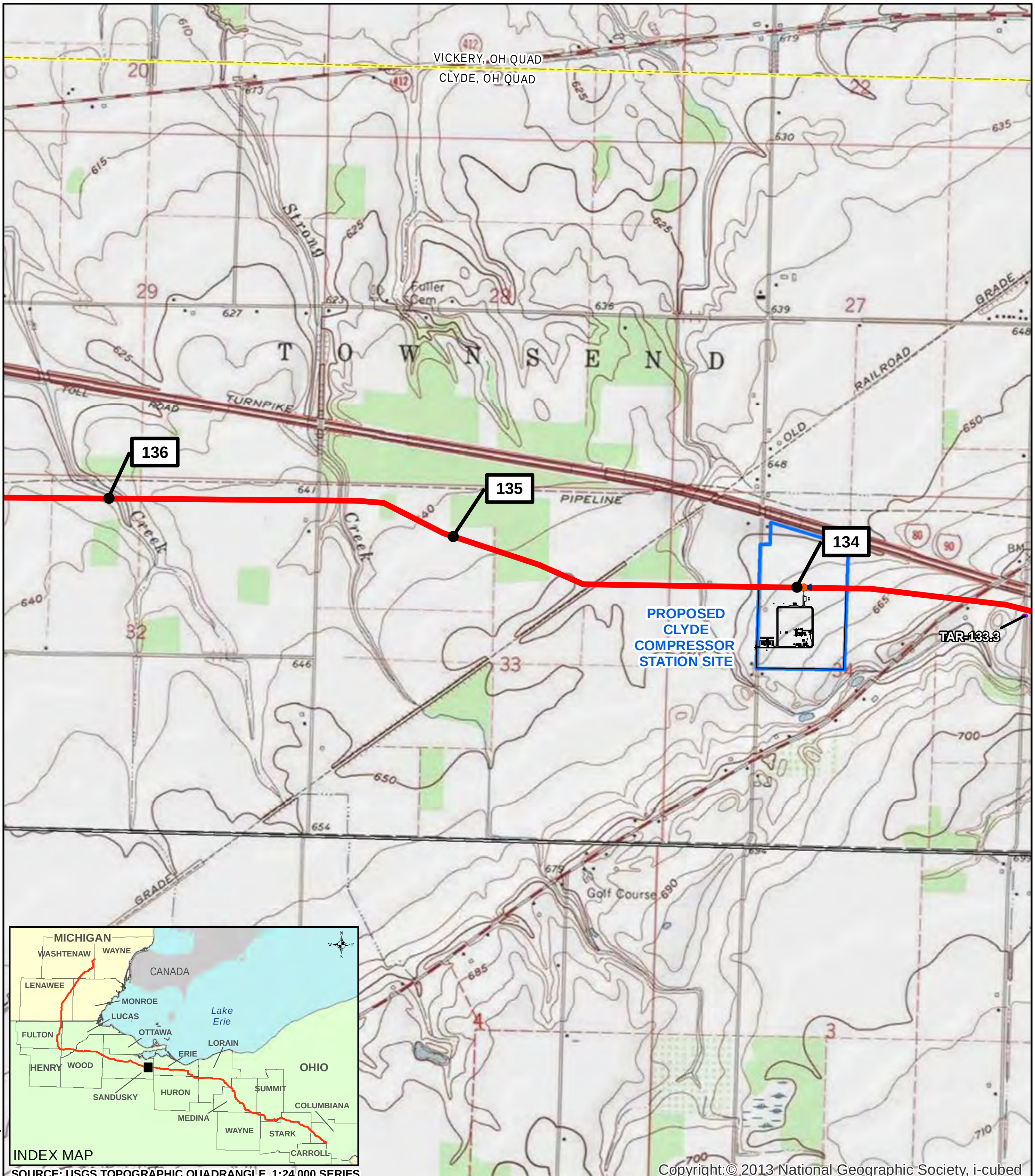
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: ERIE COUNTY, OH; SANDUSKY COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-43	MAP 43 of 81	REV. B

I.G.

NEXUS GAS TRANSMISSION



Coordinate System: NAD 1983 UTM Zone 17N Foot US

1 MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

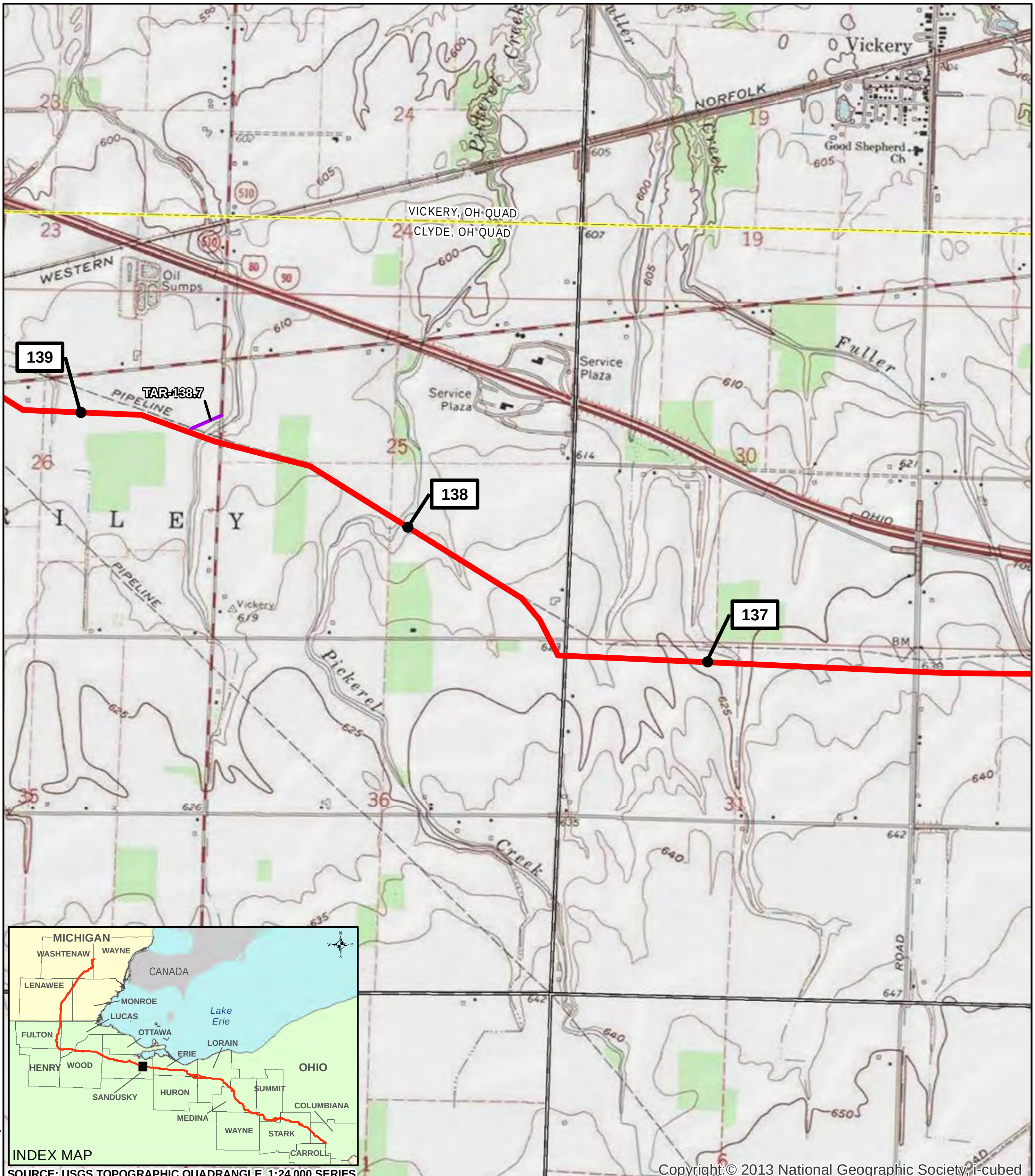
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: SANDUSKY COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-44	MAP 44 of 81	REV. B

NEXUS GAS TRANSMISSION

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

1 MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

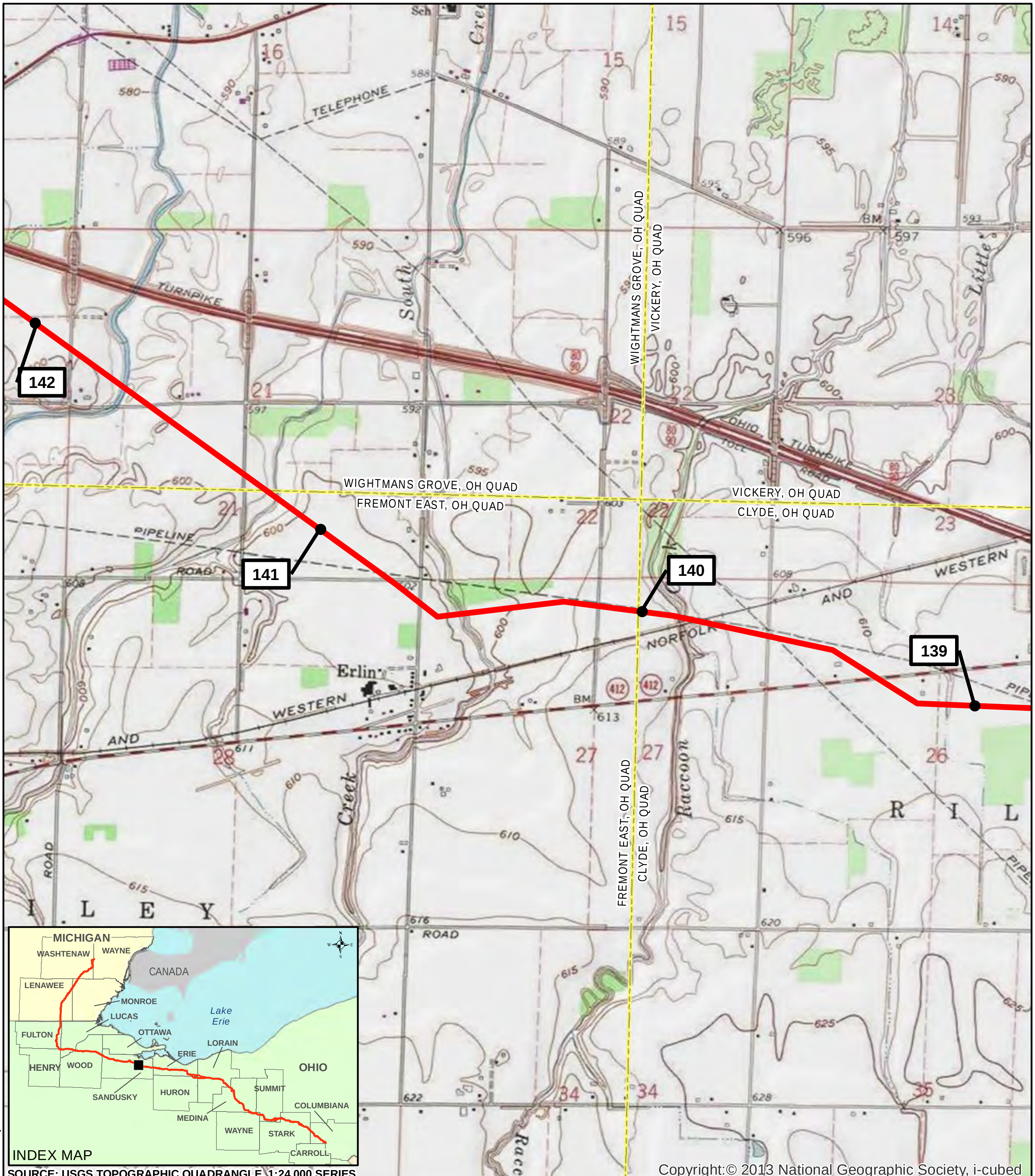
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: SANDUSKY COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-45	MAP 45 of 81 / REV. B

I.G.

NEXUS GAS TRANSMISSION SM



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

1 MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

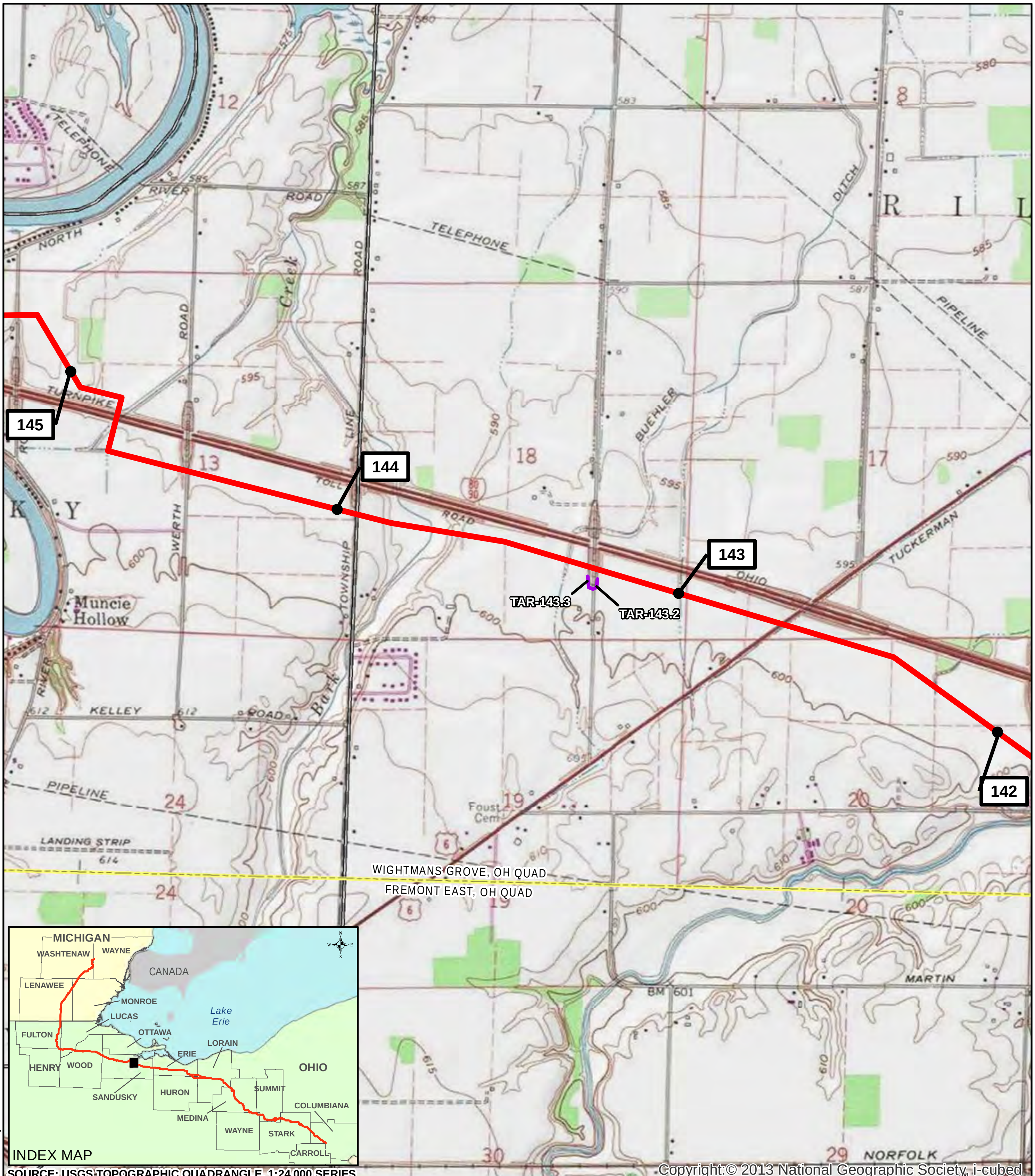
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: SANDUSKY COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-46	MAP 46 of 81	REV. B

NEXUS GAS TRANSMISSION

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

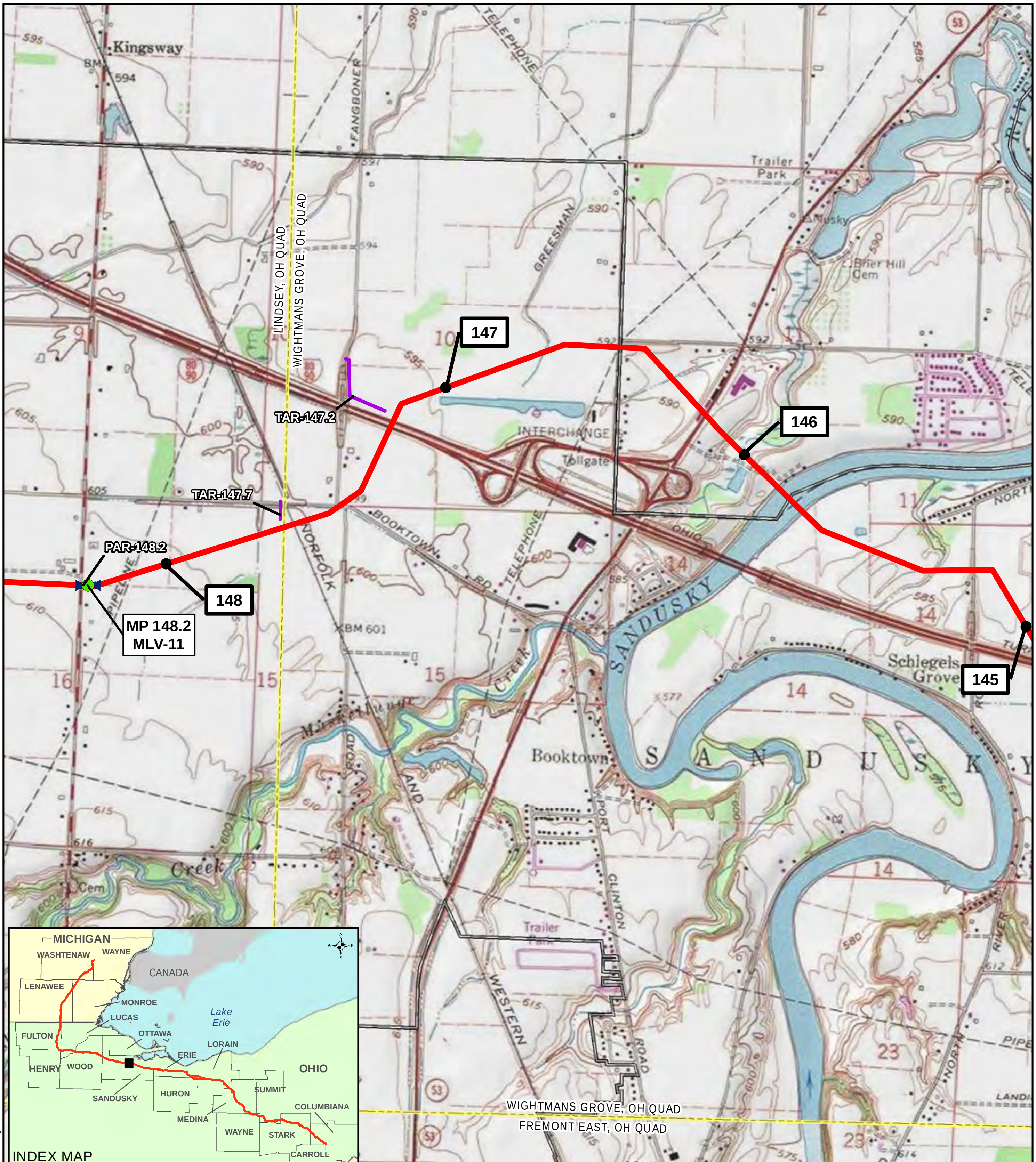
0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT PROPOSED PIPELINE - USGS QUAD MAP				
LOC.: SANDUSKY COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-47	MAP 47 of 81	REV. B

NEXUS℠ GAS TRANSMISSION

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

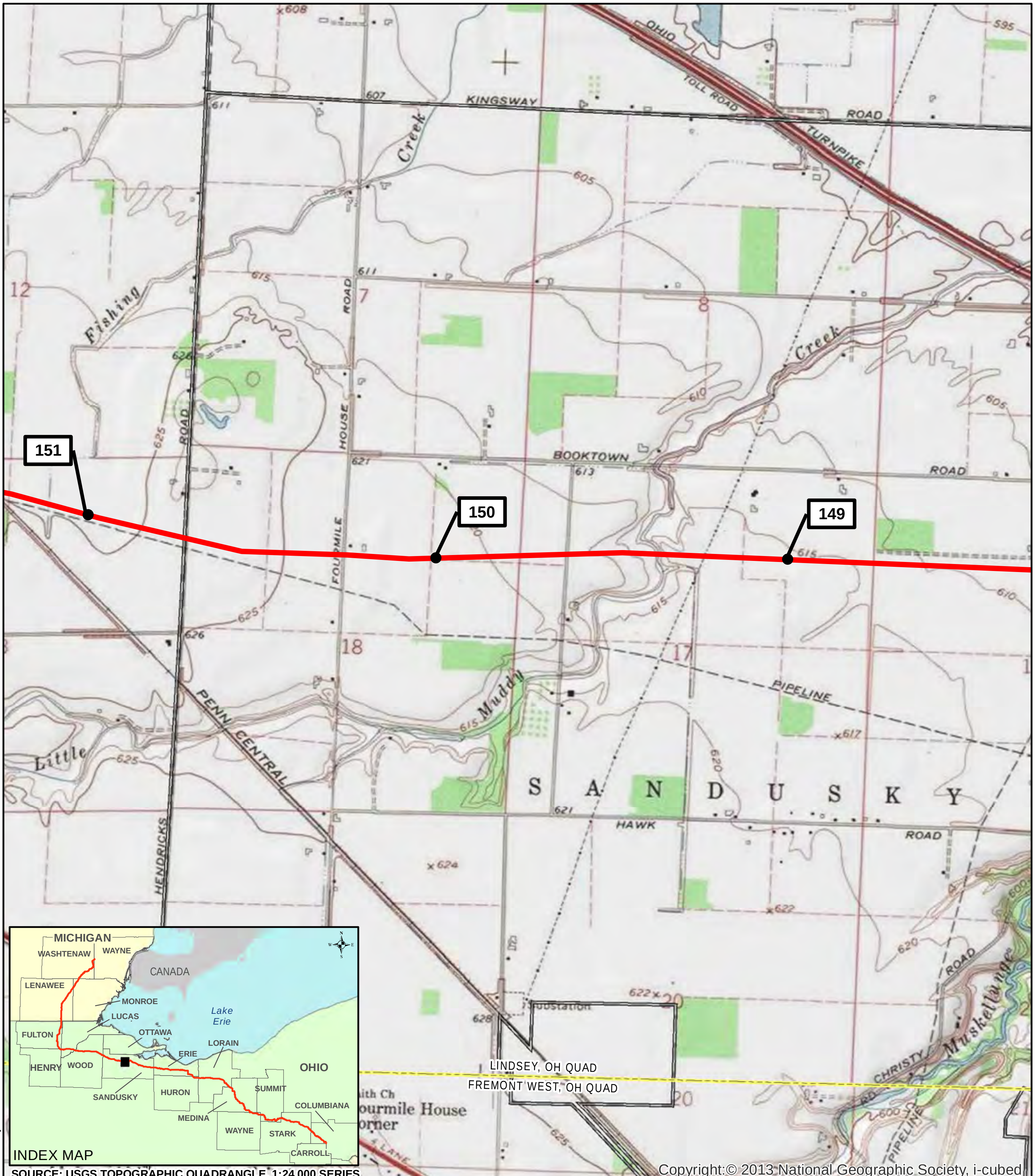
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: SANDUSKY COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-48	MAP 48 of 81	REV. B

I.G.

NEXUS GAS TRANSMISSION



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

- MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

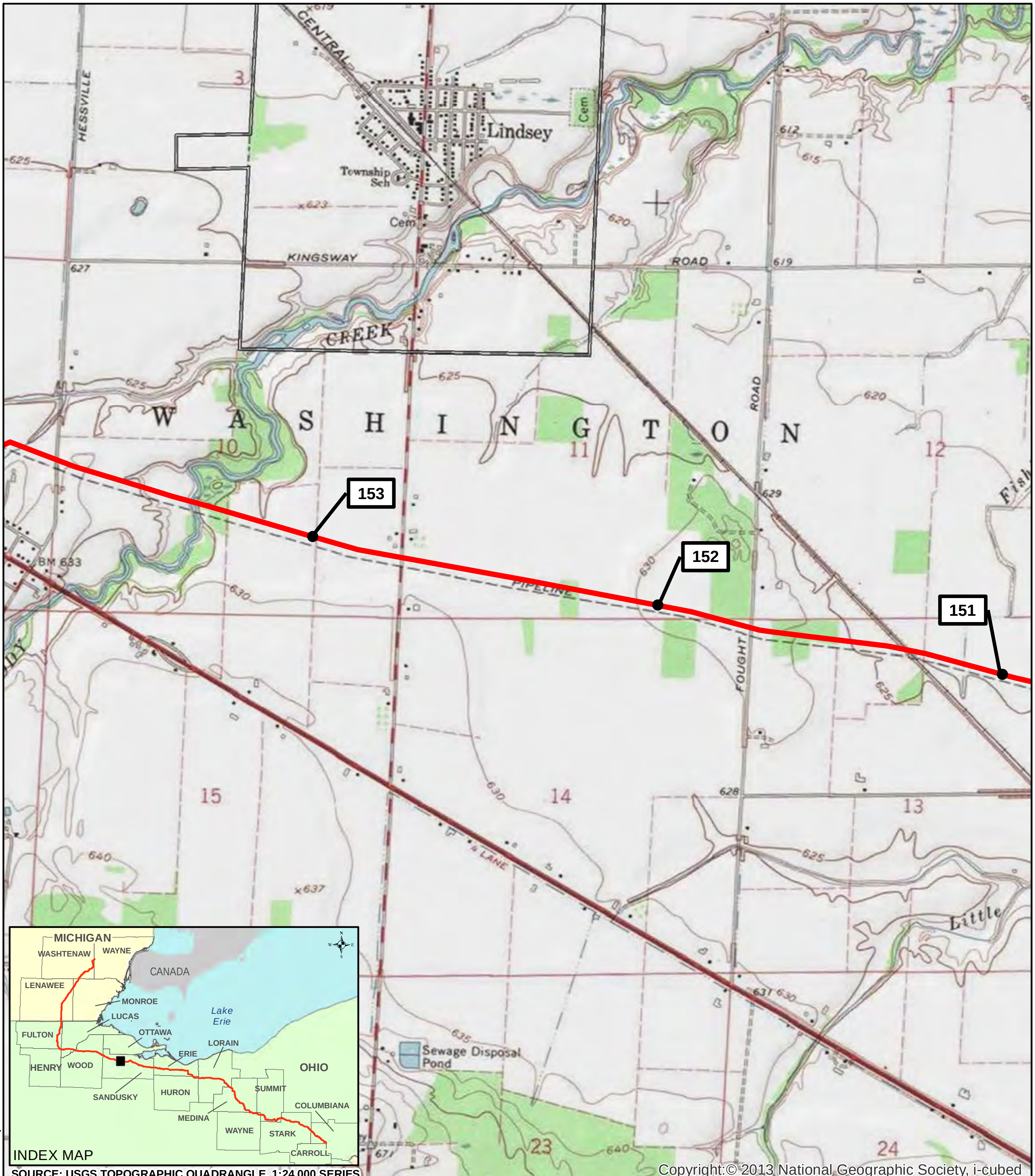
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: SANDUSKY COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-49	MAP 49 of 81	REV. B

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

1 MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

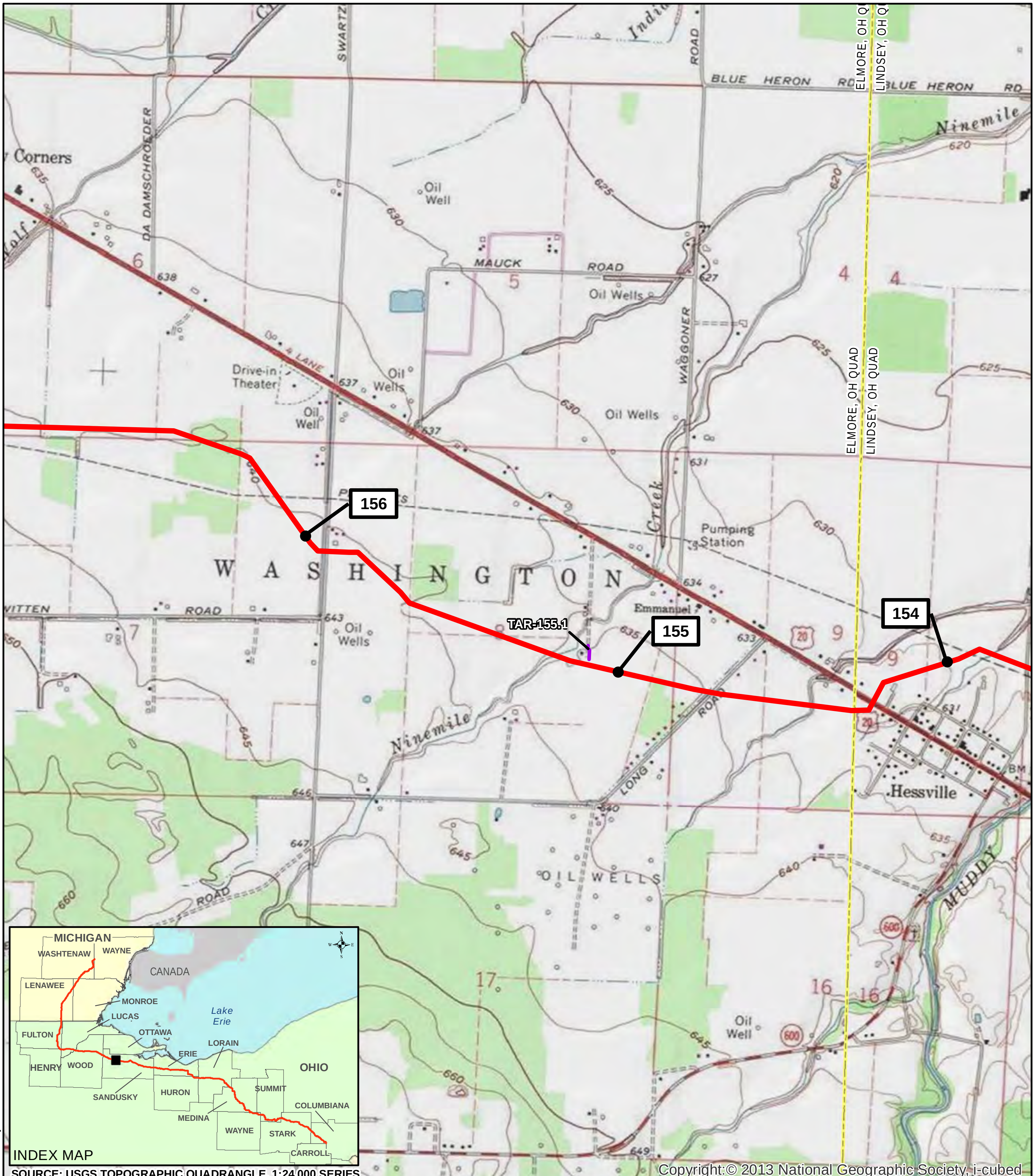
TITLE:

NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: SANDUSKY COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-50	MAP 50 of 81	REV. B

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

1 MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: SANDUSKY COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-51	MAP 51 of 81 / REV. B

I.G.

NEXUS GAS TRANSMISSION

Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

1 MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N S W E

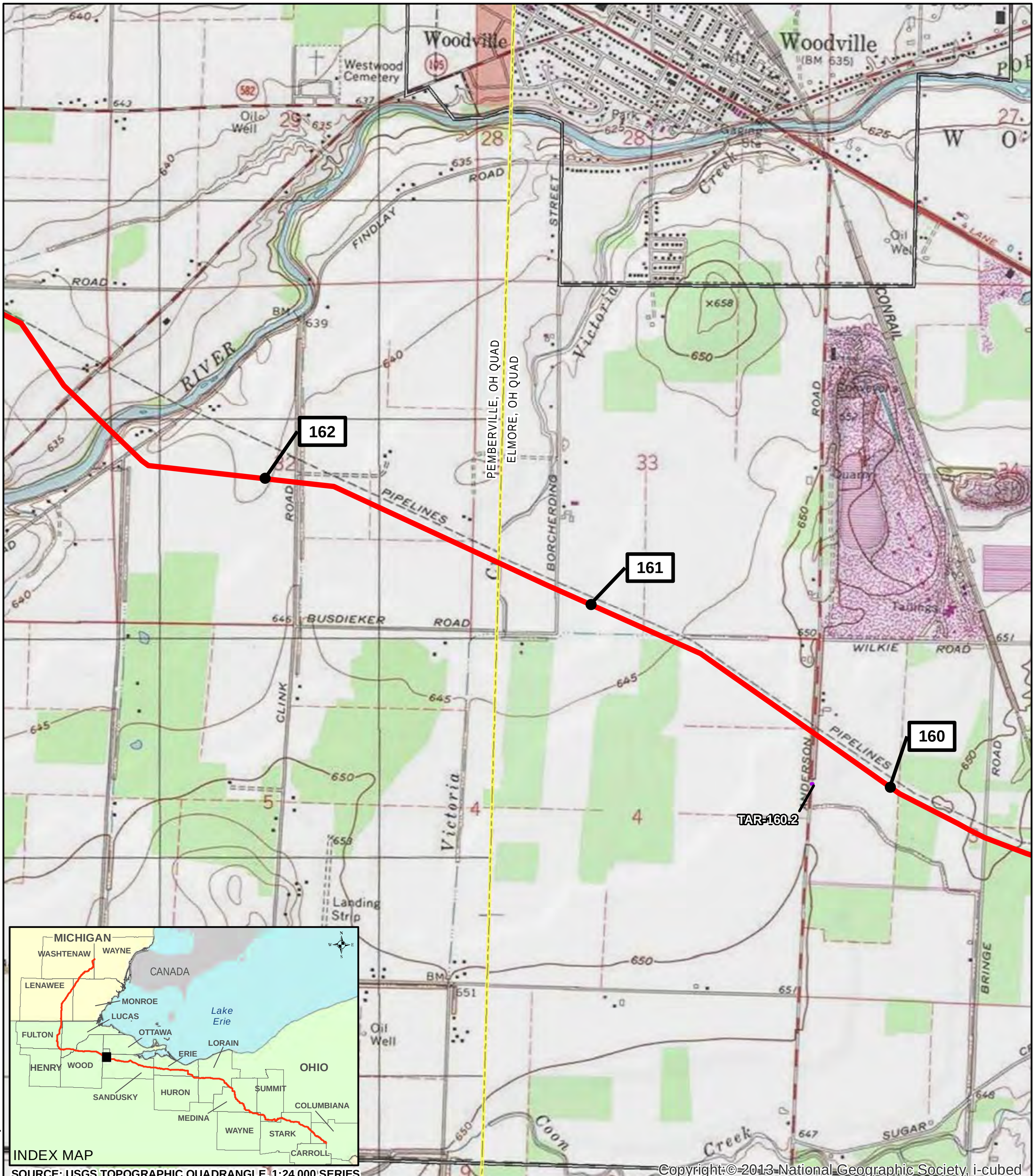
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: SANDUSKY COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-52	MAP 52 of 81 — REV. B

I.G.

NEXUS GAS TRANSMISSION



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

- MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

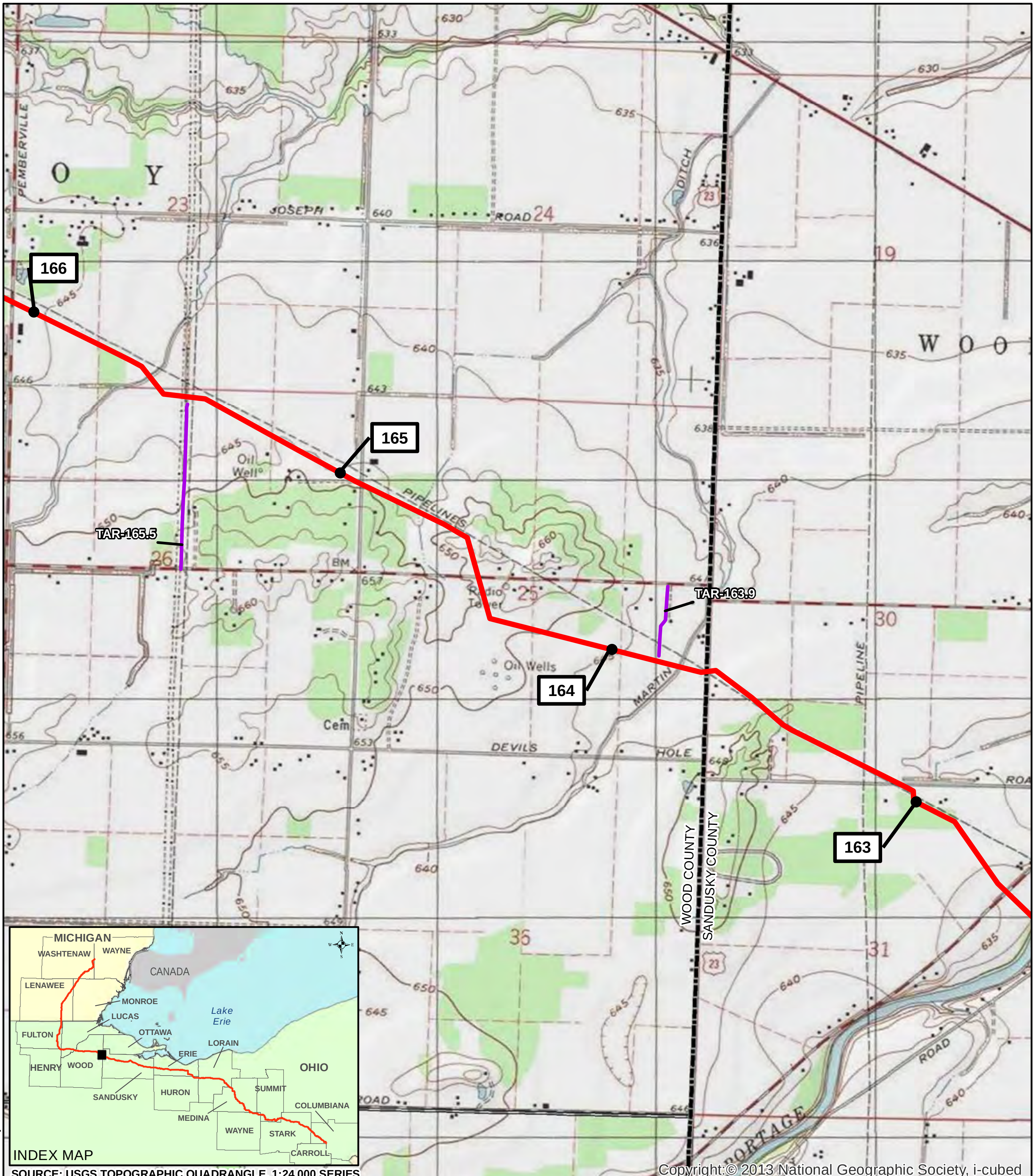
N S W E

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: SANDUSKY COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-53	MAP 53 of 81	REV. B

NEXUS GAS TRANSMISSION

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

1 MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

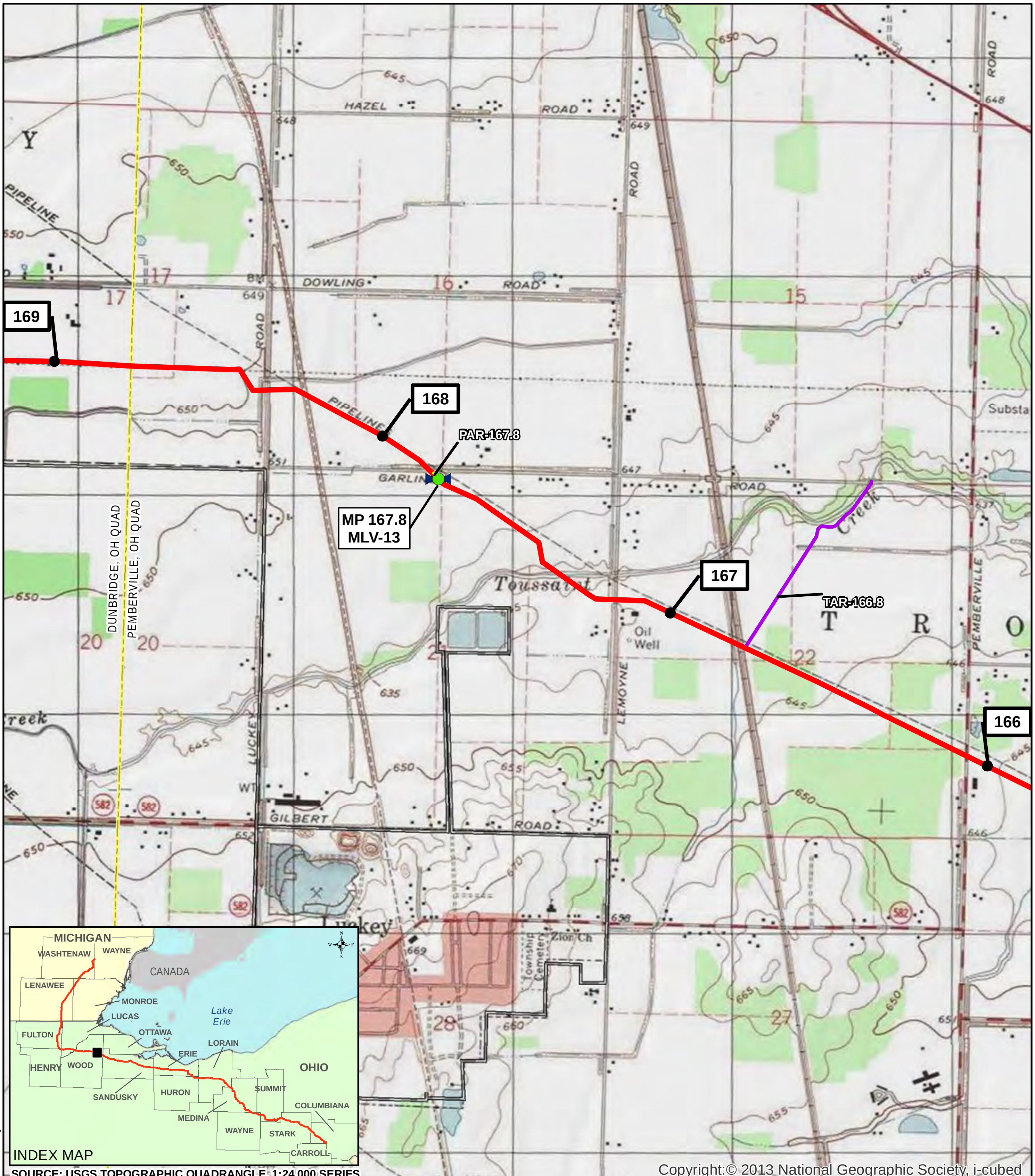
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: SANDUSKY COUNTY, OH; WOOD COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-54	MAP 54 of 81	REV. B

I.G.

NEXUS SM
GAS TRANSMISSION



1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

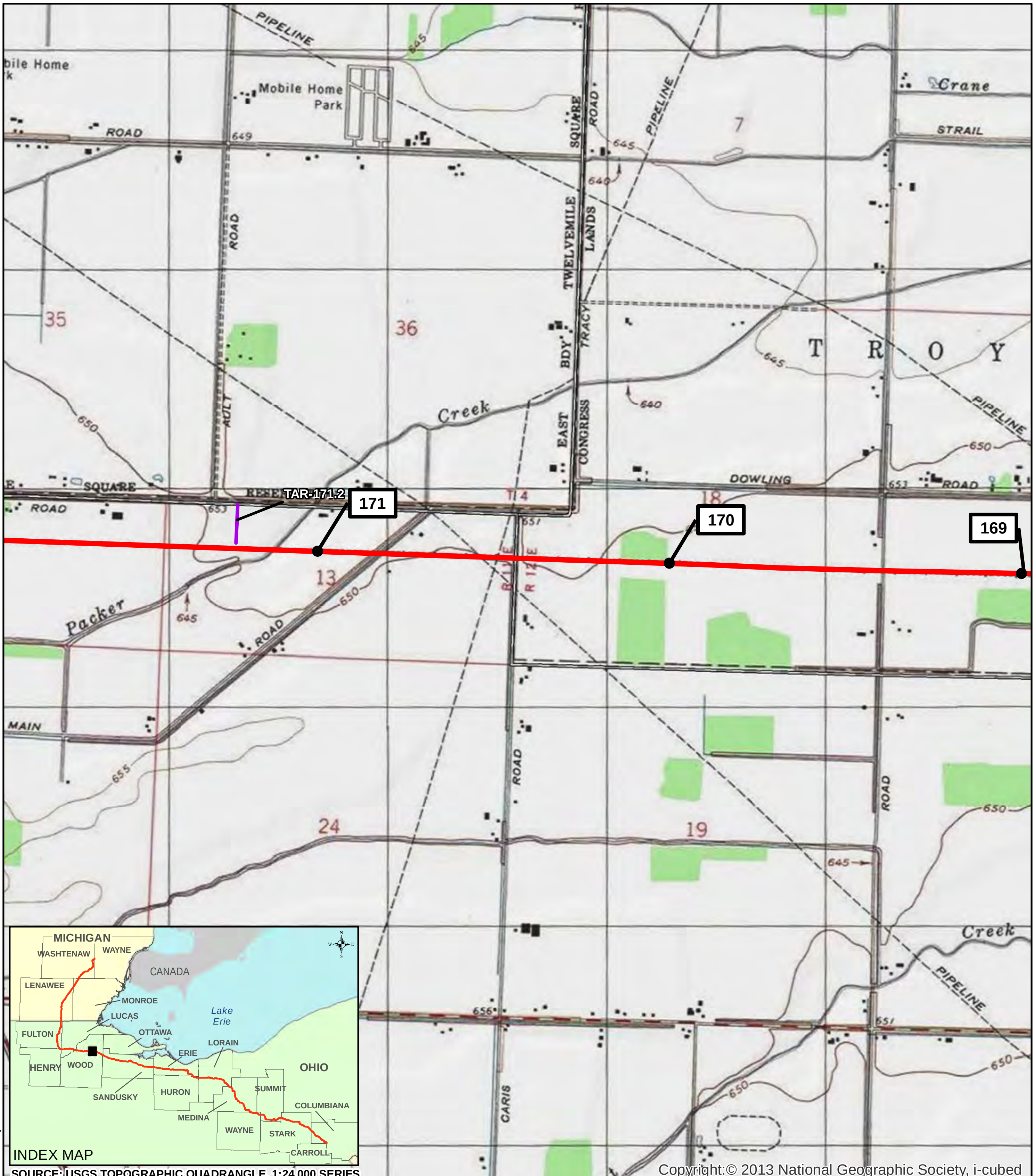
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: WOOD COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-55	MAP 55 of 81	REV. B

NEXUS GAS TRANSMISSION

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

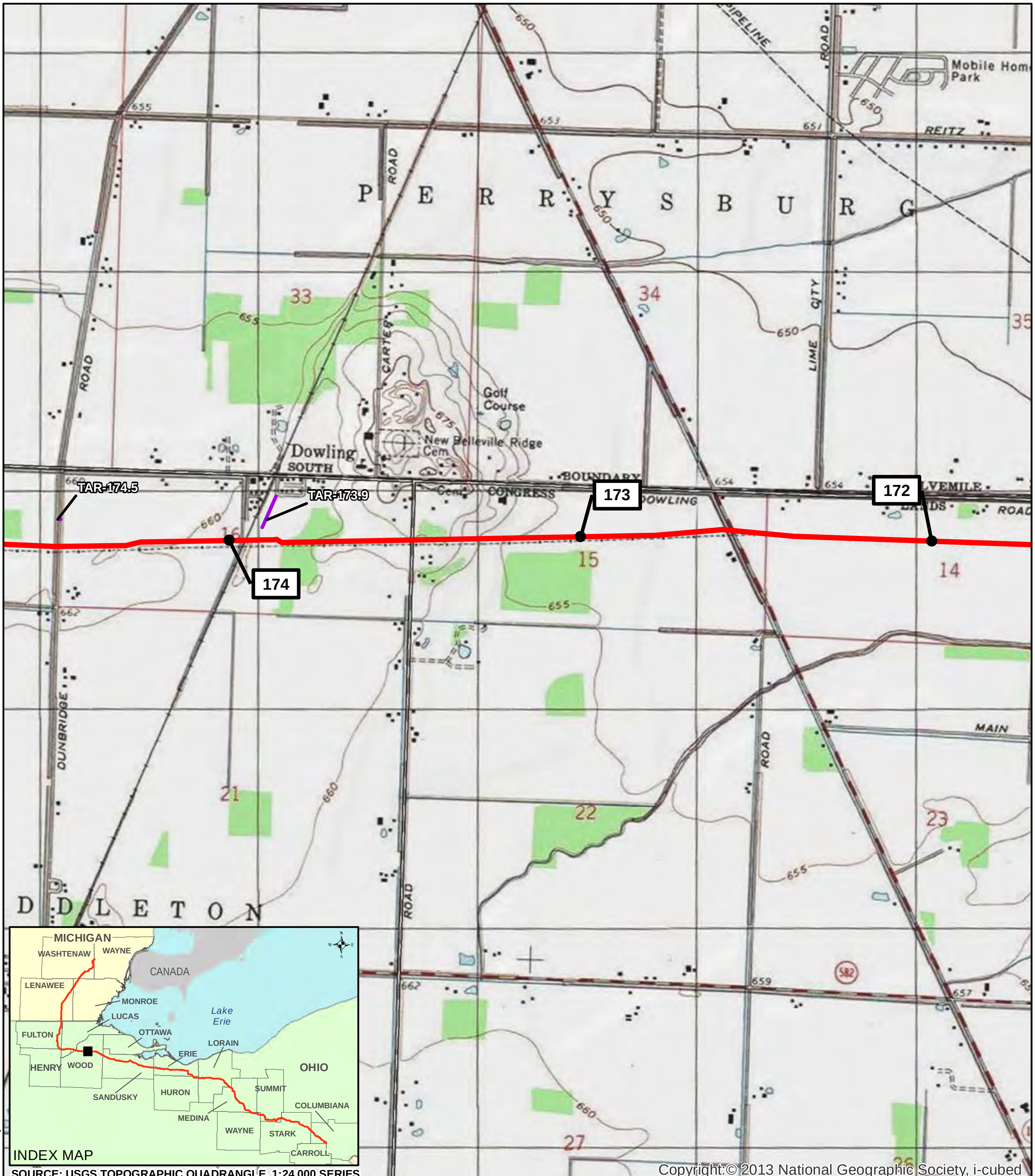
0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT PROPOSED PIPELINE - USGS QUAD MAP				
LOC.: WOOD COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-56	MAP 56 of 81	REV. B

I.G.

NEXUS GAS TRANSMISSION



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

1 MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

TITLE:

NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: WOOD COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-57	MAP 57 of 81	REV. B

I.G.

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

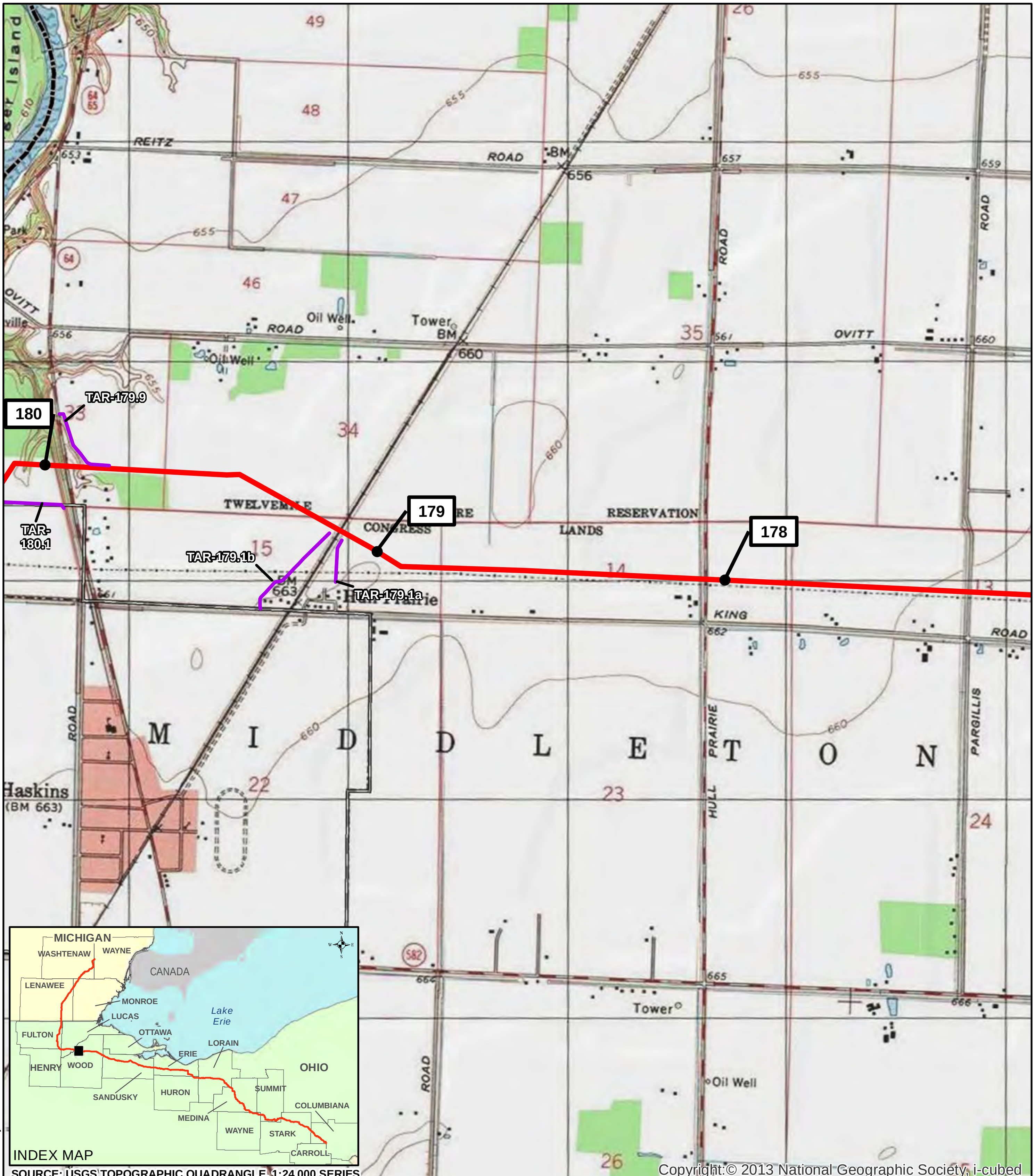
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: WOOD COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-58	MAP 58 of 81	REV. B

I.G.

NEXUS GAS TRANSMISSION



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

1 MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

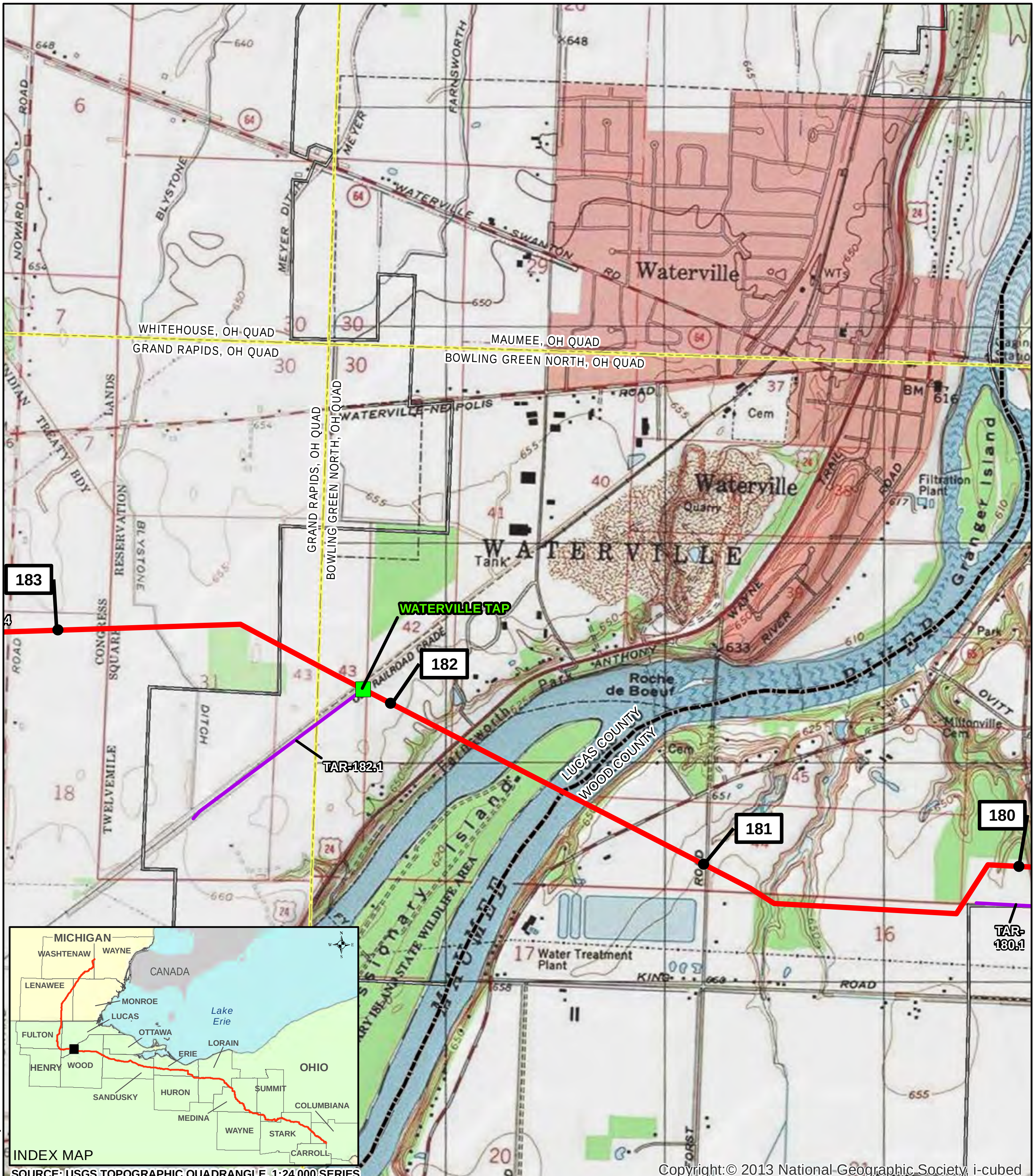
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: WOOD COUNTY, OH			
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-59	MAP 59 of 81 / REV. B

I.G.



MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

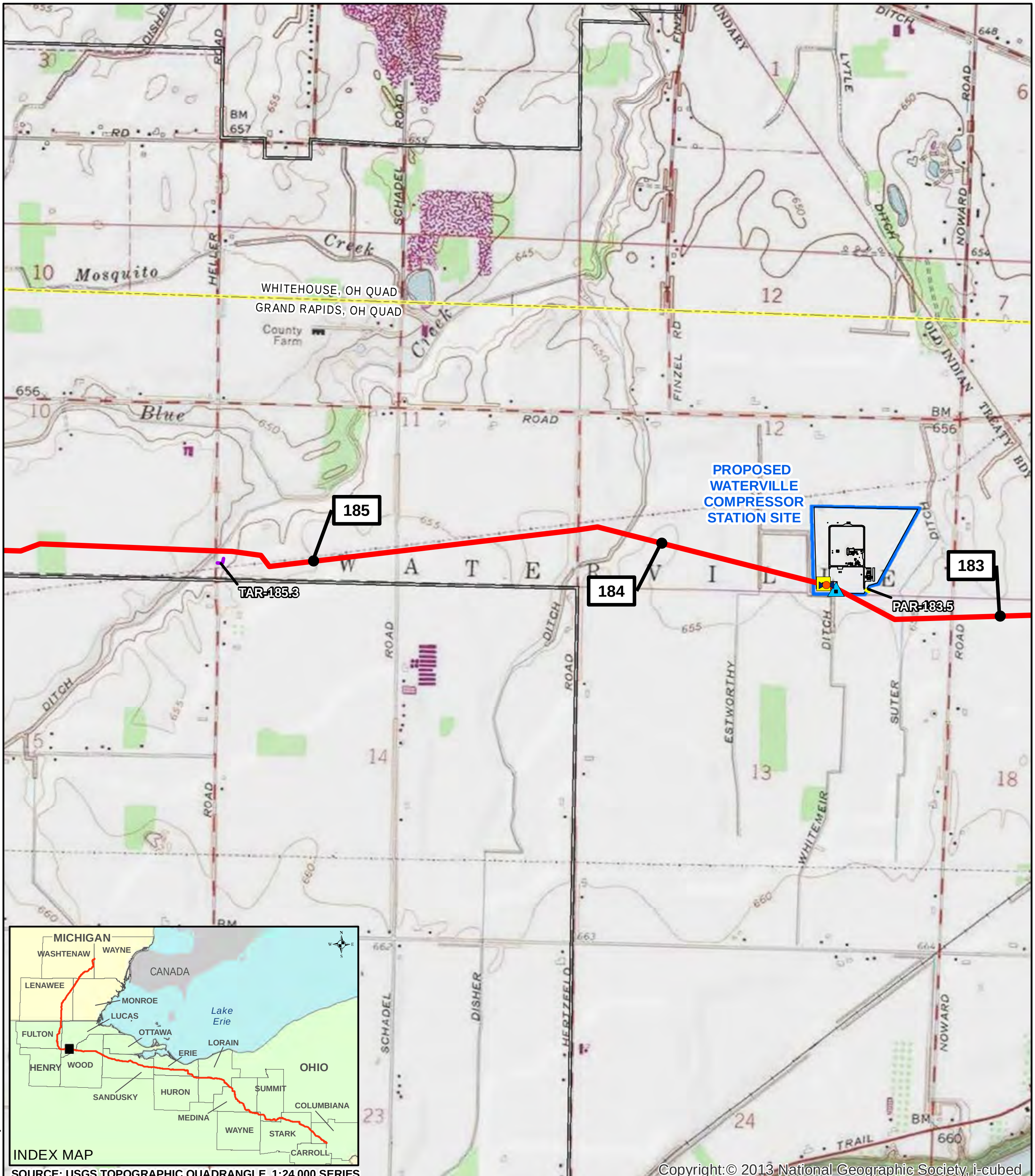
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: WOOD COUNTY, OH; LUCAS COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-60	MAP 60 of 81	REV. B

I.G.

NEXUS GAS TRANSMISSION



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

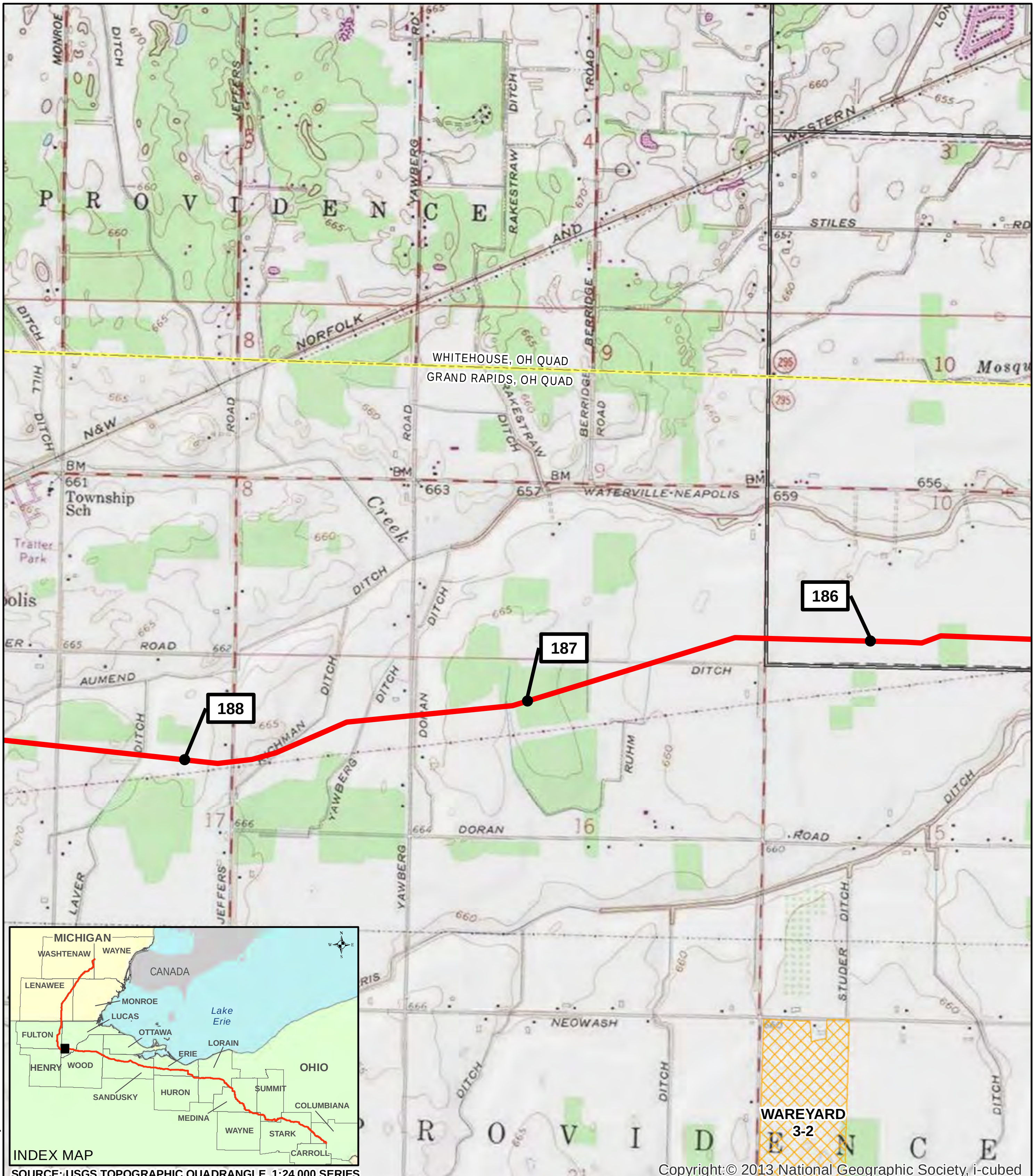
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: LUCAS COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-61	MAP 61 of 81 — REV. B

NEXUS GAS TRANSMISSION

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

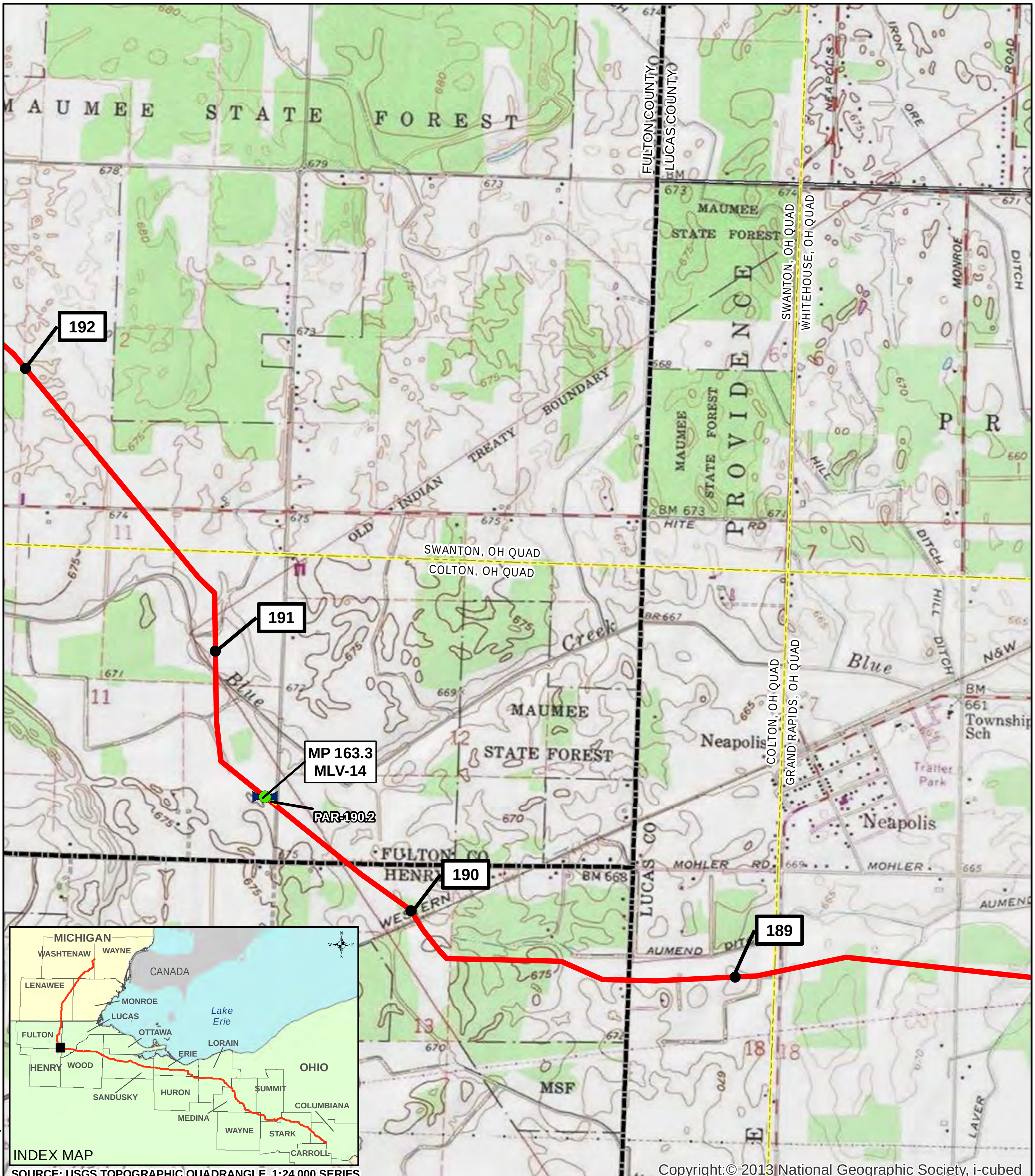
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: LUCAS COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-62	MAP 62 of 81	REV. B

I.G.



MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

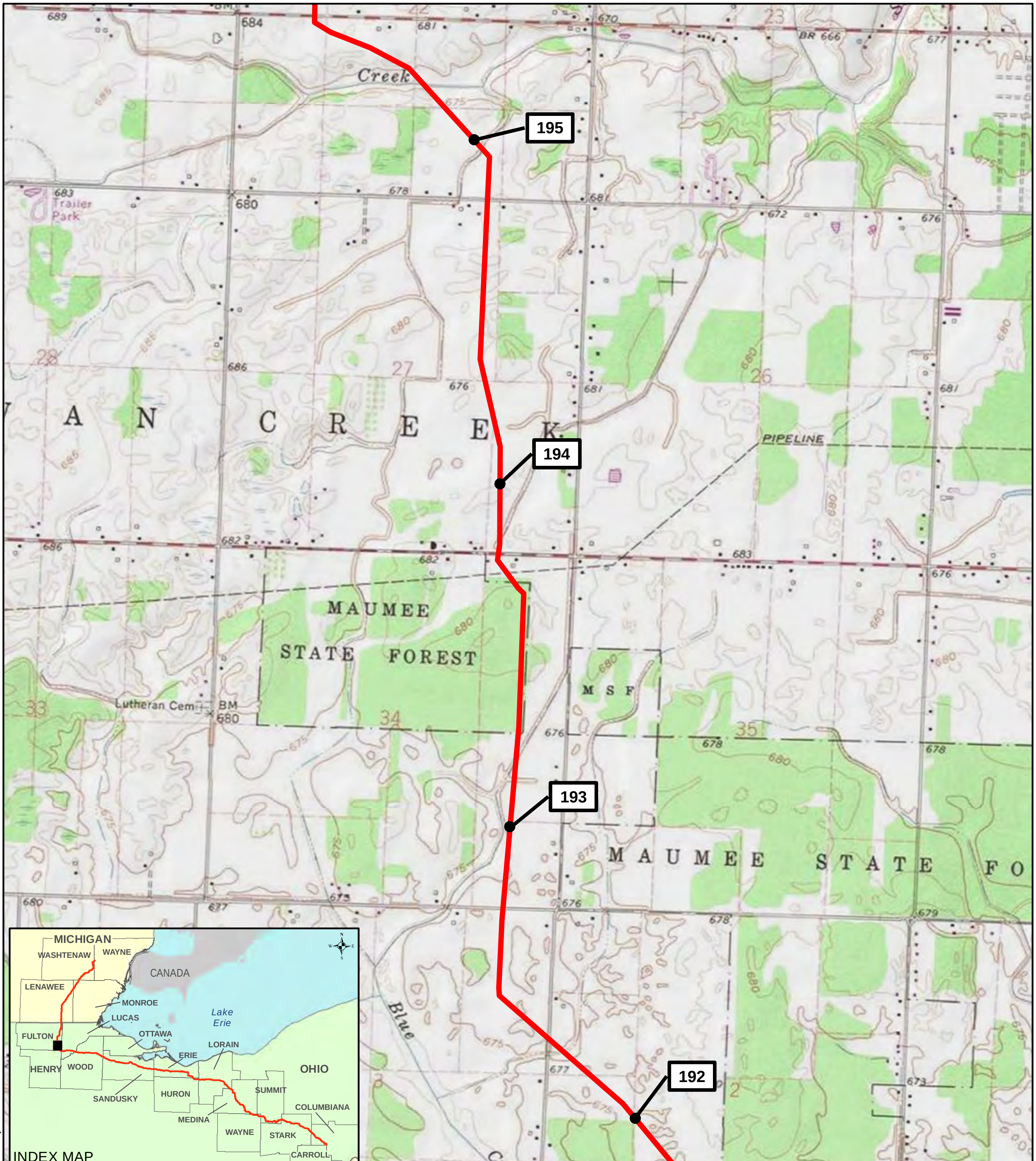
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: LUCAS COUNTY, OH; FULTON COUNTY, OH, HENRY COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-63	MAP 63 of 81	REV. B

NEXUS GAS TRANSMISSION

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1 MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

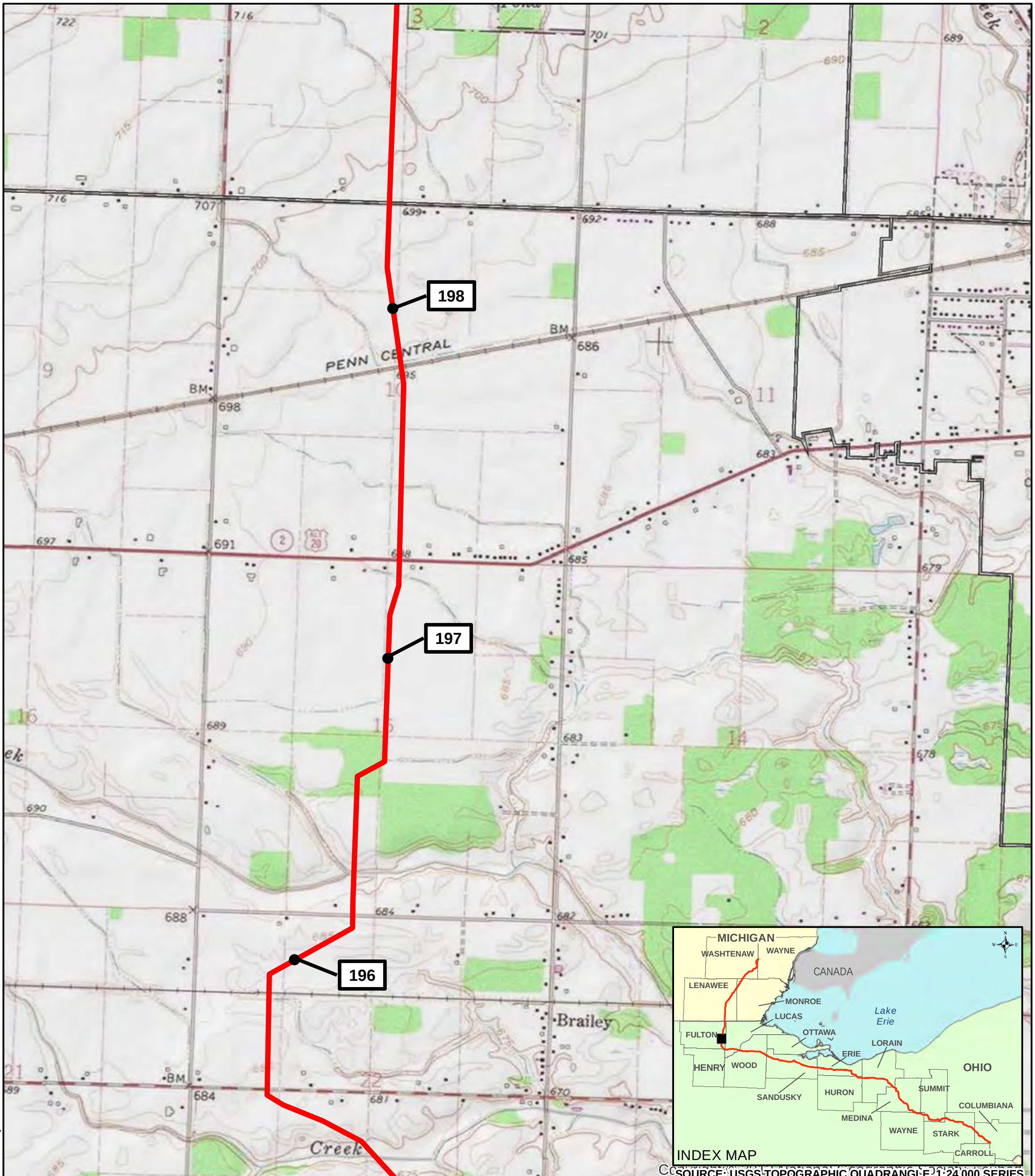
N W E S

TITLE:
NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: FULTON COUNTY, OH			
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-64	MAP 64 of 81 / REV. B

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

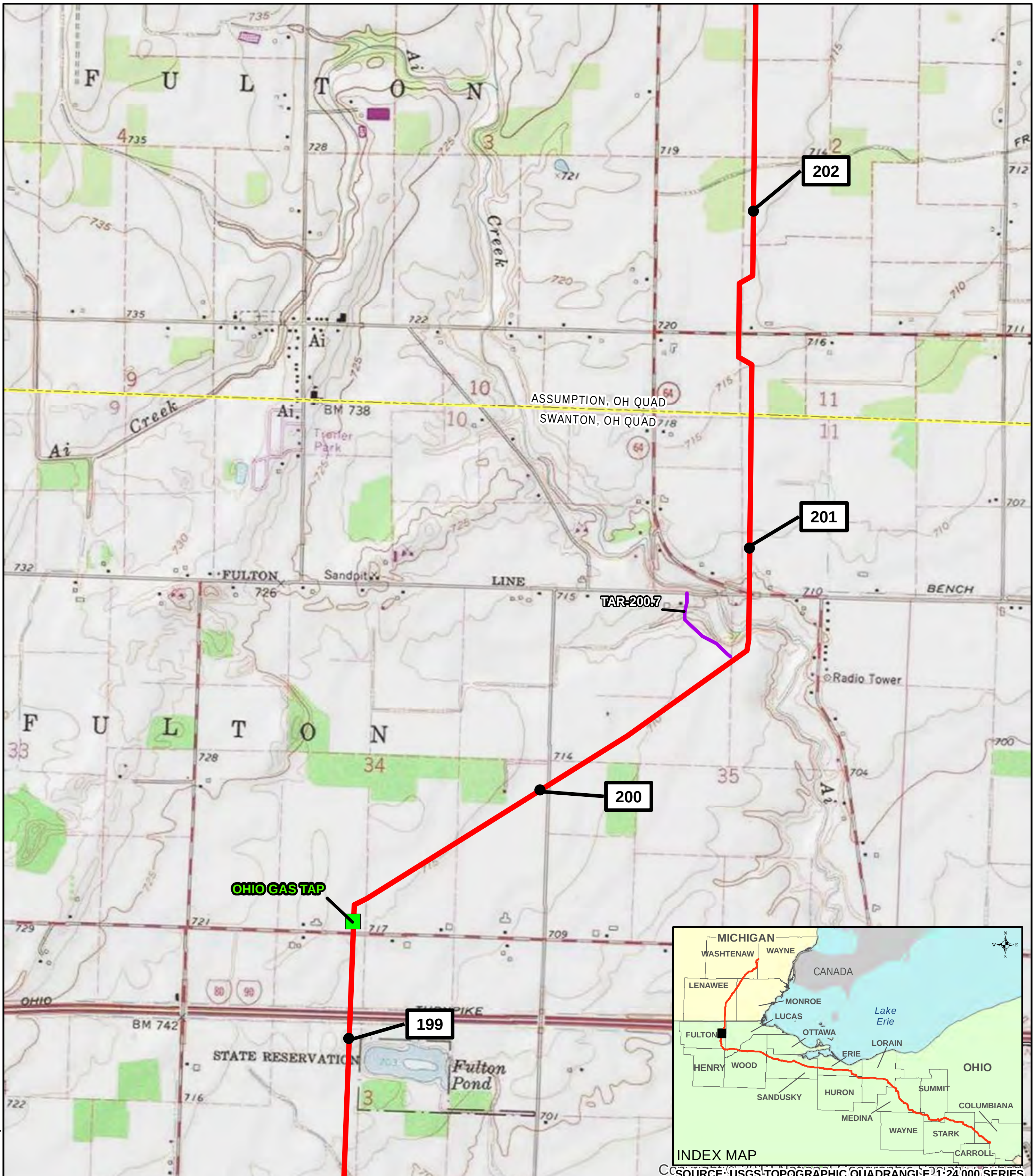
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: FULTON COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-65	MAP 65 of 81	REV. B

I.G.

NEXUS SM
GAS TRANSMISSION



Coordinate System: NAD 1983 UTM Zone 17N Foot US

- MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

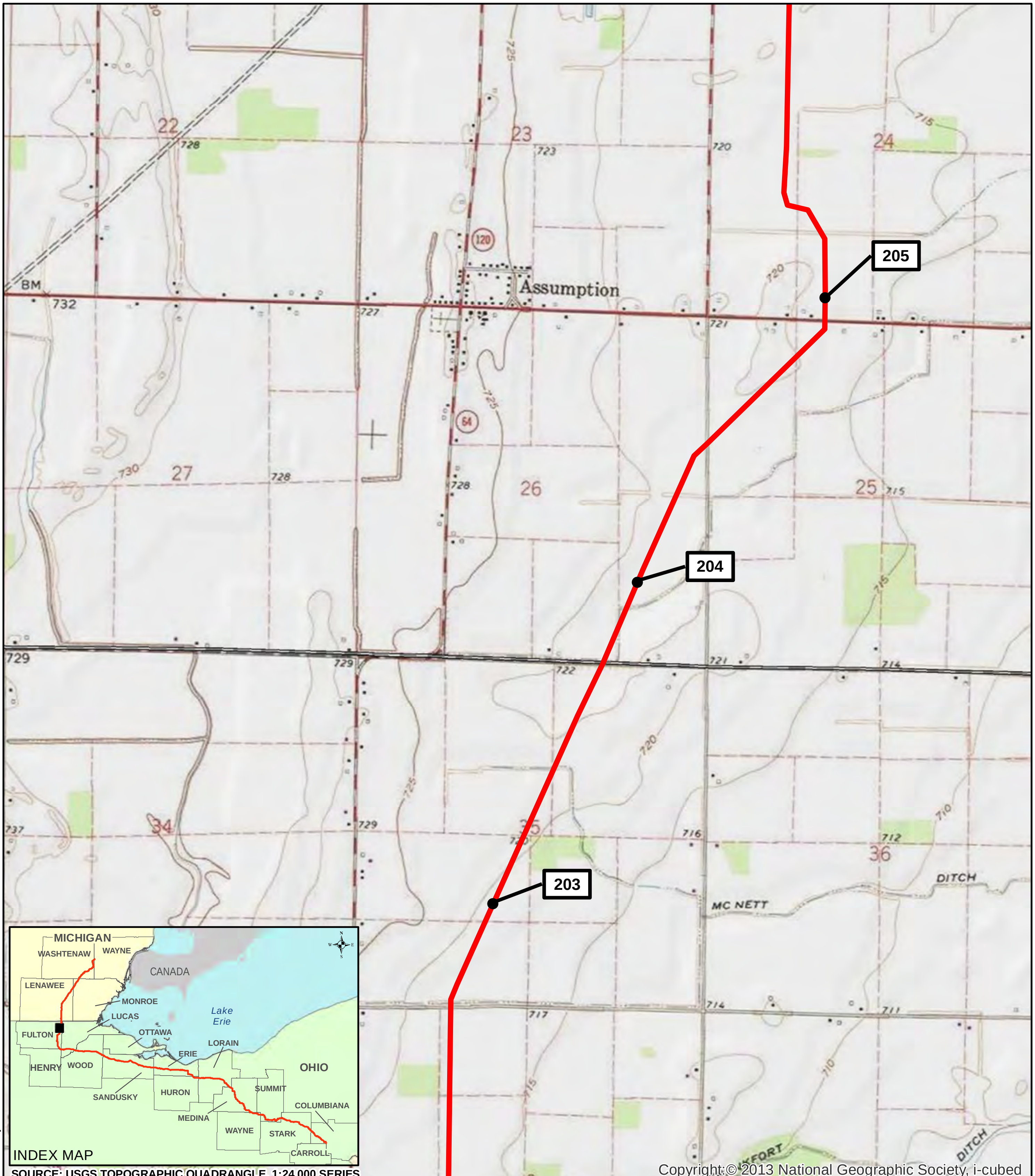
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: FULTON COUNTY, OH				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-66	MAP 66 of 81	REV. B

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

TITLE:

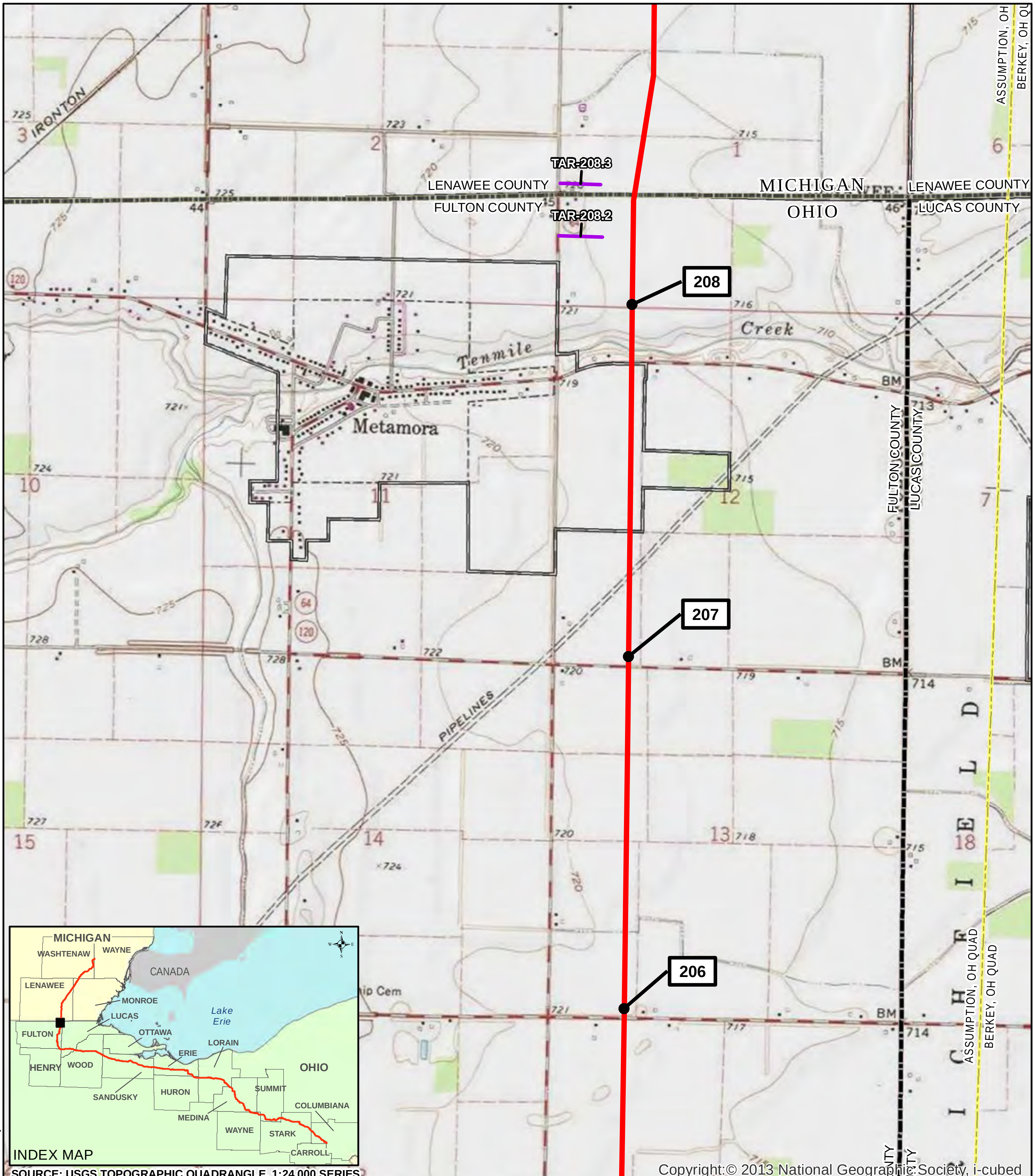
NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: FULTON COUNTY, OH

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-67	MAP 67 of 81 / REV. B

I.G.

NEXUS SM GAS TRANSMISSION



Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND		PROPOSED PERMANENT ACCESS ROAD (PAR)		PROPOSED WARE YARD
	PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)		PROPOSED TEMPORARY ACCESS ROAD (TAR)		EXISTING FACILITY
	PROPOSED MAINLINE VALVE		PROPOSED MAINLINE PIPELINE		USGS QUADRANGLE BOUNDARY
	PROPOSED PIPELINE LAUNCHER		PROPOSED INTERCONNECTING PIPELINE		COUNTY BOUNDARY
	PROPOSED PIPELINE RECEIVER		PROPOSED METERING & REGULATION STATION (M&R)		
	PROPOSED TAP		PROPOSED COMPRESSOR STATION SITE		

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N S W E

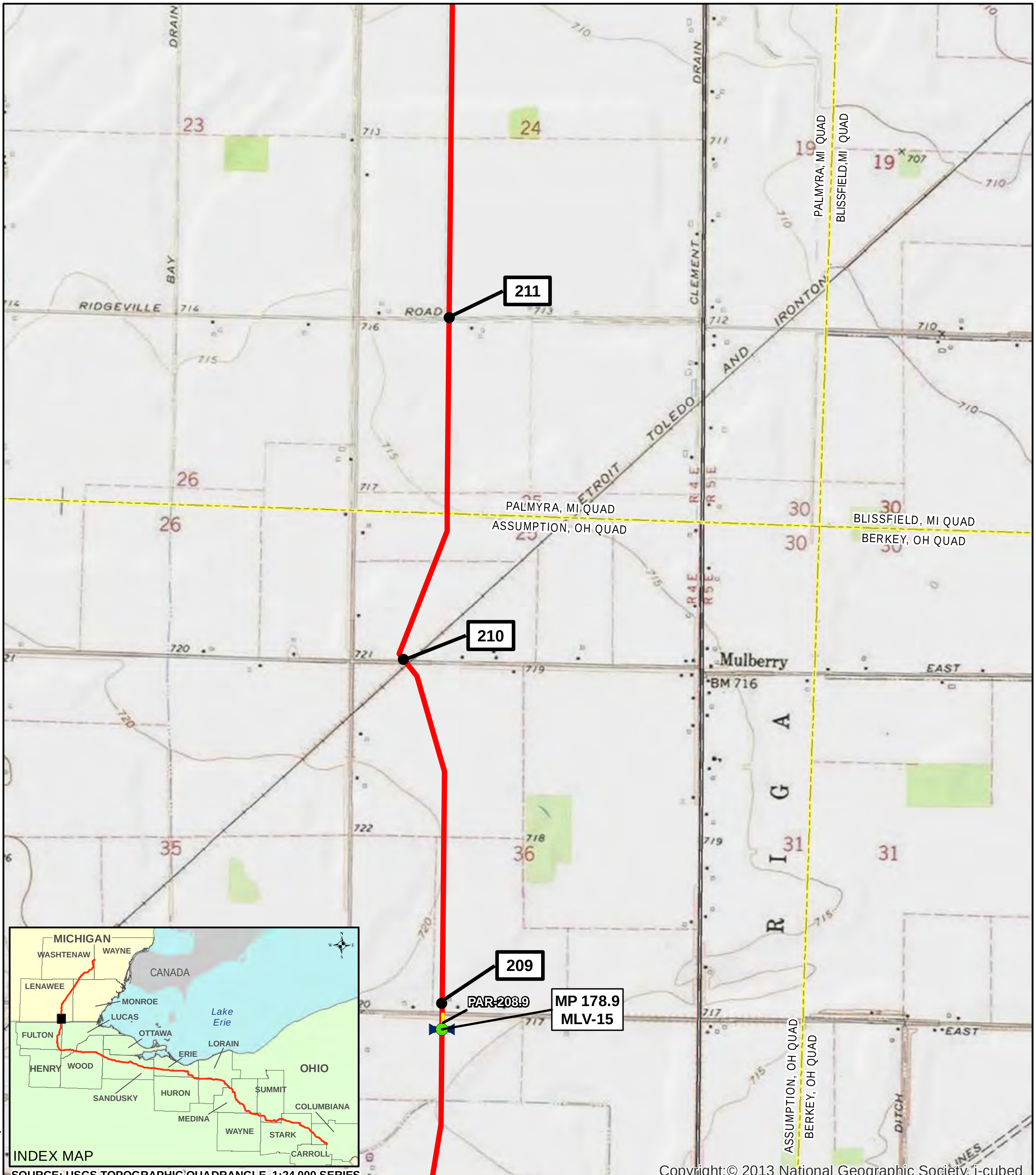
TITLE:

NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION SM

LOC.: FULTON COUNTY, OH; LENAWEE COUNTY, MI				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-68	MAP 68 of 81	REV. B

I.G.



MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

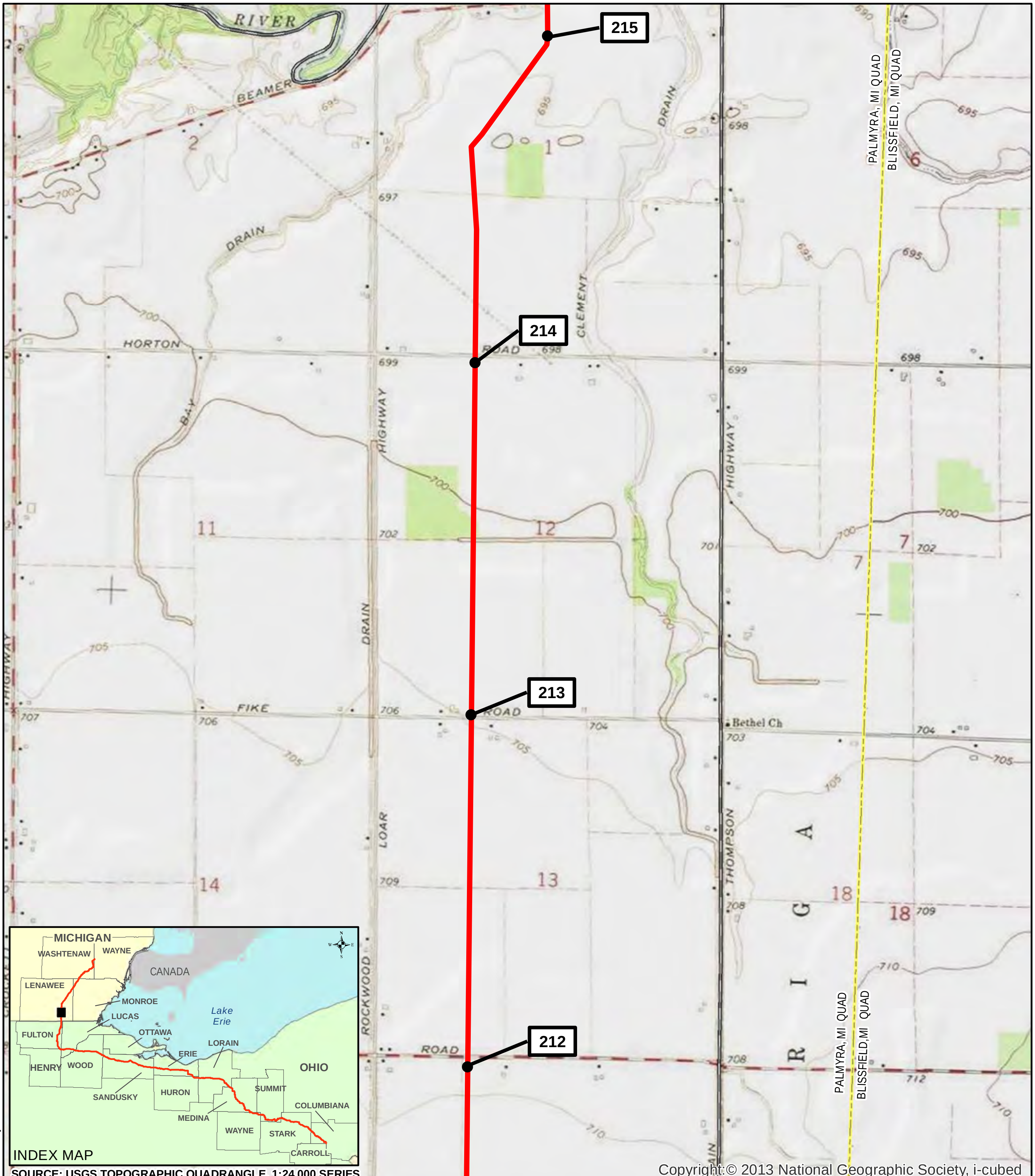
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: LENAWEE COUNTY, MI				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-69	MAP 69 of 81	REV. B

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

- MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

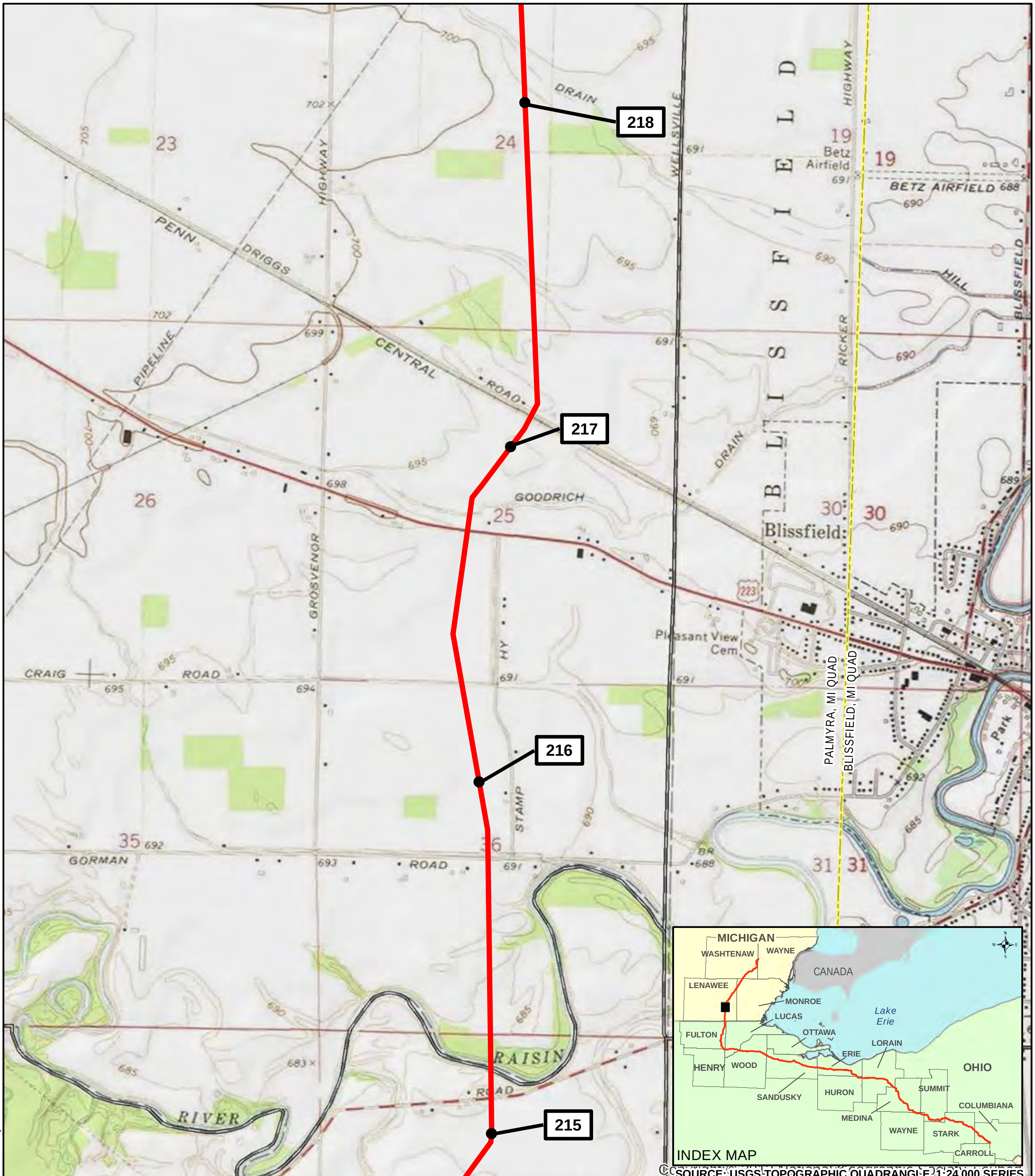
0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT PROPOSED PIPELINE - USGS QUAD MAP				
LOC.: LENAWEE COUNTY, MI				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-70	MAP 70 of 81	REV. B

NEXUS GAS TRANSMISSION

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

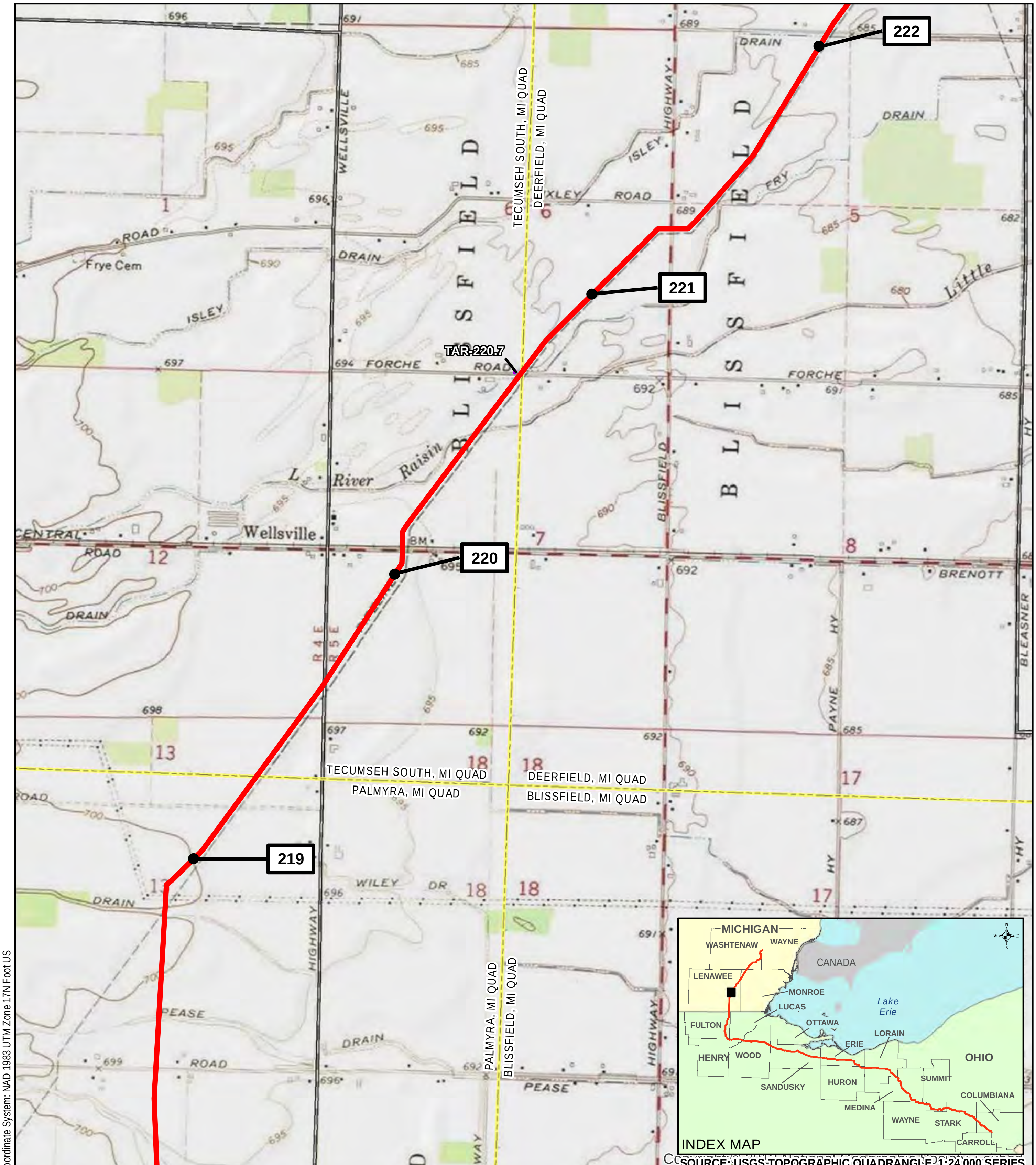
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: LENAWEE COUNTY, MI

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-71	MAP 71 of 81	REV. B

I.G.

NEXUS GAS TRANSMISSION



1 MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

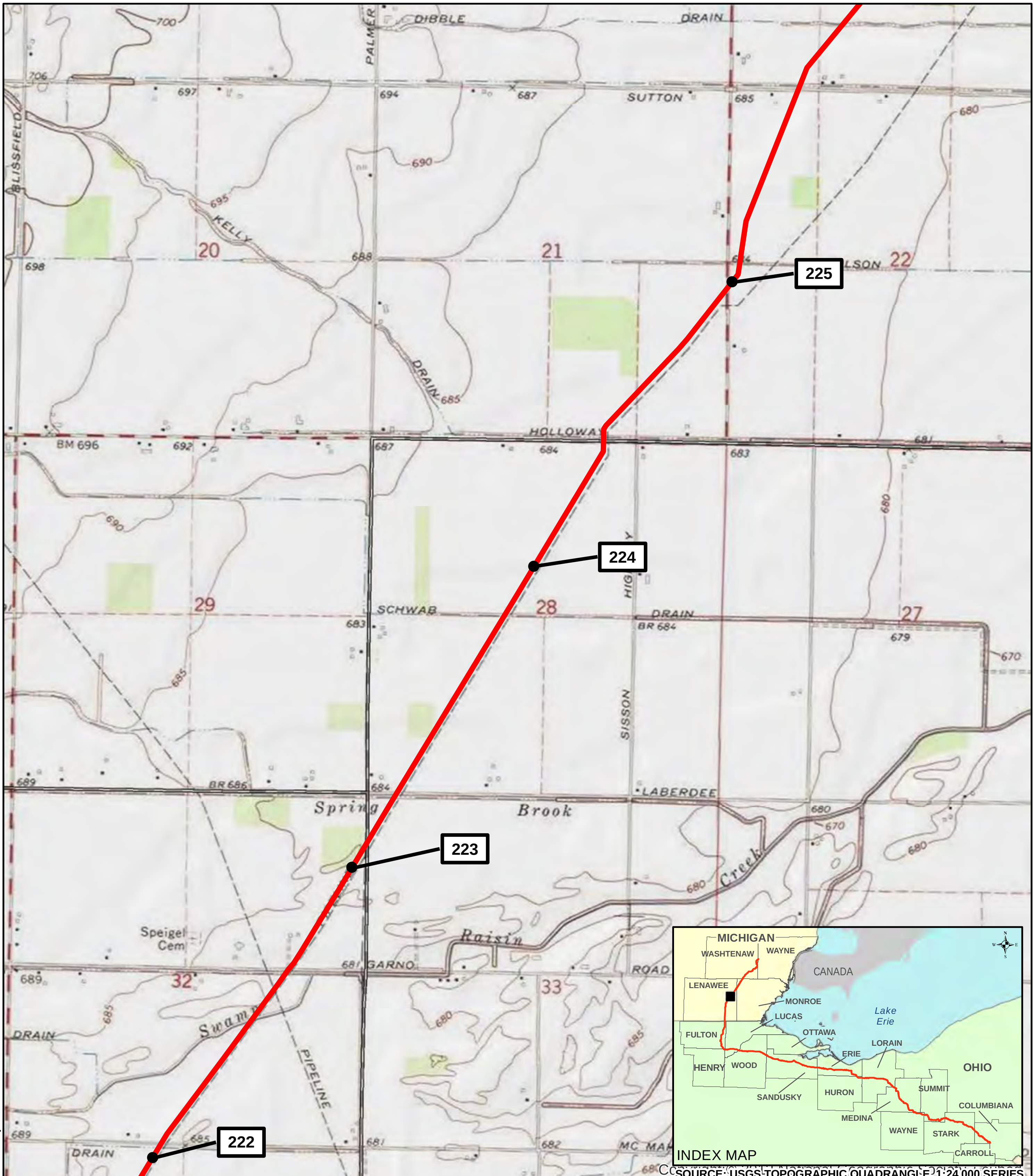
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: LENAWEE COUNTY, MI

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-72	MAP 72 of 81 REV. B

I.G.

NEXUS GAS TRANSMISSION SM



Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

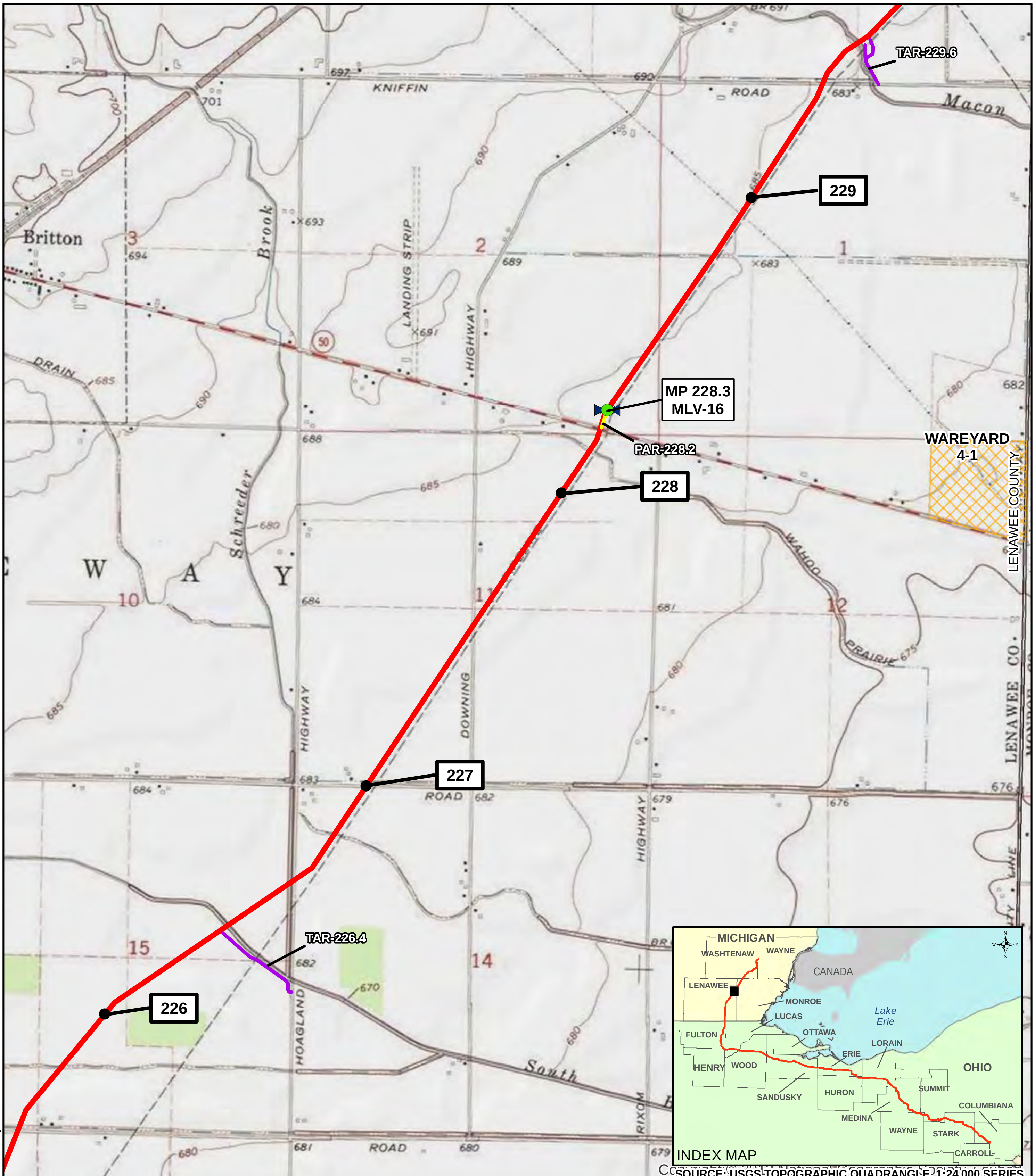
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: LENAWEE COUNTY, MI

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-73	MAP 73 of 81	REV. B

I.G.

NEXUS SM GAS TRANSMISSION



Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

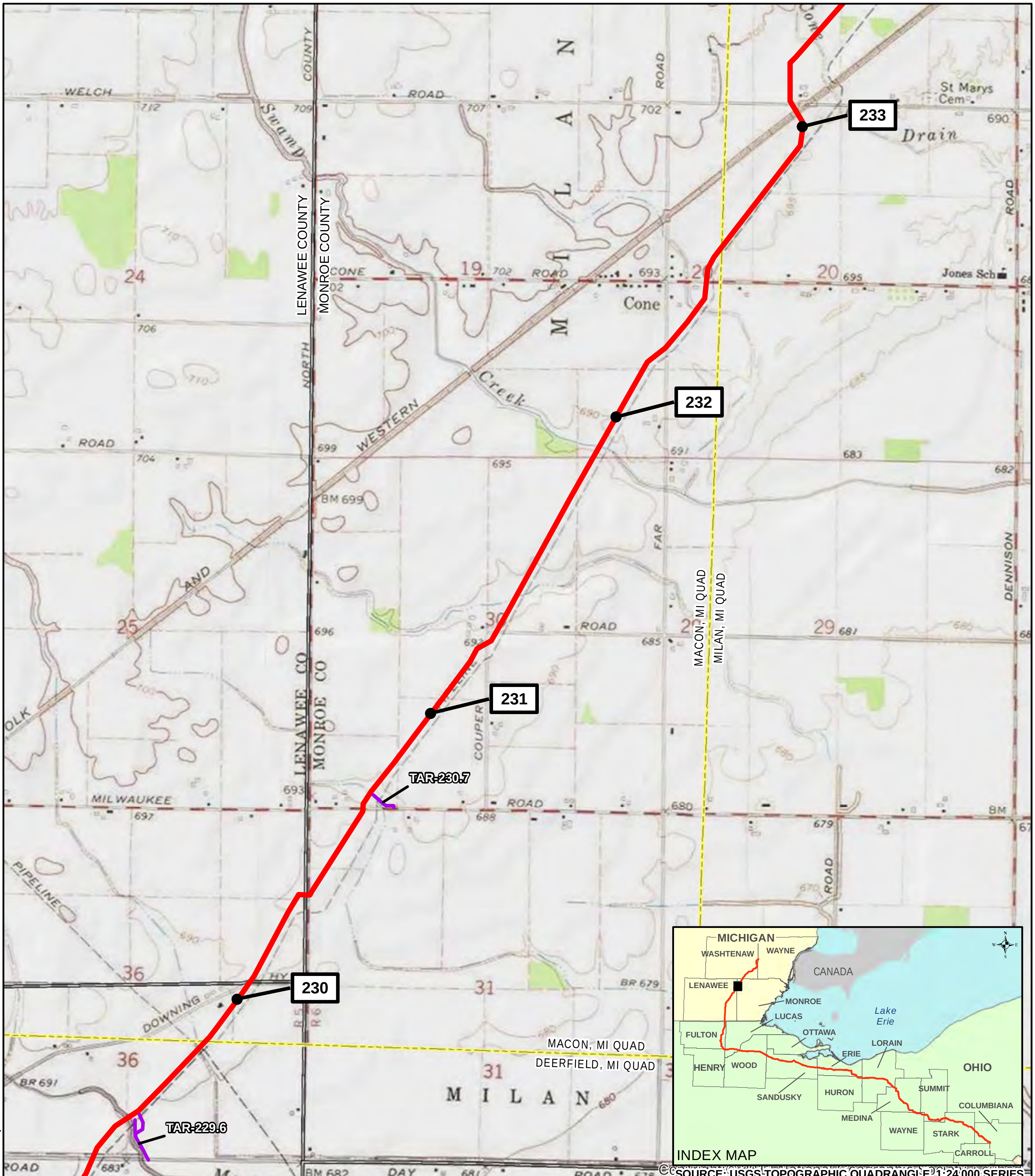
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: LENAWEE COUNTY, MI

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-74	MAP 74 of 81	REV. B

I.G.

NEXUS GAS TRANSMISSION



Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: LENAWEE COUNTY, MI; MONROE COUNTY, MI				
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-75	MAP 75 of 81	REV. B

I.G.

NEXUS SM
GAS TRANSMISSION

Coordinate System: NAD 1983 UTM Zone 17N Foot US

1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

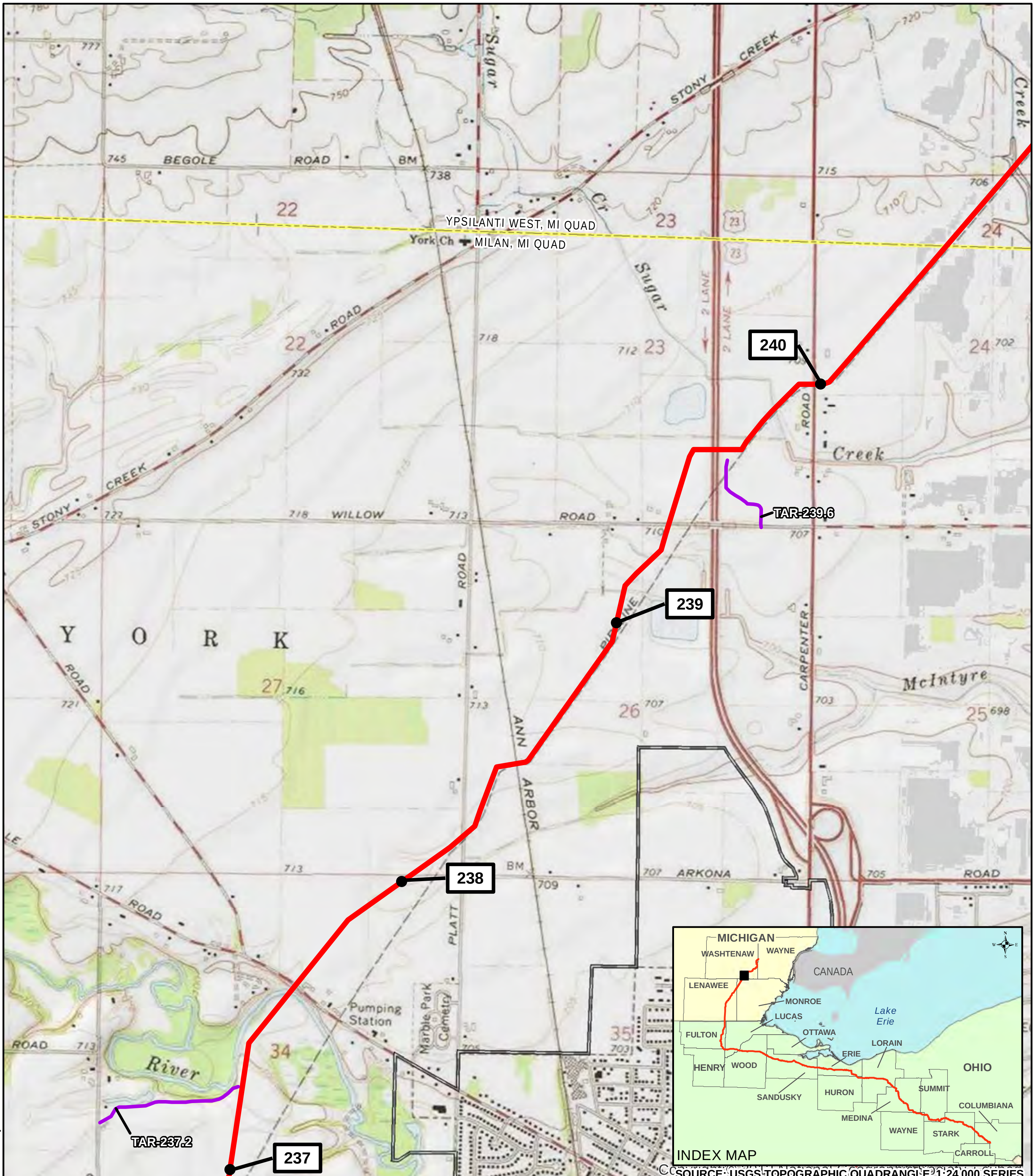
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: MONROE COUNTY, MI: WASHTENAW COUNTY, MI

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-76	MAP 76 of 81	REV. B

I.G.

NEXUS GAS TRANSMISSION



Coordinate System: NAD 1983 UTM Zone 17N Foot US

- 1 MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

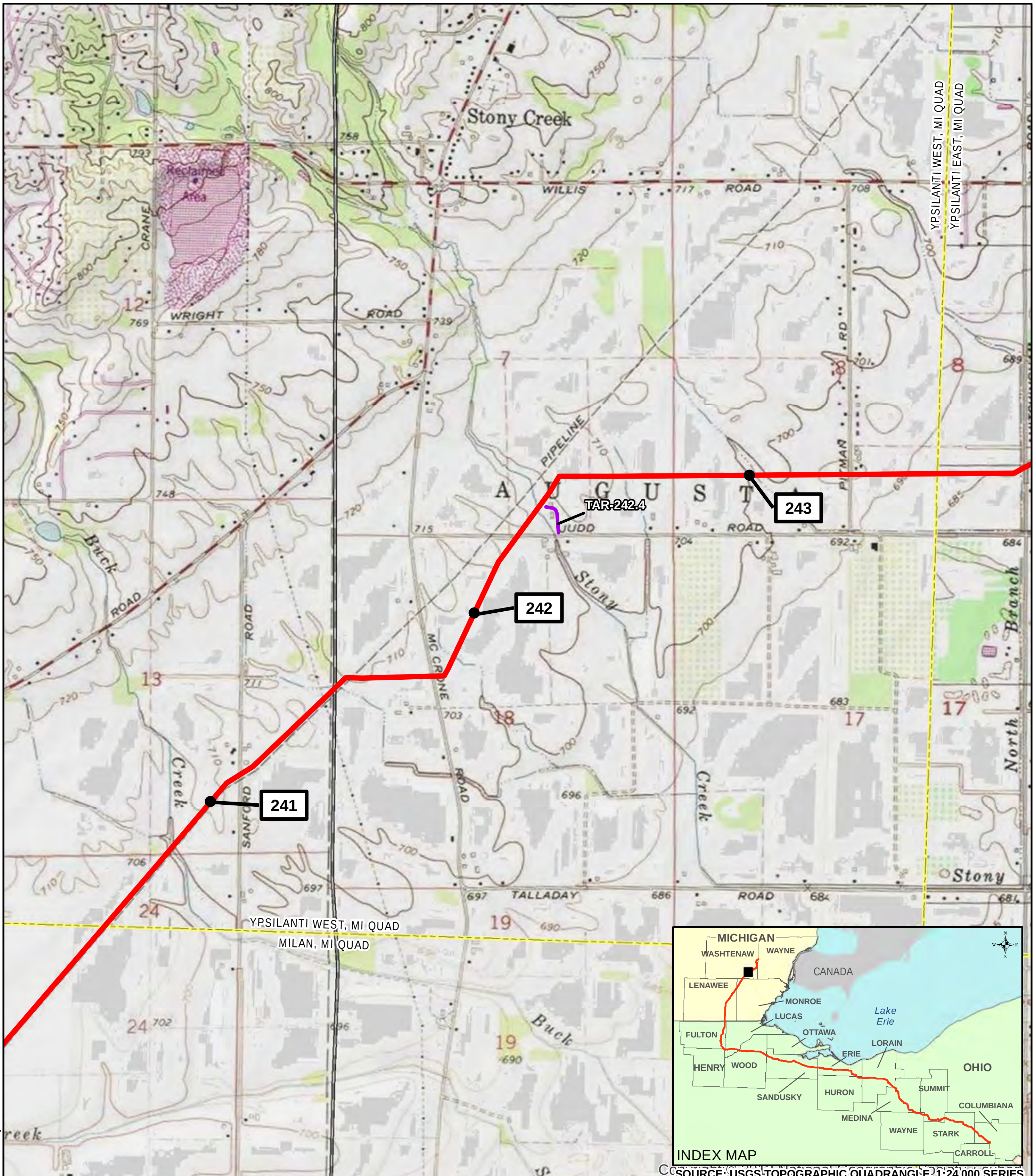
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: WASHTENAW COUNTY, MI

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.	
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-77	MAP 77 of 81	REV. B

I.G.

NEXUS GAS TRANSMISSION



1	MILEPOST - LEGEND
	PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
	PROPOSED MAINLINE VALVE
	PROPOSED PIPELINE LAUNCHER
	PROPOSED PIPELINE RECEIVER
	PROPOSED TAP
	PROPOSED PERMANENT ACCESS ROAD (PAR)
	PROPOSED TEMPORARY ACCESS ROAD (TAR)
	PROPOSED MAINLINE PIPELINE
	PROPOSED INTERCONNECTING PIPELINE
	PROPOSED METERING & REGULATION STATION (M&R)
	PROPOSED COMPRESSOR STATION SITE
	PROPOSED WARE YARD
	EXISTING FACILITY
	USGS QUADRANGLE BOUNDARY
	COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N W E S

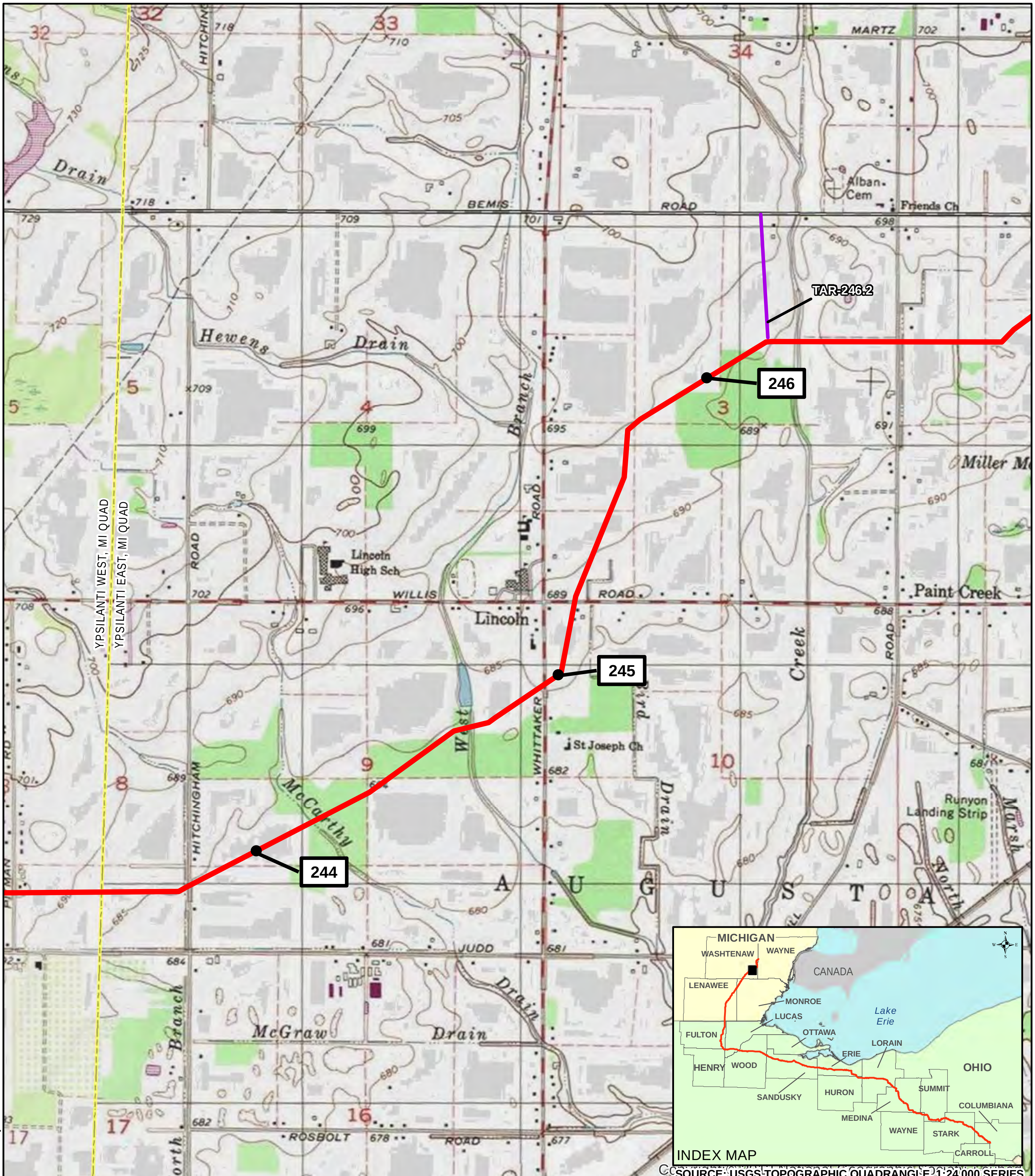
TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: WASHTENAW COUNTY, MI

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-78	MAP 78 of 81 / REV. B

I.G.

NEXUS SM
GAS TRANSMISSION



1 MILEPOST - LEGEND
PROPOSED PIPELINE VALVE (WITHIN COMPESSOR STATION)
PROPOSED MAINLINE VALVE
PROPOSED PIPELINE LAUNCHER
PROPOSED PIPELINE RECEIVER
PROPOSED TAP
PROPOSED PERMANENT ACCESS ROAD (PAR)
PROPOSED TEMPORARY ACCESS ROAD (TAR)
PROPOSED MAINLINE PIPELINE
PROPOSED INTERCONNECTING PIPELINE
PROPOSED METERING & REGULATION STATION (M&R)
PROPOSED COMPRESSOR STATION SITE
PROPOSED WARE YARD
EXISTING FACILITY
USGS QUADRANGLE BOUNDARY
COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

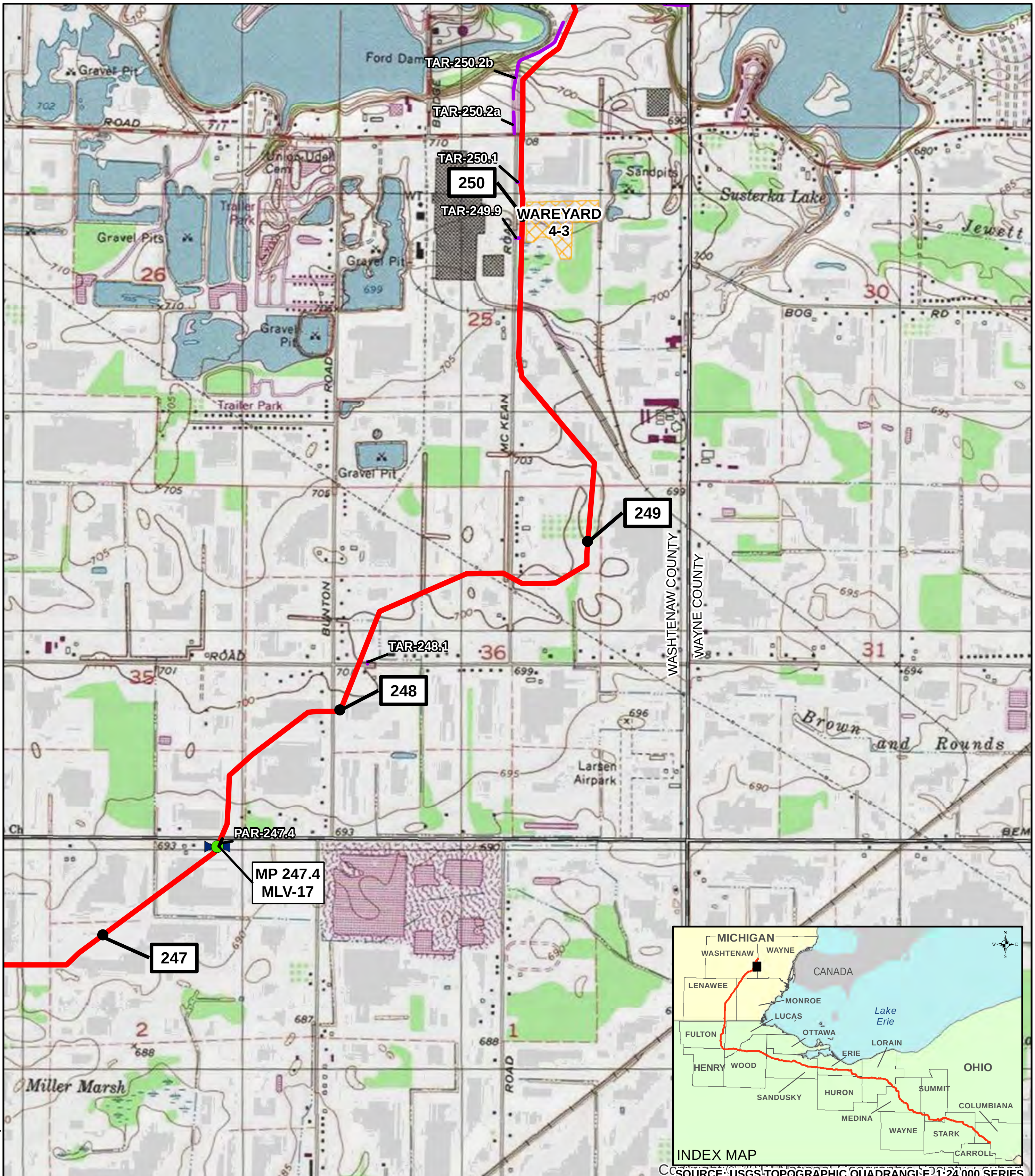
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: WASHTENAW COUNTY, MI			
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-79	MAP 79 of 81 — REV. B

I.G.



Coordinate System: NAD 1983 UTM Zone 17N Foot US

MILEPOST - LEGEND	PROPOSED PERMANENT ACCESS ROAD (PAR)	PROPOSED WARE YARD
PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)	PROPOSED TEMPORARY ACCESS ROAD (TAR)	EXISTING FACILITY
PROPOSED MAINLINE VALVE	PROPOSED MAINLINE PIPELINE	USGS QUADRANGLE BOUNDARY
PROPOSED PIPELINE LAUNCHER	PROPOSED INTERCONNECTING PIPELINE	COUNTY BOUNDARY
PROPOSED PIPELINE RECEIVER	PROPOSED METERING & REGULATION STATION (M&R)	
PROPOSED TAP	PROPOSED COMPRESSOR STATION SITE	

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

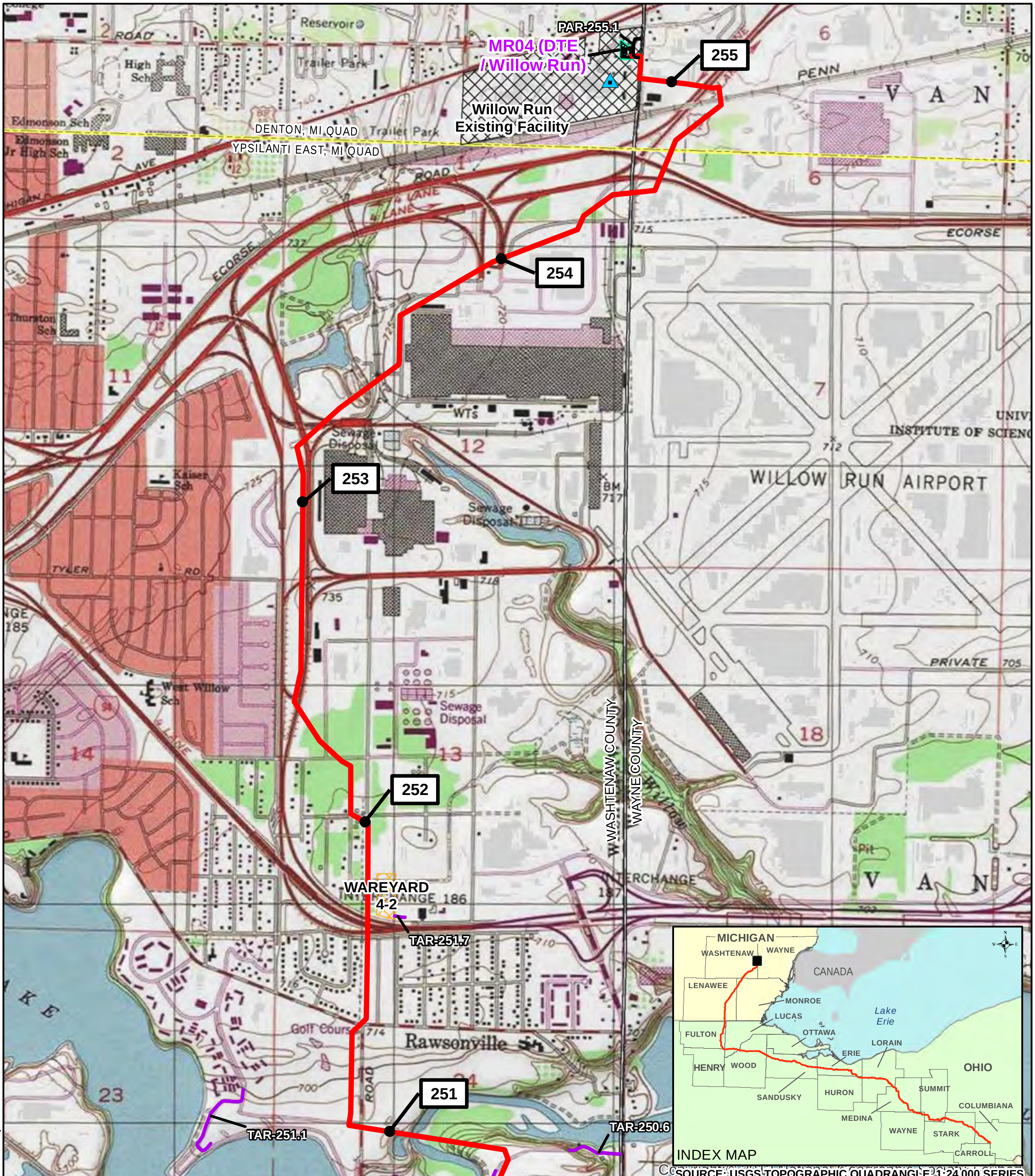
N W E S

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

NEXUS GAS TRANSMISSION

LOC.: WASHTENAW COUNTY, MI			
CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-80	MAP 80 of 81 — REV. B

I.G.



SOURCE: USGS TOPOGRAPHIC QUADRANGLE, 1:24,000 SERIES

Coordinate System: NAD 1983 UTM Zone 17N Foot US

- MILEPOST - LEGEND
- PROPOSED PIPELINE VALVE (WITHIN COMPRESSOR STATION)
- PROPOSED MAINLINE VALVE
- PROPOSED PIPELINE LAUNCHER
- PROPOSED PIPELINE RECEIVER
- PROPOSED TAP
- PROPOSED PERMANENT ACCESS ROAD (PAR)
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED MAINLINE PIPELINE
- PROPOSED INTERCONNECTING PIPELINE
- PROPOSED METERING & REGULATION STATION (M&R)
- PROPOSED COMPRESSOR STATION SITE
- PROPOSED WARE YARD
- EXISTING FACILITY
- USGS QUADRANGLE BOUNDARY
- COUNTY BOUNDARY

NOTES:
1. TEMPORARY ACCESS ROADS CONNECT TO TWS OR ATWS.
2. PERMANENT ACCESS ROADS CONNECT TO THE PERMANENT EASEMENT.

0 1,000 2,000 Feet

N S W E

TITLE: NEXUS GAS TRANSMISSION PROJECT
PROPOSED PIPELINE - USGS QUAD MAP

LOC.: WASHTENAW COUNTY, MI

CKD. BY: CPA	ENG.	DATE: 7/27/2015	W.O.
DRN. BY: KM	SCALE: 1 " = 2,000 '	FIGURE 1.1.1-81	MAP 81 of 81 / REV. B

I.G.

NEXUS GAS TRANSMISSION

APPENDIX 1B

- **1B1 - Erosion and Sediment Control Plan**
- **1B2 - Spill Prevention Control and Countermeasure Plan**
- **1B3 – NEXUS Blasting Plan**
- **1B4 – Drain Tile Mitigation Plan**
- **1B5 – Fugitive Dust Plan**
- **1B6 – Winter Construction Plan**
- **1B7 – Invasive Plant Species Management Plan**

APPENDIX 1B1

Erosion and Sediment Control Plan

EROSION AND SEDIMENTATION CONTROL PLAN

Company:	NEXUS Gas Transmission, LLC
Project:	NEXUS Gas Transmission Project
Location:	Ohio and Michigan

Prepared by: NEXUS Gas Transmission, LLC
Environmental Construction Permitting
5400 Westheimer Court
Houston, Texas 77056-5310

Effective February 18, 2003

Updated January 2015

NEXUS GAS TRANSMISSION

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NEXUS GAS TRANSMISSION

LIST OF FIGURES, continued

DEFINITIONS

7(c) – Activities authorized under a project-specific Certificate of Public Convenience and Necessity from the Federal Energy Regulatory Commission (FERC), pursuant to Section 7(c) of the Natural Gas Act, to transport or sell natural gas, as well as construct, acquire, extend, alter or operate specific natural gas facilities that provide natural gas service.

Abandonment – Permanent reduction in the availability for service of a FERC jurisdictional facility, including facility modifications which would result in changes to certificated parameters (e.g., permanently operating compressors at lower than certificated horsepower or pipelines at lower than certificated design pressures) as well as changes in operating status (e.g., abandoned-in-place, idled and not maintained, decommissioned or removed facilities). Abandonment of pipe or facilities may be authorized under the blanket certificate or a project-specific Order of Abandonment by FERC, in accordance with Section 7(b) of the Natural Gas Act.

Agricultural Land – Actively cultivated and rotated land used for the production of crops including but not limited to corn, grains, orchards, vineyards and hayfields.

Blanket Certificate Project – Blanket certificate authorization is obtained from FERC by the Company and allows the Company to construct, modify, acquire, operate, and abandon a limited set of natural gas facilities, and offer a set of services without the need for further activity-specific certificate authorizations. Regulations for FERC's Blanket Certificate program are provided under Title 18 CFR Part 157, Subpart F. Examples of these projects include, but is not limited to, pipe replacements requiring new permanent right-of-way (ROW) or temporary workspace outside of the original construction footprint, miscellaneous pipe rearrangements, new receipt and delivery points, abandonments, temporary compression facilities, underground storage field remediation and maintenance activities, and underground storage testing and development activities.

Chief Inspector – Person, designated by the Company, responsible for the quality assurance of construction activities on a project by managing on-site project inspection staff and ensuring the construction contractor meets the requirements of the Company's construction specifications, permits, and any plans and drawings related to specific construction activities. All inspectors on the project report to the Chief Inspector and the Chief Inspector reports to the Company's Construction Superintendant.

Clearance Package/Permit Book – The document issued by the Company's Environmental Construction Permitting (ECP) Department that contains all of the necessary environmental permits, clearances, plans and other requirements specific to a project. The Clearance Package/Permit Book is also included as part of the construction contract.

Deviation – A change to the placement of work limits, structures specified in the construction drawings, or changes in the design of control measures as set forth in the E&SCP, with the exception of minor variations from specifications in the typical E&SCP figures (refer to Appendix A) that are required due to site-specific conditions and which are designed to achieve an equivalent or greater degree of environmental protection.

Environmental Inspector (EI) – On-site Company representative responsible for inspecting and verifying site compliance with environmental conditions identified in the E&SCP as well as project-specific terms and conditions contained within the Clearance Package / Permit Book. The environmental inspector will perform the duties that are outlined in Section 2.1 of this plan.

Ephemeral stream – Waterbody which flows water only during precipitation events in a typical year and for a short duration after the events. Runoff from rainfall is the primary source of water for stream flow. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream.

Intermediate waterbody – Defined by FERC as a waterbody greater than 10 feet wide but less than or equal to 100 feet wide, measured from water's edge to water's edge at the time of construction.

Intermittent stream – Waterbody which flows during certain times of the year when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Line List – A list prepared by the Company of project-specific instructions for all properties affected by the project, specifying each property owner, the length of crossing, and any special instructions or restrictions for construction crew(s).

Major waterbody – Defined by FERC as a waterbody greater than 100 feet wide, measured at the water's edge at the time of construction.

Minor waterbody – Defined by FERC as a waterbody less than or equal to 10 feet wide, measured at the water's edge at the time of construction.

Pasture – Non-forested land used for grazing of domesticated livestock (horses, cattle, sheep, etc.). Pasture receives periodic renovation and treatments such as tillage, fertilization, mowing, weed control, and may be irrigated. Typical vegetation consists primarily of grasses, herbaceous plants, legumes, and forbs.

Perennial stream – Waterbody which flows water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow and runoff from rainfall is a supplemental source of water for stream flow.

Riparian area – Ecosystems that occupy the transitional zone between terrestrial and aquatic ecosystems. Typical examples of riparian areas include floodplains, streambanks, and lakeshores.

Spill Prevention, Control and Countermeasure Plan /
Preparedness, Prevention and Contingency Plan for Construction Projects (SPCC / PPC Plan) – Company document that contains measures to prevent or reduce the risk of spills or accidental exposure of oil or hazardous materials associated with construction activities, as well as procedures to be employed in the event of a spill, including measures that provide for prompt and effective cleanup of spills, notifications and proper disposal of waste generated during cleanup.

State-designated waterbody – Waterbodies specifically identified or recognized by the States or authorized Indian Tribe for water use, value or quality. Designations take into consideration the protection and propagation fish, shellfish and wildlife, as well as use and value for public water supplies, agricultural, industrial, recreational and other purposes, such as navigation. FERC's Procedures contain specific requirements with regards to state-designated fisheries.

Sensitive resource area – Areas (defined by FERC) that include wetlands, waterbodies, cultural resource sites, or sensitive species habitats.

Take up-and-Relay Pipeline Construction – Also called "lift and relay", Company construction terminology for the removal of existing pipe and installation of new pipe at the same alignment within the existing permanent easement.

Wetland – Areas that are inundated or saturated by surface or groundwater at a frequency or duration sufficient to support and, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Types of wetlands include swamps, marshes, bogs, sloughs, wet meadows, mudflats and natural ponds.

Waterbody – Any natural or artificial stream, river, or drainage with perceptible flow at the time of crossing during construction, as well as other permanent waterbodies such as ponds and lakes.

NEXUS GAS TRANSMISSION

1. INTRODUCTION

1.1 Purpose of this Plan

This Erosion and Sedimentation Control Plan (E&SCP) has been prepared for use by the Company and its contractors as a guidance manual for minimizing erosion of disturbed soils and transportation of sediments off the construction ROW and into sensitive resource and residential areas during natural gas construction projects. The procedures developed in this plan, which represent the Company's best management practices, are designed to accommodate varying field conditions while achieving compliance with regulatory requirements and protecting environmentally sensitive areas.

This E&SCP is designed to provide guidelines, best management practices and typical techniques for the installation and implementation of soil erosion and sediment control measures while permitting adequate flexibility to use the most appropriate best management practice measures based on site-specific conditions. The intent of the E&SCP is to provide general information on the pipeline construction process and sequence, and to describe specific measures that will be employed during and following construction to minimize impacts to the environment.

Figures provided in Appendix A of this plan illustrate typical and minimum requirements of best management practices for design and utilization of construction workspace areas, access roads and erosion controls, as well as construction methods for special use areas (e.g., agricultural and residential land) and crossing of features during pipeline construction, including wetlands, waterbodies and roads. References to specific figure numbers provided in Appendix A are indicated throughout the E&SCP.

The goal of the E&SCP is to preserve the integrity of environmentally sensitive areas and to maintain existing water quality by:

- Minimizing the extent and duration of disturbance;
- Diverting runoff to stabilized areas;
- Installing temporary and permanent erosion control measures; and
- Establishing an effective inspection and maintenance program.

The E&SCP is intended to be used on Company projects that have been authorized by Federal Energy Regulatory Commission (FERC) pursuant to Section 7(b) and/or 7(c) of the Natural Gas Act to construct, acquire, alter, abandon or operate gas facilities or to provide gas services. This plan is also intended to be used for projects that are conducted under Company's blanket certificate which are regulated under 18 CFR Part 157, Subpart F. All blanket certificate projects that involve ground disturbance or changes to operational air and noise emissions are subject to the FERC's standard environmental conditions, including adherence to FERC's *Upland Erosion Control, Revegetation and Maintenance Plan* (Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures), May 2013 Version.

1.2 Guidelines and Requirements

The measures described in this E&SCP have been developed based on guidelines from the FERC, United States Army Corps of Engineers (COE), the United States Fish and Wildlife Service, the United States

Department of Agriculture, the Natural Resource Conservation Service, and various state agencies as well as from the Company's significant experience and practical knowledge of pipeline construction and effective environmental protection measures. Lessons and insights gained during pipeline construction projects and comments from agency representatives are also incorporated into this E&SCP.

In accordance with FERC regulations, projects under the jurisdiction of Section 7 or the Company's blanket certificate are required to comply with the FERC's Plan and Procedures unless written approval to deviate from the Plan or Procedures is received from the Director of the Office of Energy Projects and the appropriate state agency. This revised version of the E&SCP is consistent with the requirements of FERC's Plan and Procedures (May 2013 version).

If conflicts or differences occur between project-specific conditions of appropriate federal and state agencies and the best management practices described in this E&SCP, consult with the Company Environmental Construction Permitting Department (ECP) representative or ECP Lead. The more stringent or site-specific requirement is typically applicable unless otherwise approved by ECP. With the exception of minor variations from the typical figures that may be required due to site-specific conditions and are designed to achieve an equivalent or greater degree of environmental protection, any deviations from the construction drawings or changes in the design of control measures as set forth in this E&SCP must be approved by the Company's ECP Lead and the appropriate permitting agency prior to implementation. Measures and practices identified within this plan are to be implemented during construction unless otherwise specified by project-specific permit conditions.

1.3 Surveys, Permits & Notifications

The Company shall perform the required environmental field surveys and acquire the necessary environmental permits, clearances and authorizations prior to start of construction of the project. The Company shall notify the appropriate federal, state, and local agencies prior to, during, and/or subsequent to the construction of the project, as identified in the Clearance Package/Permit Book.

1.4 Inquiries

Inquiries regarding this E&SCP should be addressed to the ECP Department at the address shown on the front cover. For field conditions requiring an immediate response, contact the designated person responsible at the address shown on the front cover.

2. SUPERVISION AND INSPECTION

To effectively mitigate project-related impacts, the E&SCP must be properly implemented in the field. Quick and appropriate decisions in the field regarding critical issues such as stream and wetland crossings, placement of erosion controls, trench dewatering, spoil containment, and other construction-related items are essential.

To ensure that the E&SCP is properly implemented, at least one Environmental Inspector (EI) will be designated by the Company for each construction spread during active construction or restoration activities. The EI is responsible for verifying environmental compliance on the construction spread, and performing the duties that are outlined in Section 2.1 below.

2.1 Role & Responsibilities of the Environmental Inspector

EIs will have the authority to stop activities that violate the environmental conditions of the FERC's Orders (if applicable), stipulations of other environmental permits or approvals, or landowner easement agreements, as well as order appropriate corrective action.

The EI will have peer status with all other activity inspectors and will report directly to the Chief Inspector who has overall authority on the construction spread or project.

The number and experience of EIs assigned to each construction spread shall be appropriate for the length of the construction spread and the number/significance of resources affected. On 7(c) and other large construction projects, the person designated as the EI will typically be a dedicated role for each construction spread. On blanket certificate projects and any other small construction activities carried out under this E&SCP, the EI role may be carried out by the Chief Inspector or another designated and properly trained Company Inspector on site, at the discretion of the Company. In such instances, the Company may employ additional periodic oversight of the EI by an environmental specialist.

At a minimum, the EI shall be responsible for:

1. Inspecting construction activities for compliance with the requirements of this E&SCP, the construction drawings, the environmental conditions of the FERC's Orders (if applicable), proposed mitigation measures, other federal or state and local (if applicable) environmental permits and approvals, and environmental requirements in landowner easement agreements;

2. Identifying, documenting, and overseeing corrective actions, as necessary to bring an activity back into compliance;

3. Verifying that the limits of authorized construction work areas and locations of access roads are visibly marked before clearing, and maintained throughout construction;

4. Verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, including waterbodies and wetlands, or areas with special requirements along the construction work area;

5. Identifying erosion/sediment control and soil stabilization needs in all areas;

6. Ensuring that the design of slope breakers will not cause erosion or direct water into sensitive resource areas, including cultural resource sites, wetlands, waterbodies and sensitive species habitats;

7. Verifying that dewatering activities are properly monitored and do not result in the deposition of sand, silt, and/or sediment into sensitive resource areas, including wetlands, waterbodies, cultural resource sites, and sensitive species habitat; stopping dewatering activities if such deposition is occurring and ensuring the design of the discharge is changed to prevent reoccurrence; and verifying that dewatering structures are removed after completion of dewatering activities;

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

9. Advising the Chief Inspector when environmental conditions (such as wet weather, severe storm events or frozen soils) make it advisable to restrict or delay construction activities to avoid topsoil mixing excessive compaction;

10. Ensuring restoration of contours and topsoil;

11. Verifying that the soils imported for agricultural or residential use have been certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner, and is considered clean and free of hazardous materials;

12. Ensuring that the appropriate erosion/sediment control and stabilization needs are implemented in all areas, including ensuring that erosion and sediment controls are properly installed and maintained daily to prevent sediment flow into sensitive resource areas (e.g., wetlands, waterbodies, cultural resource sites, and sensitive species habitats) and onto roads, and determining the need for additional erosion control devices;

13. Inspecting and ensuring the maintenance of temporary erosion and sediment control measures at least:
    a. On a daily basis in areas of active construction or equipment operation;
    b. On a weekly basis in areas with no construction or equipment operation; and
    c. Within 24 hours of each 0.5 inch of rainfall.

14. Ensuring the repair of all ineffective temporary erosion and sediment control measures within 24 hours of identification, or as soon as conditions allow if compliance with this time frame would result in greater environmental impacts;

15. Identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase;

16. Ensuring proper seed mixes, rates and restoration methods are used, and obtaining documentation;

17. Ensuring that the Contractor implements and complies with the Company's *Spill Prevention, Control and Countermeasure Plan & Preparedness, Prevention and Contingency Plan for*

Construction Projects (SPCC/PPC Plan), the Company's *Waste Management Plan,* and other Company environmental documents and standard operating procedures;

18. Verifying that locations for any disposal of excess construction materials for beneficial reuse comply with this E&SCP and any applicable permits / clearances; and,

19. Keeping records of compliance with the environmental conditions of the FERC's Orders and the mitigation measures proposed by the Company in the application submitted to the FERC (if applicable), and other federal or state environmental permits during active construction and restoration. Records should include photo documentation.

2.2 Environmental Training for Construction

Environmental training will be given to both the Company personnel and contractor personnel whose activities have the potential to impact the environment during pipeline construction. All construction personnel from the Chief Inspector, EI, craft inspectors, contractor job superintendent to loggers, welders, equipment operators, and laborers will be given some form of environmental training. The level of training will be commensurate with the type of duties of the personnel. At the discretion of the Company, environmental training for personnel may also be required on projects where it is not required by FERC.

Training will be given prior to the start of construction and throughout the construction process, as needed, and will cover the following issues:

- Specifics of this E&SCP and other Company plans;
- Job or activity specific permit requirements;
- Company policies and commitments;
- Cultural resource procedures and restrictions;
- Threatened and endangered species procedures and restrictions; and
- Any other pertinent information related to the job.

In addition to the EI, all other construction personnel are expected to play an important role in maintaining strict compliance with all permit conditions, and to promptly report any conditions that are perceived as having the potential to threaten environmental protection to the appropriate inspector during construction.

3. CONSTRUCTION TECHNIQUES FOR NATURAL GAS FACILITIES

3.1 Typical ROW Requirements

Pipeline construction workspace requirements are a function of pipe diameter, equipment size, topography, geological rock formations, location of construction such as at road crossings or river crossings, pipeline crossovers, methods of construction such as boring or open-cut construction, or existing soil conditions encountered during construction. As the diameter of the pipeline being installed increases, so does the depth of trench, excavated spoil material, equipment size, and ultimately the amount of construction work space that will be required to construct a project. See Figure CW-1 for a detail of a typical trench and Figures CW-3, CW-4 and CW-5 for typical construction ROW widths. All workspace locations for a given project will be shown on the construction drawings.

Additional construction ROW may be required at specific locations including, but not limited to, steep side or vertical slopes, road crossings, pipeline crossovers, areas requiring supplemental topsoil segregation, and staging areas associated with wetland and waterbody crossings. In particular, as shown on the construction drawings, the construction ROW width may be expanded up to 25 feet for the following situations / areas without approval from the FERC, however, prior approval is required from the EI or ECP:

- Accommodate full construction ROW topsoil segregation;
- Ensure safe construction where topographic conditions, such as side-slopes, or soil limitations exist; and
- Facilitate truck turn-arounds where no reasonable alternative access exists in limited, upland, non-riparian or non-forested areas.

All construction activities, including staging areas and additional spoil storage areas, are restricted to the construction ROW limits identified on the construction drawings, except for specific activities in limited, non-wetland and non-riparian areas that are allowed by the FERC Plan and Procedures (i.e. slope breakers, energy-dissipating devices, dewatering structures, and drain tile system repairs). Use of these limited areas is subject to landowner or land management agency approval and compliance with all applicable survey, permit, and reporting requirements; therefore, prior Company approval is required to use these areas. In some cases, federal, state and local permits and authorizations may require additional approvals.

Minor field realignments and workspace shifts per landowner needs and requirements are only allowed if construction activities remain within the environmental field survey area, comply with project-specific environmental permits and landowner easements, and do not affect new landowners or sensitive resource areas.

3.2 Access Roads & Access Points

To the extent practical, all access to the construction ROW will be limited to existing roads and will be minimized in wetlands. However, additional access roads to the construction ROW may be required at various points along the project where other road crossings (paved or gravel state/local roads) do not exist. Examples of types of access used include pipeline ROWs, abandoned town roads, railroad ROWs, power line service roads, logging roads and farm roads. Improvements to access roads (i.e., grading, placing gravel, replacing/installing culverts, and trimming overhanging vegetation) may be required due to the size and nature of the equipment that would utilize the road (Figure RD-1). The following conditions apply to the use of all access roads:

1. During construction and restoration activities, access to the ROW is limited to the use of new or existing access roads identified on the construction drawings.

2. The only access roads that can be used in wetlands, other than the construction ROW, are those existing roads requiring no modification or improvements, other than routine repair, and posing no impact on the wetland.

3. The construction ROW may be used for access across wetlands when the wetland soil is firm enough to avoid rutting or the construction ROW has been appropriately stabilized to avoid rutting (e.g., with timber riprap, prefabricated equipment mats, or terra mats). However, access is not allowed through wetlands that are specifically being avoided by HDD or would not otherwise be impacted by the project.

4. In wetlands that cannot be appropriately stabilized, all construction equipment other than that needed to install the wetland crossing shall use access roads located in upland areas. Where access roads in upland areas do not provide reasonable access, limit all other construction equipment to one pass through the wetland using the construction ROW.

5. Blanket certificate projects may not have construction drawings available in which case access to the ROW will be identified in the Clearance Package / Permit Book.

6. Maintain safe and accessible conditions at all road crossings and access points during construction and restoration. Access road maintenance through the construction sequence may include grading and the addition of gravel or stone when necessary.

7. Maintain access roads in a stable manner to prevent off-ROW impacts, including impacts to adjacent and/or nearby sensitive resource areas, and implement all appropriate erosion and sediment control measures for construction/improvement of access roads.

8. Minimize the use of tracked equipment on public roadways.

9. Remove any soil or gravel spilled or tracked onto roadways daily or more frequent as necessary to maintain safe road conditions.

10. Repair any damages to roadway surfaces, shoulders, and bar ditches.

11. If crushed stone/rock access pads are used in residential or agricultural areas, stone shall be placed on synthetic, nonwoven geotextile fabric to facilitate removal after construction (Figure RD-2).

12. All access roads across a waterbody must use an equipment bridge in accordance with Section 5.1.2.

13. For access through a saturated wetland, use timber mats or an equivalent, unless otherwise authorized by agency permits (Figure RD-3).

14. Limit construction equipment operating in wetland areas to that needed to clear the ROW, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the construction ROW. All other construction equipment shall use access roads located in upland areas to the maximum extent practical.

3.3 Pipe and Contractor Wareyards

Pipe and contractor wareyards are required for storing and staging equipment, pipe, fuel, oil, pipe fabrication, and other construction-related materials and preparations. The Contractor shall perform the following measures at pipe and contractor wareyards:

1. Strip and segregate topsoil in agricultural lands;
2. Install erosion and sediment control structures as directed by the EI or identified on the construction drawings, and as outlined in this E&SCP and the SPCC/PPC Plan. Maintain controls throughout construction and restoration activities;
3. Implement and comply with the SPCC/PPC Plan and the Waste Management Plan, including the completion of any required site-specific forms and attachments; and,
4. Restore and revegetate all disturbed areas in accordance with the measures outlined in this E&SCP, landowner agreements and/or as directed by the EI. At a minimum, the area must be returned to preconstruction contours and stabilized prior to contractor demobilization.

3.4 Off-ROW Disturbance

All construction activities are restricted to the construction ROW limits identified on the construction drawings, except for specific activities in limited, non-wetland and non-riparian areas that are allowed by the FERC Plan and Procedures. Activities allowed to occur off-ROW are limited to the installation of slope breakers, energy-dissipating devices and dewatering structures, as well as repairs to drain tile. Minor field realignment and workspace shifts per landowner needs and requirements are only allowed if construction activities remain within the environmental field survey area, maintain compliance with project-specific environmental permits and landowner easements, do not affect new landowners or environmental resources, and do not require the operation of heavy equipment off ROW. In the event that inadvertent off-ROW disturbance occurs, the following measures will be implemented:

1. The EI will immediately report the occurrence to the Chief Inspector and ROW Agent;
2. The conditions that caused the disturbance will be evaluated by the Chief Inspector and the EI, and they will determine whether work at the location can proceed under those conditions; and
3. If determined to be necessary by the Chief Inspector and EI, one or more of the following corrective actions will be taken: immediate restoration of the preconstruction contours, seeding and mulching of the disturbed area, and/or installation of erosion or sediment control devices, conduct additional tailgate or employee/contractor training, and investigation of the issue to develop lessons learned for future issue prevention.
4. The Company's ECP Department will be notified.

3.5 Construction Sequence for Pipeline Installation

Natural gas pipelines are installed using conventional overland buried pipeline construction techniques. These activities are necessary for the installation of a stable, safe, and reliable transmission facility consistent with U.S. Department of Transportation (U.S.DOT) requirements and regulations. This section provides an overview of the equipment and operations necessary for the installation of a natural gas pipeline, describes potential impacts that may occur from each operation, and identifies the measures that will be implemented to control these potential impacts. This section also discusses in detail the erosion and sediment control techniques that typically apply to each construction activity including clearing, grading, trenching, lowering-in of pipe, backfilling, and hydrostatic testing. Pipe abandonment in-place or removal, which may be associated with a pipeline replacement activity or occur as an independent activity on an existing pipeline, are also covered at the end of this section. ROW restoration is the final step in the typical construction sequence and will be addressed in Section 3.6.

Installation of the pipeline typically proceeds in a linear manner from one end of the construction spread to the other in an assembly line or "mainline" fashion. However, different stages may be running in parallel on different physical segments of the project. In some cases, this means that full completion of one of the construction sequence stages described below may not occur before the next construction sequence stage is initiated. Construction sequencing should be planned to limit the amount and duration of open trench sections, as necessary, to prevent excessive erosion or sediment flow into sensitive environmental resource areas. This is due to the Company's effort to adhere to strict construction schedules in order to minimize safety concerns, landowner effects, and environmental disturbance. The spacing between the individual crews responsible for each interdependent activity is based on anticipated rate of linear progress. The activities listed below are typically performed in the following sequence:

- Surveying and flagging the ROW;
- Clearing the ROW;
- Installing temporary sediment barriers;
- Grading the ROW;
- Installing temporary slope breakers;
- Trenching/excavating the trench;
- Pipe stringing and bending;
- Welding and weld inspection;
- Lowering the pipe into the trench;
- Backfilling the trench;
- Hydrostatic testing of pipe; and
- ROW restoration and clean-up.

Obstacles to the mainline technique are often encountered and are not considered to be out of the ordinary. These obstacles, which include side hill crossings, rock, wetlands, streams, roads and residential areas, do not normally interrupt the assembly line flow.

3.5.1 Clearing & Flagging

Clearing operations include the removal of vegetation within the construction ROW. Various clearing methods are employed depending on tree size, contour of the land, and the ability of the ground to support clearing equipment. Vegetative clearing can be accomplished either by hand or by cutting equipment. The following procedures will be standard practice during clearing:

1. Prior to beginning the removal of vegetation,
    a. The limits of clearing will be established and visibly marked before clearing;
    b. Signs and highly visible flagging will also be used to mark the boundaries of sensitive resource areas, including waterbodies and wetlands, and/or areas with special requirements along the construction work area, in accordance with the construction drawings;
    c. Flagging or marking shall be maintained throughout construction;
    d. Trees to be protected per landowner requests or as otherwise directed will be clearly marked;
2. All construction activities and ground disturbance will be confined to within the construction ROW shown on the construction drawings (with the limited exception of compliance activities described above in Section 3.4);
3. All brush and trees will be felled into the construction ROW to minimize damage to trees and structures adjacent to the ROW. Trees that inadvertently fall beyond the edge of the ROW will be immediately moved onto the ROW and disturbed areas will be immediately stabilized, per landowner approval;
4. Trees will be chipped and removed or cut into lengths identified by the landowner and then stacked at the edge of the ROW or removed. Trees may be burned depending on local and state restrictions, applicable permits, construction Line List stipulations, and landowner agreements;
5. Brush and limbs may be disposed of in one or more of the following ways depending on local restrictions, applicable permits, construction Line List stipulations, and landowner agreements:
    a. Stockpiled along the edge of the ROW;
    b. Burned;
    c. Chipped, spread across the ROW in upland areas, and plowed in at the discretion of the Chief Inspector or EI (excess material must be removed);
    d. Used as part of erosion control mix material; or
    e. Hauled off site to a Company-approved location.
6. Existing surface drainage patterns shall not be altered by the placement of timber or brush piles at the edge of the construction ROW.

3.5.2 Temporary Sediment Barriers

Sediment barriers, which are temporary sediment controls intended to minimize the flow and deposition of sediment beyond approved workspaces or into sensitive resource areas, shall be installed following vegetative clearing operations. They may be constructed of materials such as silt fence, staked straw bales, compacted earth (e.g., drivable berms across travel lanes), sand bags, or other appropriate materials (Figures EC-1, EC-2, EC-3 and EC-5). Where allowed by regulatory agencies, hay bales may be used in lieu of straw bales with the following restrictions**:** hay bales shall not be used for mulching and the Contractor is responsible for their removal and disposal.

1. Install temporary sediment barriers at the base of slopes greater than 5% where the base of the slope is less than 50 feet from a road crossing, waterbody and/or wetland in accordance with Sections 5.1.4 and 6.3 respectively.
2. Do not stake or trench in place straw bales used on equipment bridges or on mats across the travel lane.
3. Inspect temporary sediment barriers daily in areas of active construction to ensure proper functioning and maintenance. In other areas with no construction or equipment operation, sediment barriers will be inspected and maintained on a weekly basis throughout construction, and within 24 hours of each 0.5 inch of rainfall. Conduct an inspection within 24 hours once a storm event has produced 0.5 inch of rainfall, even if the storm event is still continuing.
4. Maintain all temporary sediment barriers in place until permanent revegetation measures are successful or the upland areas adjacent to wetlands, waterbodies, or roads are stabilized.
5. Remove temporary sediment barriers from an area when replaced by permanent erosion or sediment control measures or when the area has been successfully restored as specified in Section 8.1.

3.5.3 Grading

The construction ROW will be graded as needed to provide a level workspace for safe operation of heavy equipment used in pipeline construction. The following procedures will be standard practice during grading:

3.5.3.1 Topsoil Segregation

During construction, topsoil and subsoil will be disturbed by grading of the right-of-way, trench excavation, and by heavy equipment moving along the right-of-way. Implementation of proper topsoil segregation is intended to mitigate these construction impacts and promote or facilitate post-construction revegetation success.

Topsoil segregation methods will be used in all residential areas (except where the topsoil is being replaced), wetlands (except areas where standing water is present or soils are saturated), cultivated or rotated croplands, managed pastures, hayfields, and other areas at the landowner's or land managing agency's request. Either the "ditch plus spoil side" or the "full right-of-way" segregation method will be used, as illustrated in Figure CW-2.

a. Prevent the mixing of topsoil with subsoil by stripping topsoil from either the full work area or from the trench and subsoil storage area ("ditch plus spoil side" method) as stipulated in the Construction Contract or Line List.

b. Segregate at least 12 inches of topsoil in deep soils with more than 12 inches of topsoil. In soils with less than 12 inches of topsoil, make every effort to segregate the entire topsoil layer.

c. Within wetlands, segregate the top 12 inches of topsoil within the trenchline, except in areas where standing water is present or soils are saturated.

d. In residential areas, importation of topsoil (i.e. topsoil replacement) is an acceptable alternative to topsoil segregation, if approved by the landowner and Chief Inspector.

e. Maintain separation of salvaged topsoil and subsoil throughout all construction activities.

f. Leave gaps in the topsoil piles and spoil piles for the installation of temporary slope breakers to allow water to be diverted off the construction ROW.

g. Never use topsoil for padding the pipe, constructing temporary slope breakers, trench breakers or trench plugs, improving or maintaining roads, or as a fill material.

h. Stabilize topsoil piles and minimize loss due to wind and water erosion with use of sediment barriers, mulch, temporary seeding, tackifiers, or functional equivalents, where necessary.

3.5.3.2 Tree Stump Removal and Disposal

a. Remove tree stumps in upland areas along the entire width of the permanent ROW to allow adequate clearance for the safe operation of vehicles and equipment. Stumps within the temporary ROW will be removed or ground below the surface in accordance with Company construction specifications to allow the safe passage of equipment, as determined by the Chief Inspector or EI.

b. In wetlands, limit pulling of tree stumps and grading activities to directly over the trenchline.

c. Dispose of stumps by one of the following methods with the approval of the Chief Inspector and the landowner and in accordance with regulatory requirements:

- Buried at a Company-approved off-site location (except in wetlands and agricultural areas);
- Burned on construction ROW;
- Chipped, spread across the construction ROW in upland areas, and plowed in;
- Used as erosion control mix material;
- Ground to grade in wetlands, excess chips will be removed for proper disposal; or
- Hauled off-site.

d. Grading operations and tree stump removal in wetland areas will be conducted in accordance with Section 6.2.

3.5.3.3 Rock Management

Rock, including blast rock, will be used, removed or disposed of in one of the following ways:

a. Rock excavated from the trench may be used to backfill the trench only to the top of the existing bedrock profile. (Rock that is not returned to the trench shall be considered construction material or waste, unless approved for use as mulch or for some other use on the construction work areas by the land owner or land managing agency.);

b. Windrowed per written landowner agreement with the Company;

c. Removed and disposed of at a Company-approved landfill; or

d. Used as riprap for streambank stabilization as allowed by applicable regulatory agency(ies) and provided the rock is uncontaminated and free of soil and other debris (Figure WC-6).

3.5.4 Temporary Slope Breakers

Temporary slope breakers, also called interceptor dikes, are temporary erosion control measures intended to reduce runoff velocity and divert water off the construction ROW. Temporary slope breakers may be constructed of materials such as compacted soil, silt fence, staked straw bales, or sand bags. Segregated topsoil may not be used for constructing temporary slope breakers. If permitted by regulatory agency(ies), hay bales may be used in lieu of straw bales except for mulching. If hay bales are used, the Contractor is responsible for their removal and Company-approved disposal.

1. Install temporary slope breakers on all disturbed areas as necessary following grading operations (Figure EC-7) to avoid excessive erosion. Unless otherwise specified by permit conditions, temporary slope breakers must be installed on slopes greater than 5% at the recommended spacing interval indicated below (Closer spacing should be used if necessary):

Slope (%)	**Spacing (feet)**
< 5	No structure
5 – 15	300
> 15 – 30	200
> 30	100

2. Direct the outfall of each slope breaker to a stable, well vegetated area or construct an energy-dissipating device (silt fence, staked straw bales, erosion control fabric) at the end of the slope breaker.

3. Position the outfall of each temporary slope breaker to prevent sediment discharge into wetlands, waterbodies, or other sensitive resource areas.

4. Install temporary slope breakers across the entire construction ROW along slopes greater than 5 % where the base of the slope is less than 50 feet from waterbody, wetland, and road crossings.
5. Inspect temporary slope breakers daily in areas of active construction to insure proper functioning and maintenance. In other areas, the slope breakers will be inspected and maintained on a weekly basis throughout construction, and within 24 hours of each 0.5 inch of rainfall. Repairs should be made within 24 hours of identification, if possible.

Drivable berms, which are smaller versions of slope breakers constructed of compacted soil or sand bags, may be used in place of staked straw bales at the entrances and exits of travel lanes at road crossings, waterbodies, and wetlands. They are installed across the width of the travel lane at the start of the equipment crossing and made low enough to allow equipment and other vehicles to pass. Yet, they should function to reduce and divert water runoff from sensitive resource areas.

3.5.5 Trenching

The trench centerline will be staked after the construction ROW has been prepared. In general, a trench will be excavated to a depth that will permit burial of the pipe with a minimum of 3 feet of cover (Figure CW-1). Overland trenching may be accomplished using a conventional backhoe or a rotary wheel-ditching machine. In shale or rocky areas where the use of the conventional excavation equipment is limited, a tractor-drawn ripper or rock hammer may be employed to break and loosen hard substratum material. In areas where rock cannot be ripped or hammered, drilling and blasting may be required. A backhoe may then be used to remove rock and soil from the ditch.

The following procedures will be standard practice during ditching:

- Flag drainage tiles damaged during ditching activities for repair;
- Place spoil in additional extra work areas or at least 10 feet away from the waterbody's edge in the construction ROW. Spoil will be contained with erosion and sediment control devices to prevent spoil materials or sediment-laden water from transferring into waterbodies and wetlands or off of the ROW; and,
- If temporary erosion or sediment controls are damaged or removed during trenching, they shall be repaired and/or replaced before the end of the work day.

3.5.5.1 Temporary Trench Plugs

Temporary trench plugs are barriers within the ditch that are intended to segment the continuous open trench prior to backfill. They typically consist of unexcavated portions of the ditch (hard plug), compacted subsoil or sandbags (soft plug) placed across the ditch, or some functional equivalent. Along steep slopes, they serve to reduce erosion and sedimentation in the trench and minimize dewatering problems at the base of slopes where sensitive environments such as waterbodies and wetlands are frequently located. In addition, they provide access across the trench for wildlife and livestock.

a. Do not use topsoil for constructing trench plugs.

b. Coordinate with the landowner to identify optimal locations for the placement of temporary hard plugs designed to provide access for livestock.

c. Temporary trench plugs may be used in conjunction with slope breakers to prevent water in the trench from overflowing into sensitive resource areas (Figure EC-6). Attempt to divert trench overflow to a well-vegetated off-ROW location or construct an energy-dissipating device.

d. Position temporary trench plugs, as necessary, to reduce trenchline erosion and minimize the volume and velocity of trench water flow at the base of slopes.

3.5.6 Trench & Site Dewatering

Dewatering may be periodically conducted to remove accumulated groundwater or precipitation from the construction ROW, including from within the trenchline. The need for erosion controls as well as the type of control used will vary depending on the type and amount of sediment within the water, and volume and rate of discharge.

1. Conduct dewatering (on or off the construction ROW) in such a manner that does not cause erosion and does not result in silt-laden water flowing into any waterbody or wetland.
2. Elevate and screen the intake of each hose used to withdraw the water from the trench to minimize pumping of deposited sediments.
3. Water may be discharged into areas where adequate vegetation is present adjacent to the construction ROW to function as a filter medium.
4. Where vegetation is absent or in the vicinity of waterbody / wetland areas, water will be pumped into a discharge structure that accommodates the anticipated discharge volumes as well as type and amount of sediment within the water being discharged, including

   a. a filter bag, as illustrated in Figure WD-1, or

   b. a structure composed of sediment barriers (Options for these types of controls are illustrated in Figure WD-2 and WD-3.).

   A structure that is more typically used for discharges of hydrostatic test water, as illustrated in Figure WD-2, may be necessary for large volumes of water.
5. When using filter bags, secure the discharge hose to the bag with a clamp.
6. Remove dewatering structures as soon as practicable after the completion of dewatering activities.

3.5.7 Pipe Installation

During all phases of the pipe installation process, ensure that all roadway crossings and access points are safe and accessible conditions. Repair damaged temporary erosion controls by the end of the work day. If portions of slope breakers are removed from the travel lane to facilitate safe work conditions, they shall be restored prior to the end of the work day.

3.5.7.1 Stringing and Bending

Following trench excavation, pipe sections will be delivered to the construction site by truck or tracked vehicle, and strung out along the trench. Individual pipe sections will be placed on temporary supports or wooden skids and staggered to allow room for work on the exposed ends. Certain pipe sections will be bent, as necessary, to conform to changes in slope and direction of the trench.

All rope bands should be collected and disposed of properly.

3.5.7.2 Welding

Once the bending operation is complete, the pipe sections will be welded together on supports using approved welding procedures that comply with Company welding specifications. After welding, the welds will be inspected radiographically or ultrasonically to ensure their structural integrity.

3.5.7.3 Lowering-in and Tie-ins

Lowering-in consists of placing the completed pipeline sections into the trench typically using two or more sideboom tractors acting in unison and spaced so as not to buckle or otherwise damage the pipe. The pipeline will be lifted from the supports, swung out over the trench, and lowered directly into the trench. The equipment uses a "leap frogging" technique requiring sufficient area to safely move around other tractors within the construction ROW to gain an advanced position on the pipe. The unwelded ends of the completed pipeline segments (typically present at road crossings, stream crossings, etc.) are then welded together or "tied-in" by specialized tie-in crews.

3.5.8 Backfilling

Backfilling consists of covering the pipe with 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. Backfilling will follow lowering-in of the pipeline as close as is practical.

In areas where the trench bottom is irregularly shaped due to consolidated rock or where the excavated spoil materials are unacceptable for backfilling around the pipe, padding material may be required to prevent damage to the pipe. This padding material will generally consist of sand or screened spoil materials from trench excavation.

1. Under no circumstances shall topsoil be used as padding material.

2. Excess rock, including blast rock, may be used to backfill the trench only to the top of the existing bedrock profile in accordance with Company specifications. Rock that is not used to backfill the trench will be managed as described in Section 3.5.3.3.

3. Any excess material will be spread within the ROW in upland areas and land contours will be roughed-in to match adjacent topography.

4. The trench may be backfilled with a crown over the pipe to compensate for compaction and settling. Openings will be left in the completed trench crown to restore pre-construction drainage patterns. Crowning shall not be used in wetland areas.

3.5.8.1 Permanent Trench Breakers

Permanent trench breakers are intended to slow subsurface water flow and erosion along the trench and around the pipe in sloping terrain. An engineer or similarly qualified professional shall determine the need for and spacing of permanent trench breakers. However, trench breakers will not be installed within a wetland.

Permanent trench breakers will be constructed with sand bags, polyurethane foam, or an equivalent as identified in the permit requirements (Figure EC-10 and EC-11). Topsoil shall not be used to construct trench breakers. Sakrete may be used at the discretion of the Chief Inspector on severe slopes greater than 30 percent.

Permanent trench breakers, which are used in conjunction with slope breakers, shall be installed at the locations shown on the construction drawings, at the same spacing interval as and upslope of permanent slope breakers, or as otherwise determined by an engineer or similarly qualified professional, such as the EI (Figure EC-12). At a minimum, install trench breakers:

a. At the base of slopes greater than 5% where the base of the slope is less than 50 feet from a waterbody or wetland;

b. Where needed to avoid draining of a resource, including at wetland boundaries where the pipeline trench may drain a wetland, and/or seal the trench bottom as necessary to maintain the original wetland hydrology; and,

c. In agricultural fields and residential areas where slope breakers are not typically required, install trench breakers at the same spacing as if permanent slope breakers were required.

3.5.9 Hydrostatic Testing

Once the pipeline is completed and before it is placed into service, it will be hydrostatically tested for structural integrity. Hydrostatic testing involves filling the pipeline with clean water and maintaining a test pressure in excess of normal operating pressures for a specified period of time (typically 8 hours). The testing procedure involves filling the pipeline with water, performing the pressure test, and discharging the test water.

The following general hydrostatic testing procedures shall be adhered to for all projects. Environmental conditions for hydrostatic testing activities are also addressed in the project-specific Hydrostatic Test Clearance Package that is issued by ECP if permits are required for water appropriation and/or discharge. During planning and permitting of test events:

1. Identify the location of all waterbodies proposed for use as a hydrostatic test water source or discharge location. Use only the water sources identified in the Clearance Package/Permit Book.
    a. Do not use water from or discharge into state-designated exceptional value waters, waterbodies that provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate federal, state, and/or local permitting agencies grant written permission.
2. Locate hydrostatic test manifolds outside wetlands and riparian areas to the maximum extent practicable.
3. Attempt to locate discharge sites in a well-vegetated and stabilized area, if practical, at least 50-feet from adjacent waterbody/wetland areas.
4. Apply for and obtain state-issued water withdrawal permits and National Pollutant Discharge Elimination System (NPDES) or state-issued discharge permits, as required.

During preparation for testing, including appropriation of source water and preparing discharge/outfall site:

1. At least 48 hours before testing activities, the EI shall notify appropriate state agencies (as identified in the relevant permit for hydrostatic test discharges) of the intent to use specific test water sources (unless waived in writing).
2. If pumps used for hydrostatic testing are within 100 feet of any waterbody or wetland, the use of secondary containment, operation and refueling of those pumps will be addressed and conducted in accordance with the SPCC/PPC Plan.
3. Screen the intake hose to minimize the potential for entrainment of fish and other aquatic life.
4. Maintain adequate flow rates to protect aquatic life, provide for all waterbody uses, and provide for downstream withdrawals of water by existing users.
5. Install all discharge structures in a well-vegetated and stabilized area, if practical, and attempt to maintain at least a 50-foot vegetated buffer from adjacent waterbody/wetland areas. If an adequate buffer is not available, sediment barriers or similar sediment control measure must be installed.

During the discharge of hydrostatic test water on-site:

1. Discharge water only at the locations shown on the construction drawings or locations identified in the Clearance Package/Permit Book or ECP's Hydrostatic Test Clearance Package.
2. Regulate rate of discharge water and use energy dissipation device(s) and sediment barriers, as necessary, to prevent erosion, streambed scour to aquatic resources, sedimentation, flooding or excessive stream flow (Figures WD-2 and WD-3).

3. Use absorbent booms as necessary during discharge from existing pipe or as stipulated by the applicable NPDES permit.
4. The test water may be discharged through an appropriate filtration system including holding tanks or frac tanks and/or carbon filters if needed to meet effluent limitations or conditions stipulated in the NPDES permit.
5. Do not discharge into state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate federal, state, and local permitting agencies grant written permission.
6. The EI or appropriate designee shall sample and test the source water and discharge water in accordance with the permit requirements.

3.5.10 Pipeline Abandonment and Removal

Pipeline abandonment and removal activities may occur when gas service is no longer needed, such as the abandonment of a lateral to a customer receipt or delivery point. Removal or in-place abandonment of pipe can also be conducted as part of an expansion or maintenance project, such as the lift-and-relay of existing pipe, the replacement or relocation of an existing pipeline due to road or highway modifications, or activities required to maintain compliance with U.S.DOT requirements.

Abandonment approval from FERC, such as project-specific Section 7(b) Order or blanket certificate authorization, is required prior to abandoning facilities or services. Abandonment of FERC-regulated natural gas pipelines or storage facilities, either in place or by removal, must follow FERC's regulations.

Where removal of a section of existing pipeline is required, construction activities typically proceed in a construction sequence similar to what has been described above in Section 3.5, except that instead of the pipeline installation step, the existing pipeline would be cut and removed from the trench. If the pipeline removal is associated with a lift-and-relay project or a replacement, then the new pipeline installation would follow the removal of the old pipe. Pipe that is abandoned by removal will be handled, taken off-site and properly disposed of or recycled in accordance with Company procedures.

When a pipeline is abandoned in place, typically work involves only relatively small excavations to remove above-ground appurtenances and meters, as well as expose the pipe in certain locations, cut it, fill with grout or blanket gas and cap the ends of the pipe, in accordance with agency and Company requirements.

Mitigation measures for pipeline abandonment and removal activities, such as erosion control measures, will follow the same requirements outlined within the E&SCP for pipeline installation in order to minimize erosion and enhance revegetation, as well as mitigate the extent and duration of project-related disturbance to wetlands and waterbodies.

3.6 ROW Restoration & Final Cleanup

Restoration of the ROW will begin after pipeline construction activities have been completed. Restoration measures include the re-establishment of final grades and drainage patterns as well as the installation of permanent erosion and sediment control devices to minimize post-construction erosion. Residential areas will be restored in accordance with Section 4.3.3. Property shall be restored as close to its preconstruction condition as practical unless otherwise specified by the landowner.

1. The Contractor shall make every reasonable effort to complete final cleanup of an area (including final grading, topsoil replacement and installation of permanent erosion control structures) within 20 days after backfilling the trench in that area (within 10 days in residential areas). If seasonal or other weather conditions prevent compliance with these timeframes, continue to inspect and maintain temporary erosion and sediment controls (i.e. temporary slope breakers, sediment barriers, and mulch) until conditions allow completion of cleanup. If construction or restoration unexpectedly continues into the winter season, follow the requirements of Frozen Conditions & Winter Construction, Section 3.6.4.

2. Seed all disturbed soils within 6 working days of final grading, weather and soil conditions permitting.

3. If construction or restoration unexpectedly cannot be completed and is delayed until the next recommended growing season, the winter stabilization measures shall be followed.

4. Grade the ROW to pre-construction contours, with the exception of the installation of any permanent measures required herein.

5. Spread segregated topsoil back across the graded ROW to its original profile.

6. Remove excess rock from at least the top 12 inches of soil in all cultivated or rotated cropland, managed pastures, hayfields, residential areas, as well as other areas at the landowner's request. The size, density, and distribution of rock on the construction ROW shall be similar to adjacent areas not disturbed by construction. The landowner or land managing agency may approve other provisions in writing.

7. A travel lane may be left open temporarily to allow access by construction traffic if the temporary erosion and sediment control structures are installed, regularly inspected and maintained. When access is no longer required, the travel lane must be removed and the ROW restored.

8. Remove all construction debris (used filter bags, skids, trash, etc.) from all construction work areas unless the landowner or land managing agency approves leaving material onsite for beneficial reuse, stabilization, or habitat restoration. Grade or till the ROW to leave the soil in the proper condition for planting.

3.6.1 Permanent Erosion Control

3.6.1.1 Permanent Slope Breakers

Permanent slope breakers are intended to reduce runoff velocity, divert water off the construction ROW, and prevent sediment deposition into sensitive resources. Permanent slope breakers will be constructed of compacted soil (Figure EC-8). Stone or some functional equivalent may be used when approved by the Company.

a. Construct and maintain permanent slope breakers in all areas, except cultivated areas and lawns, unless requested by the landowner, at the locations shown on the construction drawings.

b. Use spacing recommendations obtained from the local soil conservation authority or land managing agency. If not shown on the construction drawings or in the absence of written recommendations, use the following spacing (same as temporary slope breaker spacing) unless closer spacing is necessary to avoid excessive erosion on the construction ROW:

Slope (%)	**Spacing (feet)**
< 5	No structure
5 – 15	300
> 15 – 30	200
> 30	100

c. A permanent trench breaker will be located immediately upslope of the slope breaker.

d. Install permanent slope breakers across the construction ROW at the base of slopes adjacent to roads. When the ROW parallels an existing utility ROW, permanent slope breakers may be installed to match existing slope breakers on the adjacent undisturbed utility ROW.

e. Install permanent slope breakers across the construction ROW at the base of slopes greater than 5% that are less than 50 feet from a wetland or waterbody, or as needed to prevent sediment transport into a wetland or waterbody.

f. Construct slope breakers with a 2 to 8 percent outslope to divert surface flow to a stable vegetative area without causing water to pool or erode behind the slope breaker. In the absence of a stable vegetative area, install an energy-dissipating device at the end of the slope breaker.

g. Slope breakers may extend slightly (about 4 feet) beyond the edge of the construction ROW to effectively drain water off the disturbed area. Where slope breakers extend beyond the edge of the construction ROW, they are subject to compliance with all applicable survey and permit requirements.

h. Install chevron-style slope breakers on slopes as appropriate (Figure EC-9).

i. Where drainage is insufficient in upland areas, install a rock-lined drainage swale as approved by the EI. The drainage swale is generally 8 feet wide and a maximum of 18-24 inches deep (Figure EC-4).

3.6.1.2 Erosion Control Fabric / Blankets

Erosion control fabric or blankets are used during restoration, including as mulch, to slow down stormwater and stabilize soil until vegetation becomes established. Examples of these erosion controls include jute thatching or bonded fiber blankets. Do not use synthetic monofilament mesh/netted erosion control materials in areas designated as sensitive wildlife habitat, unless the product is specifically designed to minimize harm to wildlife.

Install erosion control fabric or blankets where necessary or as recommended by the EI

a. at slope breaker outlets and drainage swales (Figure EC-7, EC-8 and EC-4);

b. on slopes adjacent to roads or waterbodies (Figure EC-14); and

c. on waterbody banks at the time of final bank recontouring (Figure WC-5).

Anchor the erosion control fabric or blanket with staples or other appropriate devices in accordance with the manufacturers' recommendations (Figure EC-13). Evaluate flow conditions to determine if erosion control fabric is suitable as an effective vegetation stabilization technique on waterbody banks. High-velocity erosion control fabric should be used on the swale side of permanent slope breakers.

3.6.2 Revegetation and Seeding

Successful revegetation of soils disturbed by project-related activities is essential. Seeding will be conducted using the following requirements:

1. Fertilize and add soil pH modifiers in accordance with the recommendations in Appendix C. Incorporate recommended soil pH modifier and fertilizer into the top 2 inches of soil as soon as practicable after application;

2. Seed all disturbed areas within 6 working days of final grading, weather and soil conditions permitting;

3. Prepare seedbed in disturbed areas to a depth of 3 to 4 inches to provide a firm seedbed. When hydroseeding, scarify the seedbed to facilitate lodging and germination of seed;

4. Seed disturbed areas in accordance with the seed mixes, rates, and dates in Appendix C, except in upland areas where landowners or a land management agency may request alternative seed mixes, however, seeding is not required in cultivated croplands unless requested by the landowner;

5. Perform seeding of permanent vegetation within the recommended seeding dates as outlined in Appendix C. If seeding cannot be done within those dates, use appropriate temporary erosion

control measures discussed in Section 3.5.2 and perform seeding of permanent vegetation at the beginning of the next recommended seeding season. Dormant seeding or temporary seeding of annual species may also be used, if necessary, to establish cover, as approved by the EI. Mulch in accordance with Section 3.6.3. Lawns may be seeded on a schedule established with the landowner;

6. Base seeding rates on Pure Live Seed (PLS);

7. Use seed within 12 months of seed testing;

8. Treat legume seed with an inoculant specific to the species using the manufacturer's recommended rate of inoculant appropriate for the seeding method (broadcast, drill, or hydroseeding); and,

9. Uniformly apply and cover seed in accordance with the appropriate seed mix from Appendix C, in the absence of any recommendations from the local soil conservation authorities, landowner, or land managing agency to the contrary.

    a. A seed drill equipped with a cultipacker is preferred for application but, where permitted by regulatory agencies, broadcast or hydroseeding can be used at double the recommended seeding rates.

    b. Where seed is broadcast, firm the seedbed with a cultipacker or roller after seeding.

    c. In rocky soils, or where site conditions may limit the effectiveness of this equipment, other alternatives may be appropriate (e.g., use of a chain drag) to lightly cover seed after application, as approved by the EI.

3.6.3 Mulch

Mulch is intended to stabilize the soil surface and shall consist of weed-free straw, wood fiber hydromulch, erosion control fabric or some functional equivalent as approved by the EI and Chief Inspector.

1. Mulch all disturbed upland areas (except cultivated cropland) **before** seeding if:

    a. Final cleanup, including final grading and installation of permanent erosion control measures, is not completed in an area within 20 days after the trench in that area is backfilled (10 days in residential areas); or

    b. Construction or restoration activity is interrupted for extended periods, such as when seeding cannot be completed due to seeding period restrictions.

    NOTE: When mulching before seeding, increase mulch application on all slopes within 100 feet of waterbodies and wetlands to a rate of 3 tons/acre of straw or equivalent.

2. Apply mulch on all slopes (except in cultivated cropland) concurrent with or immediately after seeding, where necessary, to stabilize the soil surface and to reduce wind and water erosion. Spread mulch uniformly over the ROW at a rate of 2 tons/acre of straw or equivalent.

3. Mulch with woodchips only under the following conditions with prior approval from the Chief Inspector or the EI:

    a. Do not use more than 1 ton/acre; and

    b. Add the equivalent of 11 lbs/acre available nitrogen (at least 50% of which is slow release).

4. Ensure that mulch is anchored to minimize loss by wind and water. Anchoring may be achieved by wet soil conditions, when approved by the EI, mechanical means, or use of liquid mulch binders.

5. When anchoring with liquid mulch binders, use rates recommended by the manufacturer. Do not use liquid mulch binders within 100 feet of wetlands and waterbodies, except where the product is certified environmentally non-toxic by the appropriate state or federal agency or independent standards-setting organization.

6. If used, install erosion control fabric or blankets in accordance with Section 3.6.1.2.

3.6.4 Frozen Conditions & Winter Construction

Winter weather may not provide suitable conditions for soil handling or restoration of disturbed areas. In the event that the construction occurs too late in the year for cleanup activities to adequately proceed or if construction is planned to occur during winter weather conditions, the Company will develop a project-specific Winter Construction Plan that addresses:

- 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 will 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).

The Winter Construction Plan will be provided within the project-specific Clearance Package / Permit Book. Section 7(c) and prior notice projects are required to file the Winter Construction Plan for the review and written approval by the FERC. (The requirement to file a plan does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.)

3.6.5 Unauthorized Vehicle Access to ROW

The Company will offer to install and maintain measures to control unauthorized vehicle access to the ROW based on requests by the manager or owner of forested lands. These measures may include:

- Signs;
- Fences with locking gates;

- Permanent access roads;
- Slash and timber barriers, pipe barriers, or a line of boulders across the ROW; or
- Conifers or other appropriate shrubs with a mature height of 4 feet or less across the ROW.

3.7 Aboveground Facility Construction

Construction at aboveground facilities, including compressor stations, meter stations, valve sites, and other facilities, will follow the same best management practices identified for pipeline installation and removal on the ROW. Work activities in this category can include installation of new aboveground facilities, modification or relocation of facilities at existing compressor station sites, upgrades or installations at existing meter station sites, construction of new receipt or delivery points, and a variety of other activities. Certain project types covered in this section may trigger additional stormwater permitting. Check with the ECP Lead to ensure that all stormwater requirements are met prior to construction.

1. Aboveground facilities shall not be located in any wetland, except as permitted or where the location of such facilities outside of wetlands would prohibit compliance with U.S.DOT regulations.

2. Install temporary sediment barriers at the base of slopes adjacent to roads and at waterbodies and wetlands in accordance with Sections 5.1.4 and 6.3 respectively.

3. Inspect temporary sediment barriers daily in areas of active construction to ensure proper functioning and maintenance. In other areas with no construction or equipment operation, sediment barriers will be inspected and maintained on a weekly basis throughout construction, and within 24 hours of each 0.5 inch of rainfall. Conduct an inspection within 24 hours once a storm event has produced 0.5 inch of rainfall, even if the storm event is still continuing.

4. If a waterbody is present on or immediately adjacent to an existing facility property where work is being conducted, install sediment barriers as necessary along the edge of the construction area to contain spoil and sediment within the work area.

5. All extra work areas should be located at least 50 feet away from the water's edge of a waterbody or a wetland, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land. FERC approval is necessary for the use of work areas if these setback conditions cannot be met.

6. Wetland boundaries and buffers (e.g., extra work area setbacks, refueling restrictions) must be clearly marked in the field with signs and /or highly visible flagging until construction-related ground disturbing activities are complete.

7. When work is required within a wetland at an existing facility, and standing water or saturated soils are present, or if construction equipment causes ruts or mixing of the topsoil and subsoil in wetlands, use low-ground-weight construction equipment or operate normal equipment on timber riprap, prefabricated equipment mats or terra mats. Do not use more than two layers of timber riprap to stabilize the work area.

8. Maintain all temporary sediment barriers in place until permanent revegetation measures are successful or the upland areas adjacent to wetlands, waterbodies and roads are stabilized.

9. Remove temporary sediment barriers from an area when replaced by permanent erosion or sediment control measures or when the area has been successfully restored as specified in Section 8.1.

10. Temporary slope breakers are to be installed on all disturbed areas as necessary to avoid excessive erosion as described in Section 3.5.4.

11. Where required for work in wetlands (except areas where standing water is present or soils are saturated) segregate topsoil as described in Section 3.5.3.1.

12. Place spoil at least 10 feet upgradient from the edge of waterbodies or as indicated on construction drawings. Spoil will be contained with erosion and sediment control devices to prevent spoil materials or silt-laden water from transferring into waterbodies and wetlands or off of the facility property.

13. If required, dewatering should be conducted as described in Section 3.5.6.

14. The Contractor shall make every reasonable effort to complete final cleanup of an area (including final grading and installation of permanent erosion control structures) within 20 days after ground disturbing activities are completed. If seasonal or other weather conditions prevent compliance with these time frames, continue to inspect and maintain temporary erosion and sediment controls (temporary slope breakers and sediment barriers) until conditions allow completion of cleanup. Cleanup shall be conducted in accordance with Section 3.6 of this document.

15. Grade to contours shown on construction drawings or site plans or return grade to pre-construction contours.

16. New gravel, stone and paving at the site shall be placed in accordance with construction drawings. No additional gravel, stone, or paving shall be added without prior approval by ECP.

17. Install permanent erosion controls and post-construction stormwater measures at the locations shown on the construction drawings.

18. Disturbed soils will be seeded within 6 working days of final grading, weather and soil conditions permitting, unless permit conditions indicate otherwise.

19. Remove all timber riprap and prefabricated equipment mats in any wetlands upon completion of construction.

4. SPECIAL CONSTRUCTION METHODS

The Company will utilize the following specialized construction procedures for agricultural areas, road crossings, and residential areas along the pipeline project, when applicable. The project construction drawings, Line Lists, and Construction Contract will indicate the locations where specialized construction methods will be used.

4.1 Agricultural Areas

The following sections identify construction procedures and best practices for activities within actively cultivated or rotated land used for the production of crops including but not limited to corn, grains, orchards, vineyards and hayfields.

4.1.1 Drain Tiles

Develop procedures for constructing through drain-tiled areas and repairing drain tiles after construction. Engage qualified drain tile specialists, as needed, to conduct or monitor repairs to drain tile systems affected by construction. Use drain tile specialist from the project area, if available.

1. Attempt to locate existing drain tiles.
2. Probe all drainage tile systems within the area of disturbance to check for damage.
3. Ensure that the depth of cover over the new pipeline is sufficient to avoid interference with drain tile systems (existing or proposed). For adjacent pipeline loops in agricultural areas, install the new pipeline with at least the same depth of cover as the existing pipeline(s).
4. Repair damaged drain tiles to their original or better condition (Figure SU-1). Filter-covered drain tiles may not be used unless the local soil conservation authorities and the landowner agree in writing prior to construction.

4.1.2 Irrigation

Maintain water flow in crop irrigation systems, unless shutoff is coordinated with affected parties. Repair any damage to irrigation systems as soon as practical.

4.1.3 Soil Compaction Mitigation & Restoration

The following measures are to be employed during decompaction and restoration of soil within agricultural areas disturbed by construction activities:

1. In agricultural areas, test topsoil and subsoil disturbed by construction activities for compaction at regular intervals. Use penetrometers or other appropriate devices to conduct tests. In order to approximate preconstruction conditions, conduct tests on the same soil type under similar moisture conditions in undisturbed areas.
2. Plow severely compacted soils with a paraplow or other deep tillage implement;
    a. In areas where topsoil has been segregated, plow the subsoil before replacing the segregated topsoil.

b. If subsequent construction and cleanup activities result in further compaction, conduct additional tilling.

3. Soils imported for use within agricultural areas are to be certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner.

4. Remove excess rock from at least the top 12 inches of soil in all cultivated or rotated cropland, managed pastures, hayfields. The size, density, and distribution of rock on the construction work area shall be similar to adjacent areas not disturbed by construction. The landowner or land management agency may approve other provisions in writing.

4.2 Road Crossings

The "open cut" method is typically used when installing the pipeline across small roads (Figure RD-4). Traffic is diverted while the trench is excavated across the road and the pipeline is installed. An open cut crossing may involve closing the road to all traffic and constructing an adequate detour around the crossing area, or excavating one-half of the road at a time allowing through traffic to be maintained. Any detour constructed around the crossing area must remain within the approved construction workspace. After completing the crossing, all backfill is compacted, the road bed is repaired and the road surface is replaced.

Bores are often used to install the pipeline across highways, major roads with heavy traffic, and railroads (Figure RD-5), unless the crossing permit allows an open cut crossing. Similar to a directional drill, as discussed in Section 4.4, the road bore is accomplished with a horizontal drill rig or boring machine. The boring machine drills a hole under the road to allow insertion of the pipe. Typically, a dummy pipe section is pulled through which is welded to the line pipe. The dummy pipe is pulled back through placing the line pipe in the crossing. In some instances, a casing (another larger pipe) is installed in the hole and the pipeline is inserted inside the casing. Casings typically are not installed today, although some states require casings on rail crossings. Casings also may be used in soils where it is difficult to pull pipe. The benefit of the road bore is that it allows installation of the pipeline without disrupting traffic.

Access roads shall be used and maintained in accordance with Section 3.2.

4.3 Residential Areas

Specialized construction procedures will be utilized in areas of heavy residential or commercial/ industrial congestion where residences or business establishments lie within 50 feet from the edge of the construction ROW.

1. Install safety fence at the edge of the construction ROW for a distance of 100 feet on either side of the residence or business establishment.

2. 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. If a distance of 25 feet cannot be maintained, refer to Section 4.3.2.

3. If crushed stone/rock access pads are used in residential areas, rock shall be placed on nonwoven synthetic geotextile fabric to facilitate rock removal after construction.

4. 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.

5. Prevent the mixing of subsoil and topsoil by implementing segregation methods in all residential areas, except where the topsoil is being replaced, as stipulated in Section 3.5.3.1, unless the landowner or land managing agency specifically approves otherwise.

In addition to the aforementioned specialized procedures, smaller "spreads" of labor and equipment, operating independent of the mainline work force, will utilize either the stove pipe or drag section pipeline construction techniques in those areas of congestion where a minimum distance of 25 feet cannot be maintained between the residence (or business establishment) and the edge of the construction work area. In no case shall the temporary work area be located within 10 feet of a residence unless the landowner agrees in writing, or the area is within the existing maintained ROW.

The following techniques shall be utilized for a distance of 100 feet on either side of the residence or business establishment at the locations identified in the Company Construction Contract and/or Line List. Refer to site-specific residential construction plans, as applicable.

4.3.1 Stove Pipe Technique

The stove pipe construction technique is a less efficient alternative to the mainline method of construction, typically used when the pipeline is to be installed in very close proximity to an existing structure or when an open trench would adversely impact a commercial/industrial establishment. The technique involves installing one joint of pipe at a time whereby the welding, weld inspection, and coating activities are all performed in the open trench. At the end of each day after the pipe is lowered-in, the trench is backfilled and/or covered with steel plates or timber mats. The length of excavation performed each day cannot exceed the amount of pipe installed.

4.3.2 Drag Section Technique

The drag section construction technique, while less efficient than the mainline method, is normally preferred over the stove pipe alternative. This technique involves the trenching, installation, and backfill of a prefabricated length of pipe containing several segments all in one day. At the end of each day after the pipe is lowered-in, the trench is backfilled and/or covered with steel plates or timber mats. Use of the drag section technique will typically require adequate staging areas outside of the residential and/or commercial/industrial congestion for assembly of the prefabricated sections.

4.3.3 Residential Area Cleanup and Restoration

Restore all lawn areas and landscaping immediately following cleanup operations, or as specified in landowner agreements, including

1. Perform appropriate soil compaction mitigation in severely compacted residential areas.
2. Remove excess rock from at least the top 12 inches of soil in all cultivated or rotated cropland, managed pastures, hayfields. The size, density, and distribution of rock on the

construction work area shall be similar to adjacent areas not disturbed by construction. The landowner or land management agency may approve other provisions in writing.

3. Importation of topsoil is an acceptable alternative to topsoil segregation. Soils imported for use within residential areas are to be certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner.
4. Reseed all disturbed lawns with a seed mixture acceptable to landowner or comparable to the adjoining lawn.

In residential areas, complete final grading, topsoil replacement, and installation of permanent erosion control structures within 10 days after backfilling the trench. Mulch all disturbed areas before seeding if final grading and installation of permanent erosion control measures will not be completed within 10 days after the trench in that area is backfilled in residential areas. If seasonal or other weather conditions prevent compliance with these time frames, maintain temporary erosion controls (i.e., temporary slope breakers, sediment barriers, and mulch) until conditions allow completion of cleanup.

Landowners shall be compensated for damages in a fair and reasonable manner, and as specified in the damage provision within the controlling easement on each property.

4.4 Horizontal Directional Drill Method

Horizontal Directional Drilling (HDD) is a trenchless crossing method that can help avoid direct impacts to sensitive resources (e.g., waterbodies and wetlands) or infrastructure (e.g., roads and railways) by directionally drilling beneath them. HDD installation typically is carried out in three stages:

1. Directional drilling of a small diameter pilot hole;
2. Enlarging the pilot hole to a sufficient diameter to accommodate the pipeline; and,
3. Pulling the prefabricated pipeline, or pull string, into the enlarged bore hole.

For each waterbody or wetland that would be crossed using the HDD method, the Company will prepare a project-specific HDD Plan that includes:

- Site-specific construction diagrams that show the location of mud pits, pipe assembly areas, and all areas to be disturbed or cleared for construction;
- Justification that disturbed areas are limited to the minimum needed to construct the crossing;
- Identification of any aboveground disturbance or clearing between the HDD entry and exit workspaces during construction;
- A description of how an inadvertent release of drilling mud would be contained and cleaned up; and
- A contingency plan for crossing the waterbody or wetland in the event the HDD is unsuccessful and how the abandoned drill hole would be sealed, if necessary.

The HDD Plan will be provided within the project-specific Clearance Package / Permit Book.

Section 7(c) and prior notice projects are required to file HDD plans for the review and written approval by the FERC. (This requirement to file a plan does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.)

During post-construction maintenance activities, do not conduct any routine vegetation mowing or clearing in riparian areas or wetlands that are between HDD entry and exit points.

5. WATERBODY CROSSINGS

The intent of these procedures is to minimize the extent and duration of project related disturbances within waterbodies. The following section describes the construction procedures and mitigation measures that will be used for pipeline installations at waterbodies. The length of the crossing, the sensitivity of the area, existing conditions at the time of the crossing, and permit requirements will determine the most appropriate measures to be used.

The *Waterbody Reference Citing FERC Requirements* in Appendix B summarizes general waterbody crossing methods and requirements identified in the FERC Procedures. These tables provide a brief reference of the restrictions on construction techniques for waterbody crossings; equipment bridges; construction time windows. However, as more stringent agency specific requirements may exist, refer to the Clearance Package / Permit Book for project-specific requirements.

5.1 General Waterbody Procedures

Pipeline construction across waterbody channels may result in short term water quality impacts. The following general procedures are to be followed to minimize or avoid impacts at waterbody crossings:

1. Crossings of waterbodies may proceed using standard upland construction techniques when they are dry or frozen and not flowing provided that the EI verifies that water is unlikely to flow between initial disturbance and final stabilization of the feature. In the event of perceptible flow, all applicable requirements of Section 5 must be followed.
2. Construct crossings as close to perpendicular to the axis of the waterbody channel as engineering and routing conditions permit.
3. Where waterbodies meander or have multiple channels, route the pipeline to minimize the number of waterbody crossings.
4. Perform mobilization of construction equipment, trench excavation, and backfilling in a manner that will minimize the potential for erosion and sedimentation within the waterbody channel.
5. Locate all extra work areas, such as staging and additional spoil storage areas, at least 50 feet away from water's edge, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land. Site-specific written approval by FERC is required for all extra work areas with a less than 50-foot setback and associated measures to be used to ensure the waterbody is adequately protected.
6. Implement erosion control measures to confine water quality impacts within the immediate construction area and to minimize impacts to downstream areas.
7. Place all spoil from the waterbody within the construction ROW at least 10 feet from the water's edge or in the extra work areas shown on the construction drawings.
8. Maintain adequate flow rates to protect aquatic life and prevent the interruption of existing downstream uses.
9. Dewater trench in accordance with the procedures described in Section 3.5.6.

5.1.1 Time Windows for Instream Work

Unless expressly permitted or further restricted by the appropriate federal or state agency in writing on a site-specific basis, instream work must occur during the following time windows:

- Coldwater fisheries – June 1 through September 30; and
- Coolwater and warmwater fisheries – June 1 through November 30.

Installation or removal of equipment bridges above the top of bank is not subject to the aforementioned time windows.

5.1.2 Equipment Bridges

Equipment bridges may be installed and used where needed to allow equipment access across waterbodies.

1. Until the equipment bridge is installed, only clearing equipment and equipment necessary for installation of equipment bridges may cross the waterbody, and the number of crossings shall be limited to one crossing per piece of equipment, unless otherwise authorized by the appropriate permitting agency. EI approval is required prior to equipment crossing a waterbody without an equipment bridge.

2. Construct and maintain equipment bridges that allow unrestricted flow and prevent sediment from entering the waterbody. The Construction Contract agreement and/or permit conditions may specify the type of bridge to be used. Examples of bridges are provided below:

   a. Equipment pads with or without culvert(s), as illustrated in Figure BR-1;

   b. Clean crushed stone and culvert(s), as illustrated in Figure BR-2;

   c. Flexi-float or portable bridges, as illustrated in Figure BR-3;

   d. Double equipment pads, geotextile fabric and sideboards with or without culvert(s); or

   e. Railroad car bridges without culverts.

3. Design and maintain each equipment bridge to withstand the highest flows that would occur. Align culverts/flumes to prevent bank erosion or streambed scour. If necessary, install energy dissipating devices downstream of culverts.

4. Do not use soil to construct or stabilize equipment bridges.

5. Design and maintain equipment bridges to prevent sediment from entering the waterbody.

6. Remove temporary equipment bridges as soon as practicable after permanent seeding.

7. If there will be more than 1 month between final cleanup and the beginning of permanent seeding and reasonable alternative access to the ROW is available, remove temporary equipment bridges as soon as practicable after final cleanup.

8. Obtain any necessary approval or authorization from the COE and/or the appropriate state agency for temporary and permanent bridges.

5.1.3 Clearing and Grading near Waterbodies

1. Confine construction activities and ground disturbance to the construction ROW boundaries, as shown on the construction drawings. Restrict extra work areas (such as staging areas and additional spoil storage areas) to only those shown on the construction drawings.

2. If the pipeline parallels a waterbody, maintain at least 15 feet of undisturbed vegetation between the waterbody (and any adjacent wetland) and the ROW except where maintaining this offset will result in greater environmental impact.

3. Clear the ROW adjacent to all waterbodies *up to the high water bank* (where discernible). *Within 10 feet of the high water bank*, trees shall be cut to ground level and with little to no ground disturbance. **Do not grub** this 10-foot vegetative strip with equipment.

4. Immediately remove all cut trees and branches that inadvertently fall into a waterbody and stockpile in an upland area within the construction ROW for disposal.

5. Grade the ROW adjacent to waterbodies *up to within 10 feet of the high water bank*, leaving an ungrubbed vegetative strip intact.

6. Clearing and grading operations may proceed through the 10-foot vegetative strip **only on the working side of the ROW** in order to install the equipment bridge and travel lane. Use temporary sediment barriers to prevent the flow of bank spoil into the waterbody.

5.1.4 Temporary Erosion and Sediment Controls at Waterbodies

Install sediment barriers immediately after initial disturbance of the waterbody or adjacent upland. Sediment barriers must be properly maintained throughout construction and repaired or reinstalled as necessary (such as after backfilling of the trench), until replacement by permanent erosion controls or restoration of adjacent upland areas is complete. Temporary erosion and sediment control measures are addressed in more detail in Section 3.5, however, the following specific measures must be implemented at stream crossings:

1. Install sediment barriers across the entire construction ROW at all waterbody crossings, where necessary to prevent the flow of sediments into the waterbody.

2. Install sediment barriers along the edge of the construction ROW as necessary to contain spoil within the construction ROW and prevent sediment flow into the waterbody where waterbodies are adjacent to the construction ROW or parallel to the construction ROW and the ROW slopes toward the waterbody.

3. Removable or temporary sediment barriers, such as slope breakers or drivable berms as described in Section 3.5.4, may be used in lieu of sediment barriers in front of equipment bridges or timber mats across the travel lane. Removable sediment barriers can be removed

during the construction day, but must be reinstalled after construction has stopped for the day or whenever heavy precipitation is imminent.

4. Use temporary trench plugs at all waterbody crossings, as necessary, to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the waterbody. Trench plugs shall be of sufficient size to withstand upslope water pressure.

5.2 Types of Waterbody Crossing Methods

Waterbody crossing techniques allowed for use on a project will be determined by agency consultations and permits. Construction at waterbodies will be conducted using two principal crossing methods, a “dry” crossing and a “wet” crossing. The “dry” or “dry-ditch” crossing procedure is further divided into a flume crossing and a dam-and-pump crossing methods. These methods are designed to maintain downstream flow at all times and to isolate the construction zone from the stream flow by channeling the water flow through a flume pipe or by damming the flow and pumping the water around the construction area. The overall objective is to minimize siltation of the waterbody and to facilitate trench excavation of saturated spoil. The two “dry” crossings are further described below in Sections 5.2.1 and 5.2.2.

The “wet” or “open-cut” crossing method involves trenching in the waterbody without isolating the construction zone from the stream flow. The objective of this method is to complete the waterbody crossing as quickly as practical in order to minimize the duration of impacts to aquatic resources. The wet crossing method is further described below in Section 5.2.3.

All streams, their classifications, timing windows, applicable permits and crossing procedures will be identified in the project-specific Clearance Package/Permit Book and on the construction drawings. Unless approved otherwise by the appropriate federal or state agency, pipeline construction and installation must occur using one of the two “dry” crossing methods for waterbodies state-designated as either coldwater or significant coolwater or warmwater fisheries, or federally designated as critical habitat. The flume and dam-and-pump crossing methods are applicable to waterbodies up to 30 feet wide (possibly wider depending on flow volume and rate) at the water’s edge at the time of construction.

5.2.1 Flume Crossing

The flume crossing method utilizes a flume pipe(s) to transport stream flow across the disturbed area and allows trenching to be done in drier conditions (Figure WC-3). The flume pipe(s) installed across the trench will be sized to accommodate anticipated stream flows. Flumes are generally not recommended for use on a waterbody with a broad unconfined channel, unstable banks, a permeable substrate, excessive stream flow, or where the installation and construction of the flume crossing will adversely affect the bed or banks of the stream.

The flume waterbody crossing shall be installed as follows:

1. Install flume pipe(s) after blasting and other rock breaking measures (if required), but before trenching;
2. Properly align flume pipe(s) to prevent bank erosion and streambed scour;

3. Use sand bags or equivalent dam diversion structure to provide a seal at either end of the flume to channel water flow (some modifications to the stream bottom may be required to achieve an effective seal);
4. **Do not remove flume pipe** during trenching, pipe laying (thread pipe underneath the flume pipe(s)), or backfilling activities, or initial streambed restoration efforts, except for crossings where a dam-and-pump method (as described in Section 5.2.2 below) has been established as an alternative measure to redirect stream flow; and
5. Remove all flume pipes and dams that are not also part of the equipment bridge as soon as final cleanup of the stream bed and bank is complete.

5.2.2 Dam-and-Pump Crossing

The dam-and-pump crossing method is presented as an alternative dry crossing procedure to the flume crossing (in limited cases, it may be used in combination with a flume crossing). The dam-and-pump method is accomplished by utilizing pumps to transport stream flow across the disturbed area (Figure WC-4). This method involves placing sandbags across the existing stream channel upstream from the proposed crossing to stop water flow and downstream from the crossing to isolate the work area. Pumps are used to pump the water across the disturbed area and back into the stream further downstream.

The dam-and-pump procedure allows for more space and flexibility during trenching and pipe installation, which shortens the duration of time spent at the waterbody. The dam-and-pump method may be used for crossings of waterbodies where pumps can adequately transfer stream flow volumes around the work area, and where there are no concerns about sensitive species passage.

The dam-and-pump crossing method shall be installed as follows:

1. Install and properly seal sandbags at the upstream and downstream location of the crossing;
2. Create an in-stream sump using sandbags if a natural sump is unavailable for the intake hose;
3. Initiate pumping of the stream around the work area prior to excavating the trench;
4. Monitor dam and pumps <u>at all times</u> to ensure proper operation until the waterbody crossing is completed; and,
5. Remove the sandbag dams, pumps and hoses and return normal flow back to the waterbody following installation and restoration of the streambed.

Implementation of the dam-and-pump crossing method will meet the following performance criteria:

- Use sufficient pumps, including onsite backup pumps, to maintain downstream flows;
- Construct dams with materials that prevent sediment and other pollutants from entering the waterbody (e.g., sandbags or clean gravel with plastic liner);
- Screen all intake hoses to minimize the entrainment of fish and other aquatic life
- Prevent streambed scour at pump discharge; and

- Continuously monitor the dam and pumps to ensure proper operation throughout the waterbody crossing.

5.2.3 Wet Crossing

Open-cut crossings involve excavating a trench for the pipeline across the bottom of the waterbody to be crossed (Figure WC-2). Depending on the depth of the water, construction equipment may be placed on barges or other floating platforms to excavate the pipe trench.

This construction technique is typically used to cross waterbodies that are not state-designated, such as ephemeral drainage ditches, and ephemeral and intermittent streams, as well as intermediate and major waterbodies with substantial flows that cannot be effectively flumed or pumped around the construction zone using one of the dry crossing techniques.

5.3 FERC Waterbody Classifications

In the FERC Procedures, a “waterbody” is defined to include 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 have been further divided into three classifications by FERC depending on the width of the feature, which dictate construction limitations or requirements.

5.3.1 Minor Waterbodies

FERC defines a "minor waterbody” as a waterbody less than or equal to 10 feet wide at the water’s edge at the time of crossing. Minor waterbodies shall be crossed in accordance with the following requirements:

1. All spoil from minor waterbody crossings must be placed in the construction ROW at least 10 feet from the water’s edge or in additional extra work areas as described above in Section 5.1.

2. Unless approved otherwise by the appropriate federal or state agency, utilize a dry crossing construction technique to install crossings at all minor waterbodies that are state-designated fisheries or federally designated as critical habitat, as identified in the Clearance Package/ Permit Book (Figures WC-3 or WC-4).

    a. All construction equipment must use an equipment bridge to cross state-designated fisheries as specified in Section 5.1.2.

3. Where a dry-ditch crossing is not required, minor waterbodies may be crossed using the wet crossing method, with the following restrictions:

    a. Except for blasting and other rock breaking measures, complete instream construction activities (including trenching, pipe installation, backfill, and restoration of the streambed contours) within 24 hours. Streambanks and unconsolidated streambeds may require additional restoration after this period;

    b. Limit use of equipment operating in the waterbody to that needed to construct the crossing;

c. If a flume is installed within the waterbody during mainline activities, it can be removed just prior to lowering in the pipeline (The 24-hour timeframe starts as soon as the flume is removed.); and,

d. Equipment bridges are not required at minor waterbodies that do not have a state-designated fishery classification or protected status (e.g., agricultural or intermittent drainage ditches). However, if an equipment bridge is used it must be constructed as described in Section 5.1.2.

5.3.2 Intermediate Waterbodies

FERC defines an "intermediate waterbody” as a waterbody greater than 10 feet wide but less than or equal to 100 feet wide at the water’s edge at the time of crossing. Intermediate waterbodies shall be crossed in accordance with the following requirements:

1. All spoil from intermediate waterbody crossings must be placed in the construction ROW at least 10 feet from the water’s edge or in additional extra work areas as described above in Section 5.1.

2. Unless approved otherwise by the appropriate federal or state agency, install the pipeline using a dry crossing method for crossings of waterbodies up to 30 feet wide (at the water’s edge at the time of construction) that are

    a. state-designated as either coldwater or significant coolwater or warmwater fisheries, or

    b. federally designated as critical habitat.

3. Where a dry-ditch crossing is not required, intermediate waterbodies may be crossed using the wet crossing method, with the following restrictions:

    a. Complete instream construction activities (not including blasting and other rock breaking measures) within 48 hours, unless site-specific conditions make completion within 48 hours infeasible;

    b. Limit use of equipment operating in the waterbody to that needed to construct the crossing; and,

    c. All other construction equipment must cross on an equipment bridge as specified in Section 5.1.2.

5.3.3 Major Waterbodies

FERC defines a "major waterbody” as a waterbody greater than 100 feet wide at the water’s edge at the time of crossing. Before construction, the Company shall prepare and file for the review and written approval by the FERC a detailed, site-specific construction plan and scaled drawings identifying all areas to be disturbed by construction for each major waterbody crossing, however the scaled drawings are not required for any offshore portions of pipeline projects. (The requirement to file major waterbody crossing plans does not apply to projects constructed under the automatic authorization provisions of the FERC’s regulations.) This site-specific plan must be developed in consultation with the appropriate state and federal agencies and shall include extra work areas, spoil storage areas, sediment control structures, etc., as well as mitigation for navigational issues.

Upland spoil from major waterbody crossings must be placed in the construction ROW at least 10 feet from the water's edge or in additional extra work areas as described in Section 5.2.

5.4 Restoration

Restore and stabilize the waterbody banks and channel in accordance with this section.

1. Return all waterbody banks to preconstruction contours or to stable angle of repose as approved by the EI.

2. Use clean gravel or native cobbles for the upper 12 inches of trench backfill in all waterbodies identified in the Clearance Package/Permit Book as coldwater fisheries, unless otherwise specified by state-specific agency recommendations or permit conditions.

3. For wet crossings, stabilize waterbody banks and install temporary sediment barriers within 24 hours of completing the crossing.

4. For dry crossings, complete bank stabilization before returning flow to the waterbody channel.

5. Limit the use of rock riprap to areas where flow conditions preclude effective vegetation stabilization techniques such as seeding and erosion control fabric, unless otherwise specified by COE and state permits. Limit the placement of rock riprap to the slopes along the disturbed waterbody crossing. Application of riprap for bank stabilization must comply with COE, or its delegated agency, permit terms and conditions.

6. Install erosion control fabric, in accordance with Section 3.6.1.2, or a functional equivalent on waterbody banks at the time of final bank contouring (Figure EC-13, WC-5). Do not use synthetic monofilament mesh/netted erosion control materials in areas designated as sensitive wildlife habitat unless the product is specifically designed to minimize harm to wildlife.

7. Revegetate disturbed riparian areas with native species of conservation grasses, legumes and woody species similar in density to adjacent undisturbed lands.

8. In the event that final cleanup is deferred more than 20 days after the trench is backfilled, all slopes within 100 feet of waterbodies shall be mulched with 3 tons/acre of straw.

9. Remove all temporary sediment barriers when replaced by permanent erosion controls or when restoration of adjacent upland areas is successful as specified in Section 8.1.

10. Install a permanent slope breaker and a trench breaker at the base of slopes greater than 5% that are less than 50 feet from each waterbody crossed.

6. WETLAND CROSSINGS

The term "wetland" as used in this plan includes any area that satisfies the requirements of the current federal methodology for identifying and delineating wetlands. The requirements outlined below do not apply to wetlands in actively cultivated or rotated cropland. Standard upland protective measures, including workspace and topsoil segregation requirements, apply to these agricultural wetlands.

Wetland boundaries are identified on the construction drawings and within the Clearance Package / Permit Book. Wetlands are delineated prior to construction using current federal methodology and summarized within a wetland delineation report, which identifies the following information for all wetlands that would be affected by the construction ROW:

- Location, including pipeline milepost if crossed by centerline;
- National Wetland Inventory (NWI) classification;
- Crossing length in feet;
- Area of permanent and temporary disturbance that would occur in each wetland, sorted by NWI classification type.

6.1 General Wetland Procedures

Crossing procedures are to comply with COE, or its delegated agency, permit terms and conditions. Project-specific permits or authorizations issued by the COE or other appropriate agenc(ies) are provided in the Clearance Package / Permit Book. Implement the following general requirements during planning and construction near or across wetlands:

1. Route the pipeline to avoid wetland areas to the maximum extent possible.

2. If a wetland cannot be avoided or crossed by following an existing right-of-way, route the new pipeline in a manner that minimizes disturbance to wetlands. Where looping an existing pipeline, overlap the existing pipeline right-of-way with the new construction right-of-way. In addition, locate the loop line no more than 25 feet away from the existing pipeline unless site-specific constraints would adversely affect the stability of the existing pipeline.

3. Identify site-specific areas where excessively wide trenches could occur and/or where spoil piles could be difficult to maintain because existing soils lack adequate unconfined compressive strength.

4. Limit construction activity and ground disturbance in wetland areas to a construction ROW width of 75 feet or as shown on the construction drawings. Only with prior written approval from the FERC, construction ROW width within the boundaries of federally delineated wetlands may be expanded beyond 75 feet if required by site-specific topographic conditions or soil limitations.

5. All extra work areas must be located at least 50 feet away from wetland boundaries, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land. Only with prior written approval from the FERC, the Company can locate extra work areas closer than 50 feet from the wetland if site-specific conditions justify a less than 50-foot setback.

6. Aboveground facilities shall not be located in any wetland, except as permitted or where the location of such facilities outside of wetlands would prohibit compliance with U.S.DOT regulations.

7. In the event a waterbody crossing is located within or adjacent to a wetland crossing, the Company must file a site-specific crossing plan for review and obtain written approval by the FERC before construction if all measures of Sections V. and VI. of the FERC Procedures cannot be met.

8. Limit construction equipment operating in wetland areas to that needed to clear the ROW, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the construction ROW. All other construction equipment shall use access roads located in upland areas to the maximum extent practical. Refer to Section 3.2 for other requirements and restrictions pertaining to access to the construction ROW or use of roads across wetlands.

6.2 Clearing and Grading at Wetlands

1. Wetland boundaries and buffers (e.g., extra work area setbacks, refueling restrictions) must be clearly marked in the field with signs and /or highly visible flagging until construction-related ground disturbing activities are complete.

2. If standing water or saturated soils are present, or if construction equipment causes ruts or mixing of the topsoil and subsoil in wetlands, use low-ground-weight construction equipment or operate normal equipment on timber riprap, prefabricated equipment mats or terra mats on the working side of the ROW during clearing operations.

3. Attempt to use no more than two layers of timber riprap to stabilize the ROW. If approved by the COE, woody debris can be burned in wetlands as long as it is in accordance with state and local regulations, ensuring that all woody debris is removed for disposal.

4. Cut vegetation just above ground level and grind stumps to ground level, leaving existing root systems in place and remove any excess vegetation (e.g., wood chips). Immediately remove all cut trees, limbs and branches from the wetland and stockpile in an upland area on ROW for disposal.

5. Limit pulling of tree stumps and grading activities to directly over the trenchline. Do not grade or remove stumps or root systems from the rest of the construction ROW in wetlands unless the Chief Inspector and EI determine that safety-related construction constraints require grading or the removal of tree stumps from under the working side of the construction ROW.

6. Do not cut trees outside of the construction ROW to obtain timber for riprap or equipment mats.

7. Cleared materials, such as slash, logs, brush, and wood chips, shall not be permanently placed within wetland areas.

6.3 Temporary Erosion & Sediment Control at Wetlands

Install sediment barriers immediately after initial ground disturbance at the following locations:

- Within the ROW at the edge of the boundary between wetland and upland;
- At the base of slopes greater than 5% where the base of the slope is less than 50 feet from a wetland;
- Across the entire ROW immediately upslope of the wetland boundary to contain spoil within the construction ROW and prevent sediment flow into the wetland;
- Along the edge of the ROW, where the ROW slopes toward the wetland, to protect adjacent, off ROW wetland; and
- Along the edge of the ROW as necessary to contain spoil and prevent sediment from migrating outside the construction ROW in areas where a wetland is both within and adjacent to the construction ROW.

Maintain all sediment barriers throughout construction and reinstall as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete in accordance with Section 8.1. Remove the sediment barriers during right-of-way cleanup.

6.4 Wetland Crossing Procedure

Procedures used to install a pipeline across wetlands vary depending on the level of soil stability and saturation encountered during construction. The following best management practices are to be employed during standard wetland crossings:

1. Assemble the pipeline in an upland area unless the wetland is dry enough to adequately support skids and pipe.

2. Do not use rock, soil imported from outside the wetland, tree stumps, or brush riprap to stabilize the ROW.

3. Perform topsoil segregation in accordance with Section 3.5.3.1, including segregating the top 1 foot of topsoil from the area disturbed by trenching, except in areas where standing water is present or soils are saturated. Immediately after backfilling is complete, restore the segregated topsoil to its original location.

4. If required, dewatering should be conducted as described in Section 3.5.6.

5. Minimize the length of time that topsoil is segregated and the trench is open. Do not trench the wetland until the pipeline is assembled and ready for lowering-in.

6. Use “push-pull” or “float” construction techniques to place the pipe in the trench where water and other site conditions allow (Refer to Section 6.4.1 below).

7. Install permanent trench breakers at the wetland boundaries and/or seal the trench bottom as necessary to maintain the original wetland hydrology at locations where the pipeline trench may drain a wetland.

8. Install a permanent slope breaker and a trench breaker at the base of slopes near the boundary between the wetland and adjacent upland areas for each wetland crossed.

9. Install a permanent slope breaker across the construction right-of-way at the base of slopes greater than 5% where the base of the slope is less than 50 feet from the wetland, or as needed to prevent sediment transport into the wetland. In some areas, with the approval of the EI, an earthen berm may be suitable as a sediment barrier adjacent to the wetland.

10. Restore segregated topsoil to its original position after backfilling is complete. When required, additional fill material imported from off the ROW must be approved by the EI.

11. Preconstruction wetland contours and flow regimes will be restored to the extent practical.

6.4.1 Push-pull Technique

The "push-pull" or "float" or "drag section" method may be utilized during wetland crossings if conditions are suitable at the time of construction. Sufficient, naturally present groundwater volumes that fill the excavated trench are required to facilitate this installation method. This method may be used to install the pipeline if the wetland to be crossed contains standing water or saturated and/or unstable soils.

- Trenching equipment will excavate a trench across the wetland, either using low-ground-weight equipment or working on timber matting.
- While the trench is being excavated, the pipeline crossing sections will be assembled and welded together in uplands.
- Prefabricated pipeline crossing sections will then be pushed or pulled into the trench; floated across the wetland and released into the trench if the trench is filled with water; or, carried into position with sideboom tractors supported on equipment mats.
- The excavating equipment will "walk through" the wetland by carrying timber mats and repositioning the mats as it operates from one mat to the next through the wetland during trenching, backfilling, and cleanup activities.

6.5 Wetland Cleanup and Restoration

1. Restore pre-construction wetland contours to maintain the wetland hydrology.

2. Revegetate the ROW with annual ryegrass at 40 lbs/acre PLS or with the recommended Wetland Seed Mix in Appendix C or project-specific seed mix where applicable, unless standing water is present or unless prohibited by state or land management agency.

3. **Do not use lime, mulch or fertilizer in wetland areas** unless required in writing by the appropriate federal or state agency**,** as identified in the Clearance Package/Permit Book.

4. In the event that final cleanup is deferred more than 20 days after the trench is backfilled, all slopes adjacent to wetlands shall be mulched with 3 tons/acre of straw for a minimum of 100 feet on each side of the crossing.

5. Remove all project-related material used to support equipment on the construction ROW, including timber riprap and prefabricated equipment mats, upon completion of construction.

6. Develop specific procedures in coordination with the appropriate federal or state agency, where necessary, to prevent the invasion or spread of invasive vegetation (such as purple loosestrife and phragmites).

7. Ensure that all disturbed areas permanently revegetate in accordance with Section 8.1.

8. Remove temporary sediment barriers located at the boundary between wetland and adjacent upland areas after upland revegetation and stabilization of adjacent upland areas are successful as specified in Section 8.1.

7. SPILL PREVENTION & RESPONSE

7.1 SPCC / PPC Plan

The Company and Contractor shall adhere to the SPCC/PPC Plan at all times. This plan has been prepared to meet the requirements of several federal regulations and guidelines: the FERC's Plan and Procedures; Oil Pollution Act; Federal Water Pollution Control Act; Comprehensive Environmental Response, Compensation and Liability Act of 1980; the Resource Conservation and Recovery Act; Toxic Substances Control Act; and, the Clean Water Act.

The purpose of the SPCC/PPC Plan is to reduce the probability and risk of a potential spill or release of oil or hazardous materials during construction-related activities. The objectives of this plan are to identify and address:

- The type and quantity of material handled, stored, or used on site during construction;
- Measures to be taken for spill preparedness and prevention;
- Emergency response procedures;
- Spill incident reporting/notification procedures; and
- Local emergency response team arrangements.

7.2 Spill Prevention Measures

Structure operations in a manner that reduce the risk of spills or the accidental exposure of fuels or hazardous materials to waterbodies or wetlands. At a minimum,

1. All employees handling fuels and other hazardous materials are to be properly trained.

2. All equipment shall be in good operating order and inspected on a regular basis.

3. Fuel trucks transporting fuel to on-site equipment should travel only on approved access roads.

4. All equipment is to be parked overnight and/or fueled at least 100 feet from any wetland or waterbody. These activities can occur closer only if the EI determines that there is no reasonable alternative, and appropriate steps have been taken (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill.

5. Do not store hazardous materials, including chemicals, fuels, and lubricating oils within 100 feet of a wetland, waterbody or designated municipal watershed area, unless the location is designated for such use by an appropriate governmental authority. This applies to storage of these materials and does not apply to normal operation or use of equipment in these areas. If the 100-foot setback cannot be met, this activity can be performed within the 100-foot setback, with EI approval, if done in accordance with the SPCC/PPC Plan.

6. Do not perform fondu or concrete coating activities within 100 feet of any wetland or waterbody boundary, unless the location is an existing industrial site designated for such use. If the 100-foot setback cannot be met, these activities can be performed within the 100-foot setback, if the EI

determines that there is no reasonable alternative and appropriate steps have been taken (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill.

7. Pumps operating within 100 feet of a waterbody or wetland boundary shall utilize appropriate secondary containment systems to prevent spills; and

8. Bulk storage of hazardous materials, including chemicals, fuels, and lubricating oils have appropriate secondary containment systems to prevent spills.

7.3 Spill Cleanup & Response

Structure operations in a manner that provides for the prompt and effective cleanup of spills of fuel and other hazardous materials. At a minimum,

1. Ensure that each construction crew (including cleanup crews) has on hand sufficient supplies of absorbent and barrier materials to allow the rapid containment and recovery of spilled materials and knows the procedure for reporting spills and unanticipated discoveries of contamination;

2. Ensure that each construction crew has on hand sufficient tools and material to stop leaks; and,

3. Know the contact names and telephone numbers for all local, state, and federal agencies (including, if necessary, the U. S. Coast Guard and the National Response Center) that must be notified of a spill; and follow the requirements of those agencies in cleaning up the spill, in excavating and disposing of soils or other materials contaminated by a spill, and in collecting and disposing of waste generated during spill cleanup.

8. POST-CONSTRUCTION ACTIVITIES

8.1 Post-Construction Monitoring

Projects conducted under the blanket certificate or a project-specific Section 7 Order, shall meet the monitoring requirements set forth in this section. Company personnel shall perform the following:

1. Establish and implement a program to monitor the success of restoration upon completion of construction and restoration activities.

2. Conduct follow-up inspections of all disturbed upland areas as necessary, to determine the success of revegetation and address landowner concerns. At a minimum, conduct inspections after the first and second growing seasons.

3. In nonagricultural upland areas, revegetation shall be considered successful if the vegetative cover is sufficient to prevent the erosion of soils on the disturbed ROW and density and cover are similar to that in adjacent undisturbed area. Sufficient coverage in upland areas is defined when vegetation has a uniform 70 percent vegetative coverage.

4. In agricultural areas, revegetation shall be considered successful when upon visual survey, growth and vigor are similar to adjacent undisturbed portions of the same field, unless the easement agreement specifies otherwise.

5. In wetlands, monitor and record the success of revegetation annually, until wetland revegetation is successful:

   a. Wetland revegetation will be considered successful when the affected wetland satisfies the current federal definition for a wetland (i.e. soils, hydrology, and vegetation);

   b. Vegetation should be at least 80 percent of either the cover documented for the wetland prior to construction, or at least 80 percent of the cover in adjacent wetland areas that were not disturbed by construction;

   c. If natural rather than active revegetation was used, the plant species composition must be consistent with early successional wetland plant communities in the affected ecoregion;

   d. Invasive species and noxious weeds should be absent unless they are abundant in adjacent areas that were not disturbed by construction; and,

   e. For any wetland where revegetation is not successful at the end of 3 years after construction, the Company shall develop and implement (in consultation with a professional wetland ecologist) a remedial plan to actively revegetate the wetland.

6. Inspect all remaining temporary erosion and sediment controls during routine patrols to ensure proper functioning. Any deficiencies found will be reported and corrected as needed. Once the area has revegetated and stabilized, the erosion controls will be removed.

7. Revegetation efforts (such as fertilizing or reseeding) will continue until revegetation is successful.

8. Restoration shall be considered successful if the ROW surface condition is similar to adjacent undisturbed lands, construction debris is removed (unless otherwise approved by the land owner or land managing agency), revegetation is successful, and proper drainage has been restored.

9. Monitor and correct problems with drainage and irrigation systems resulting from pipeline construction in agricultural areas until restoration is successful.

10. Make efforts to control unauthorized off-road vehicle use, in cooperation with the landowner, throughout the life of the project. Maintain signs, gates, and vehicle trails as necessary.

8.2 Post-Construction Maintenance

Routine maintenance of the ROW is required to allow continued access for routine pipeline patrols, maintaining access in the event of emergency repairs, and visibility during aerial patrols. Where the newly established pipeline ROW is located on other existing ROWs not affiliated with the Company, the easement holder or owner will continue to maintain their ROWs using procedures specified in their vegetative management programs.

Projects conducted under this E&SCP and subject to the FERC Plan and Procedures, shall meet the maintenance requirements set forth in this section. The following requirements restrict the amount of vegetation maintenance that can occur within new ROW.

8.2.1 Uplands

In upland areas, maintenance of the ROW will involve clearing the entire ROW of woody vegetation.

1. Routine vegetation mowing or clearing over the full width of the permanent ROW in uplands shall be conducted no more frequently than <u>once every 3 years</u>. However, to facilitate periodic corrosion and leak surveys, a 10-foot wide corridor centered on the pipeline may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state.

2. Routine vegetation mowing or clearing shall not occur between April 15 and August 1 of any year unless specifically approved in writing by the responsible land management agency of the U.S. Fish and Wildlife Service.

8.2.2 Waterbodies and Wetlands

1. Do not conduct routine vegetation mowing or clearing over the full width of the permanent ROW in wetlands or riparian areas.

   a. Limit routine vegetation mowing or clearing practices adjacent to waterbodies to allow a riparian strip that measures 25 feet back from the waterbody's mean high water mark. This riparian strip will be allowed to permanently revegetate with native plant species across the entire construction ROW.

   b. To facilitate periodic corrosion and leak surveys within wetlands and the 25-foot-wide riparian strip adjacent to waterbodies, a corridor up to 10 feet wide centered on the pipeline may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state.

c. Trees located within 15 feet of the pipeline that have roots that could compromise the integrity of the pipeline coating may be cut and removed from the permanent ROW.

2. Do not conduct any routine vegetation mowing or clearing in riparian areas or wetlands that are between HDD entry and exit points.

3. Herbicides or pesticides shall not be used in or within 100 feet of a wetland or waterbody, except as specified by the federal or state agency.

4. Time of year restrictions apply to routine mowing as well as selective clearing of trees within riparian or wetland areas. These activities are prohibited between April 15 – August 1 of any year.

8.3 Reporting

The Company shall maintain records that identify by milepost:

1. Method of application, application rate, and type of fertilizer, pH modifying agent, seed, and mulch used;
2. Acreage treated;
3. Dates of backfilling and seeding;
4. The location of any subsurface drainage repairs or improvements made during restoration;
5. Names of landowners requesting special seeding treatment and a description of the follow-up actions; and
6. Any problem areas and how they were addressed.

The Contractor is responsible for providing the EI with the information and documentation on applications, rates, and types of fertilizer, pH modifying agents, seed and mulch that are used during a project.

For the FERC-authorized projects, other than projects conducted under the blanket certificate, the Company will file quarterly activity reports documenting problems, including those identified by the landowner, and corrective actions taken for <u>at least 2 years</u> following construction.

A wetland revegetation monitoring report identifying the status of the wetland revegetation efforts will be filed at the end of 3 years following construction, and annually thereafter documenting progress within the wetland until revegetation is successful. The requirements to file wetland restoration reports with FERC does not apply to projects authorized under the blanket certificate (i.e. automatic and prior notice) or advanced notice provisions in the FERC regulations.

APPENDIX A

E&SCP FIGURES

FIGURE NUMBER	STANDARD NUMBER	DRAWING TITLE
CONSTRUCTION WORKAREAS (CW)		
CW-1	ES-0001	TYPICAL TRENCH DETAIL
CW-2	ES-0002	RIGHT-OF-WAY TOPSOIL SEGREGATION TECHNIQUES
CW-3	ES-0003	TYPICAL CONSTRUCTION WIDTHS ACQUIRING NEW PERMANENT RIGHT-OF-WAY
CW-4	ES-0004	TYPICAL CONSTRUCTION WIDTHS NOT ACQUIRING NEW PERMANENT RIGHT-OF-WAY (SINGLE LINE SYSTEM)
CW-5	ES-0005	TYPICAL CONSTRUCTION WIDTHS NOT ACQUIRING NEW PERMANENT RIGHT-OF-WAY (MULTIPLE LINE SYSTEM)
ACCESS ROADS & ROAD CROSSINGS (RD)		
RD-1	ES-0006	ACCESS ROAD CROSS SECTION
RD-2	ES-0007	ROCK ACCESS PAD
RD-3	ES-0008	TYPICAL TEMPORARY ACCESS ROAD THROUGH WETLANDS
RD-4	ES-0009	TYPICAL PAVED ROAD CROSSING CONTROL MEASURES (OPEN CUT)
RD-5	ES-0010	TYPICAL PAVED ROAD CROSSING CONTROL MEASURES (BORED)
EROSION CONTROLS (EC)		
EC-1	ES-0011	SILT FENCE DETAIL
EC-2	ES-0012	STRAW BALE DETAIL
EC-3	ES-0013	STRAW BALE CHECK DAM IN A DRAINAGEWAY
EC-4	ES-0014	ROCK-LINED DRAINAGE SWALE
EC-5	ES-0015	STORM DRAIN INLET PROTECTION
EC-6	ES-0016	TEMPORARY TRENCH PLUG OPTIONS
EC-7	ES-0017	TEMPORARY SLOPE BREAKERS
EC-8	ES-0018	PERMANENT SLOPE BREAKERS
EC-9	ES-0019	CHEVRON SLOPE BREAKER
EC-10	ES-0020	TRENCH BREAKER DETAIL (SACK)
EC-11	ES-0021	TRENCH BREAKER DETAIL (FOAM)
EC-12	ES-0022	PERMANENT TRENCH BREAKER OPTIONS
EC-13	ES-0023	EROSION CONTROL FABRIC INSTALLATION
EC-14	ES-0024	TYPICAL EROSION CONTROL BLANKETS ON SLOPES
WATER DISCHARGES (WD)		
WD-1	ES-0025	FILTER BAG
WD-2	ES-0026	DISCHARGE STRUCTURE FOR HYDROSTATIC TEST WATER
WD-3	ES-0027	OPTIONS FOR SMALL WATER DISCHARGES
WD-4	ES-0028	DISCHARGE OF HYDROSTATIC TEST WATER TO A SURFACE WATER
BRIDGES (BR)		
BR-1	ES-0029	TEMPORARY EQUIPMENT BRIDGE (EQUIPMENT PADS WITH OR WITHOUT CULVERTS)
BR-2	ES-0030	TEMPORARY EQUIPMENT BRIDGE (CRUSHED STONE WITH CULVERTS)
BR-3	ES-0031	TEMPORARY EQUIPMENT BRIDGE (FLEXI-FLOAT OR PORTABLE BRIDGE)
WATERBODY AND WETLAND CROSSINGS (WC)		
WC-1	ES-0032	TYPICAL STANDARD WETLAND CROSSING
WC-2	ES-0033	TYPICAL WET WATERBODY CROSSING
WC-3	ES-0034	TYPICAL FLUME WATERBODY CROSSING
WC-4	ES-0035	TYPICAL DAM-AND-PUMP WATERBODY CROSSING
WC-5	ES-0036	TYPICAL EROSION CONTROL BLANKETS ON STREAMBANKS
WC-6	ES-0037	TYPICAL RIP-RAP PLACEMENT
SPECIAL USE / AGRICULTURAL AREAS (SU)		
SU-1	ES-0038	DRAIN TILE REPAIR PROCEDURE

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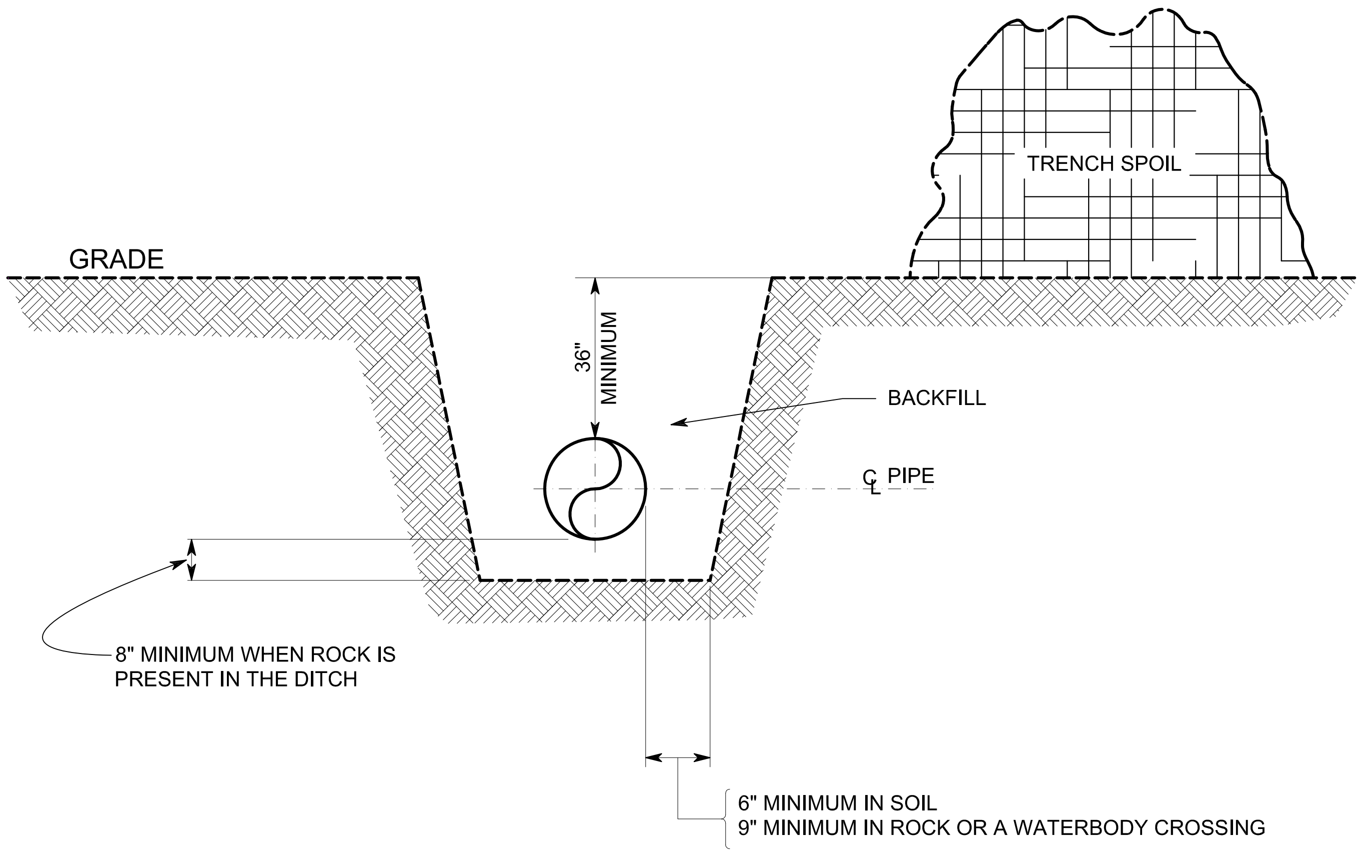
INDEX OF FIGURES

APPENDIX A

DWG. ES-0000 REV.



CROSS-SECTION VIEW

NOTES:

1. ALL PRECONSTRUCTION CONTOURS WILL BE RE-ESTABLISHED UPON COMPLETION OF PIPE INSTALLATION. EXCEPT IN WETLANDS, A CROWN MAY BE LEFT TO ACCOUNT FOR DITCH SETTLING, AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

2. IN COLD WATER FISHERY STREAMS, THE TOP 12" OF THE TRENCH WILL BE BACKFILLED WITH CLEAN GRAVEL OR NATIVE COBBLES UNLESS OTHERWISE SPECIFIED BY THE PERMITTING AGENCY.

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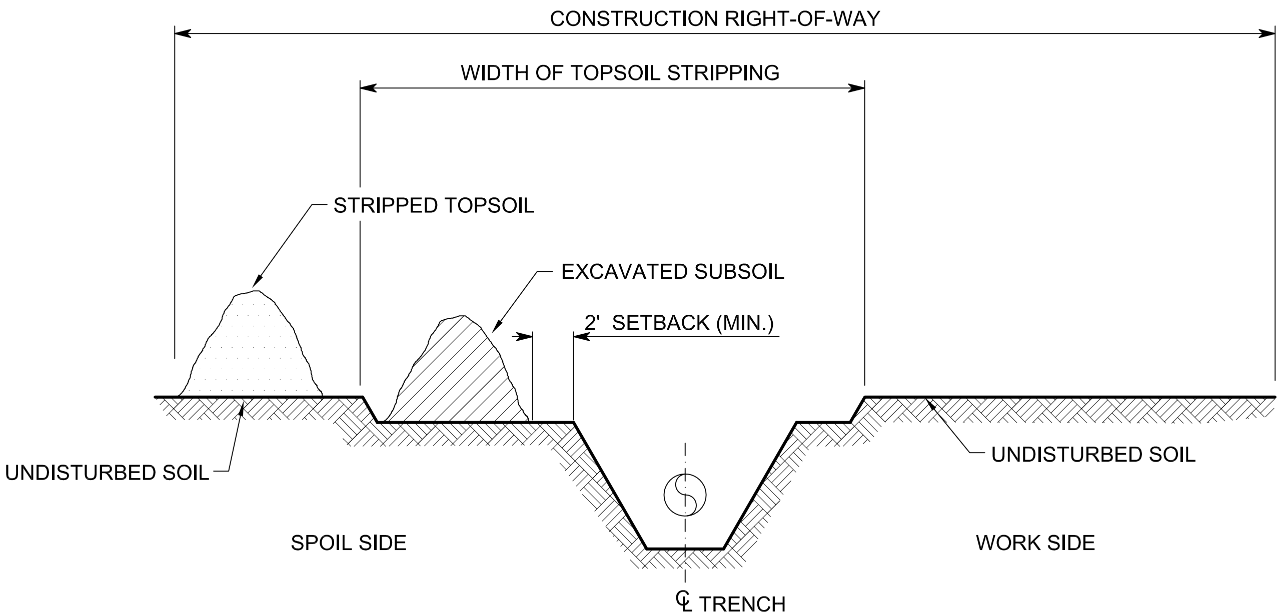
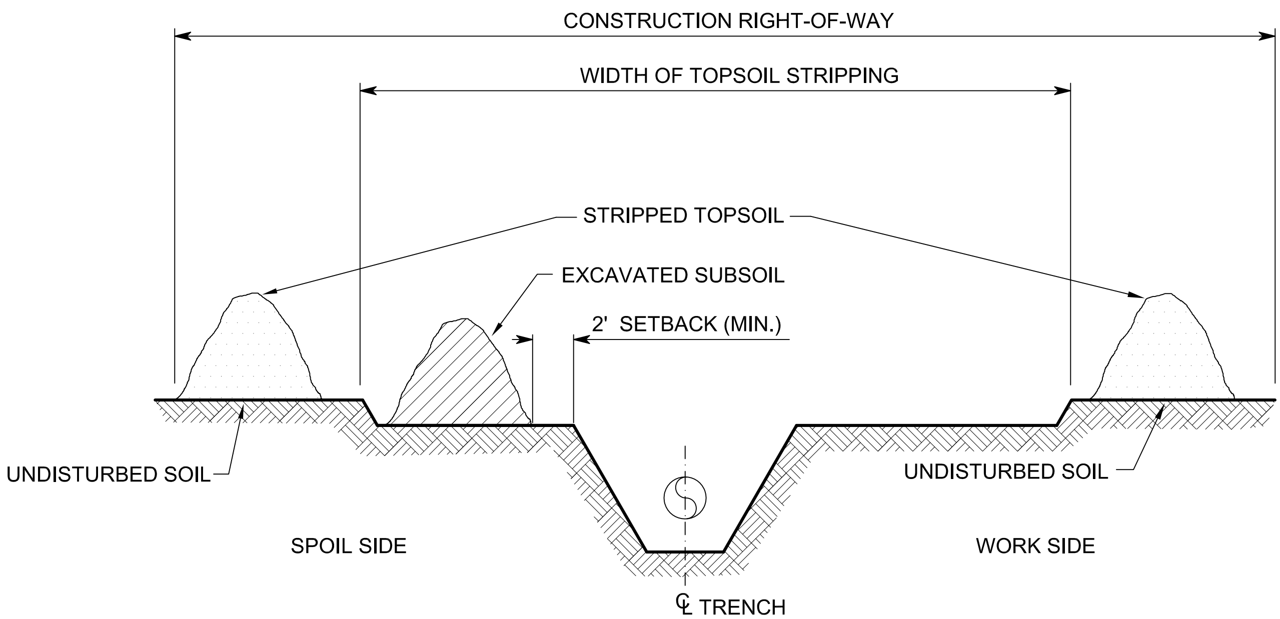
I.G. ES0001.DWG	TYPICAL TRENCH DETAIL	FIGURE CW-1
		DWG. ES-0001 REV.



DITCH PLUS SPOILSIDE TOPSOIL SEGREGATION



FULL RIGHT-OF-WAY TOPSOIL STRIPPING

NOTES:

1. TOPSOIL MAY BE STORED IN LOCATIONS AS SHOWN ABOVE OR AT OTHER COMPANY APPROVED LOCATIONS WITHIN THE CONSTRUCTION R.O.W.

2. LEAVE GAPS IN SPOIL PILES FOR WATER RUN-OFF.

3. MAINTAIN SEPARATION OF SALVAGED TOPSOIL AND SUBSOIL THROUGHOUT ALL CONSTRUCTION ACTIVITIES.

4. STABILIZE TOPSOIL PILES AND MINIMIZE LOSS DUE TO WATER OR WIND EROSION WITH USE OF SEDIMENT BARRIERS, MULCH, TEMPORARY SEEDING, TACKIFIERS OR FUNCTIONAL EQUIVALENTS, WHERE NECESSARY.

RIGHT-OF-WAY TOPSOIL SEGREGATION TECHNIQUES

FIGURE CW-2

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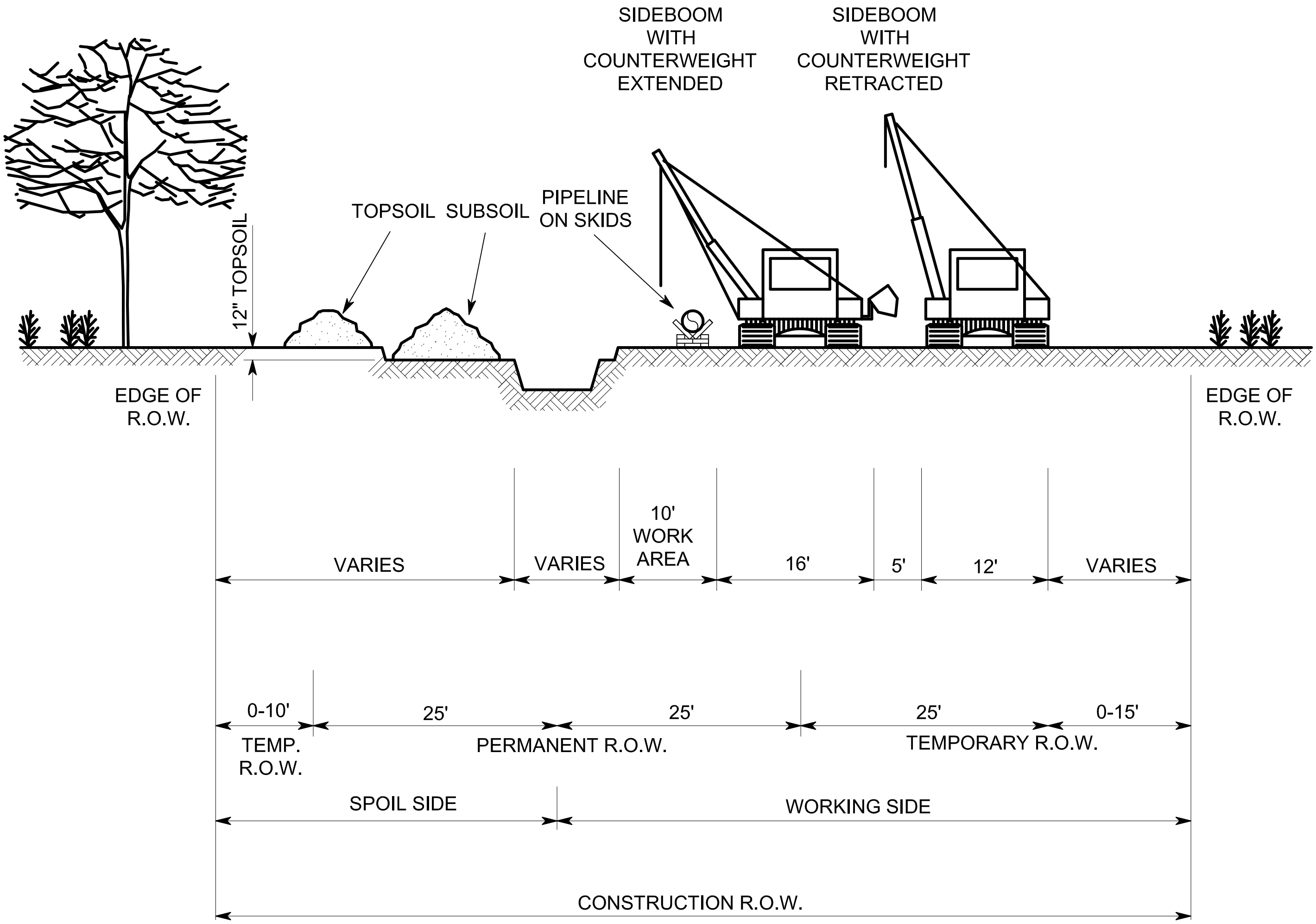

PIPE DIAMETER	SPOIL SIDE (FT.)	WORKING SIDE (FT.)	CONSTRUCTION R.O.W. (FT.)
12" OR LESS	25	50	75
14" - 30"	35	50	85
36" - 42"	35	65	100
WETLANDS	25	50	75

NOTES:

1. ALTHOUGH THE DIMENSIONS SHOWN ARE TYPICAL, SOME VARIATIONS MAY EXIST DUE TO SITE SPECIFIC CONDITIONS. UNLESS OTHERWISE INDICATED ON THE ALIGNMENT SHEETS, THE MAXIMUM WIDTH OF THE CONSTRUCTION RIGHT-OF-WAY SHALL BE AS SHOWN IN THE TABLE FOR THE APPROPRIATE PIPE DIAMETER.

2. TOPSOIL SEGREGATION METHODS WILL BE USED IN ALL RESIDENTIAL AREAS AND WHEN THE CONSTRUCTION ROW IS WIDER THAN 30 FEET IN CULTIVATED OR ROTATED AGRICULTURAL LANDS, MANAGED PASTURES, HAYFIELDS, AND OTHER AREAS AT THE LANDOWNER'S OR LAND MANAGEMENT AGENCY'S REQUEST. FOR WETLANDS, SEGREGATE THE TOP 12 INCHES OF TOPSOIL WITHIN THE DITCH LINE, EXCEPT IN AREAS WHERE STANDING WATER IS PRESENT OR SOILS ARE SATURATED.

TYPICAL CONSTRUCTION WIDTHS ACQUIRING NEW PERMANENT RIGHT-OF-WAY

FIGURE CW-3

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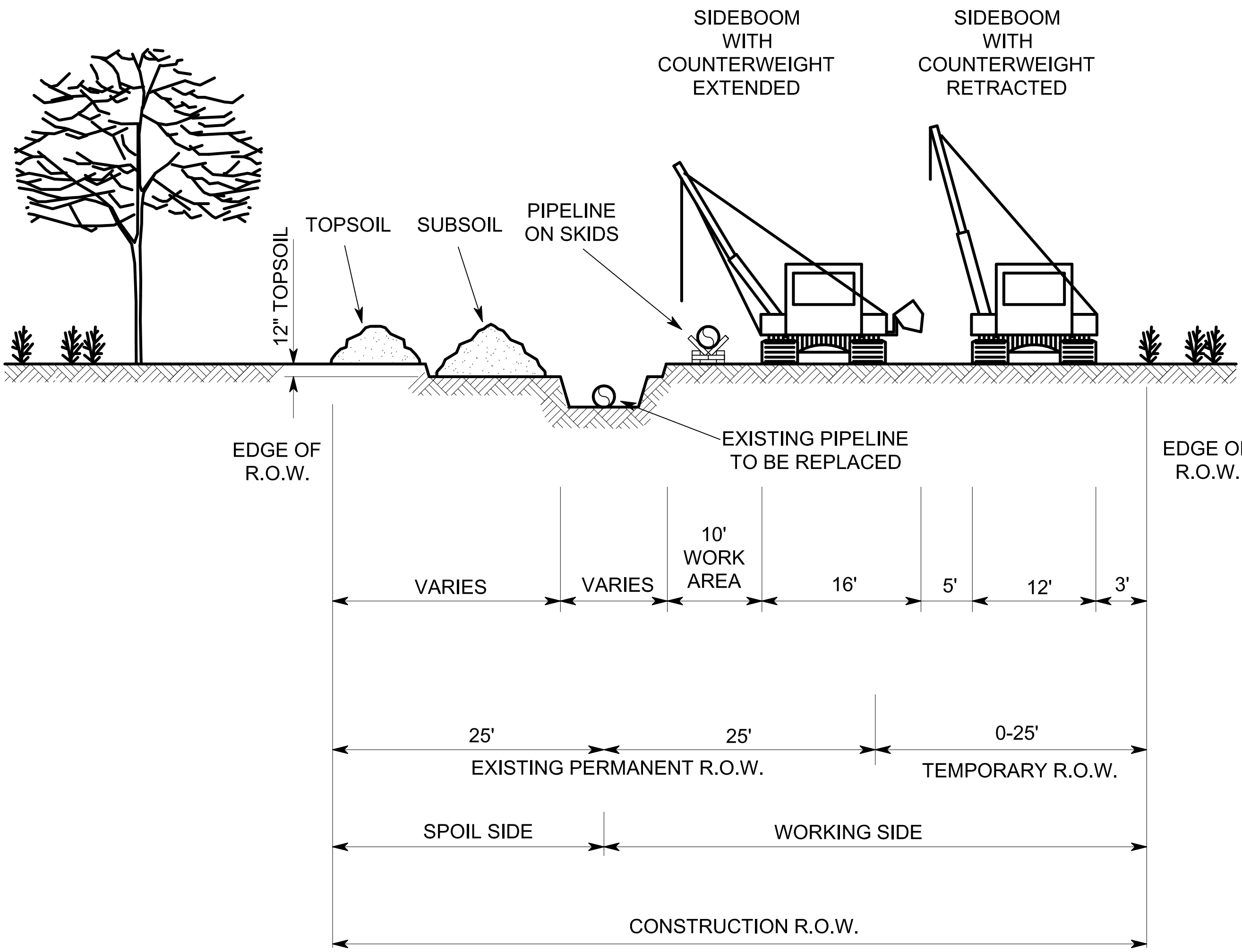

PIPE DIAMETER	SPOIL SIDE (FT.)	WORKING SIDE (FT.)	CONSTRUCTION R.O.W. (FT.)
12" OR LESS	25	25	50
14" - 30"	25	50	75
36" - 42"	25	50	75
WETLANDS	25	50	75

NOTES:

1. ALTHOUGH THE DIMENSIONS SHOWN ARE TYPICAL, SOME VARIATIONS MAY EXIST DUE TO SITE SPECIFIC CONDITIONS. UNLESS OTHERWISE INDICATED ON THE ALIGNMENT SHEETS, THE MAXIMUM WIDTH OF THE CONSTRUCTION RIGHT-OF-WAY SHALL BE AS SHOWN IN THE TABLE FOR THE APPROPRIATE PIPE DIAMETER.

2. TOPSOIL SEGREGATION METHODS WILL BE USED IN ALL RESIDENTIAL AREAS AND WHEN THE CONSTRUCTION ROW IS WIDER THAN 30 FEET IN CULTIVATED OR ROTATED AGRICULTURAL LANDS, MANAGED PASTURES, HAYFIELDS, AND OTHER AREAS AT THE LANDOWNER'S OR LAND MANAGEMENT AGENCY'S REQUEST. FOR WETLANDS, SEGREGATE THE TOP 12 INCHES OF TOPSOIL WITHIN THE DITCH LINE, EXCEPT IN AREAS WHERE STANDING WATER IS PRESENT OR SOILS ARE SATURATED.

3. IF THE WORKING SIDE MUST BE GREATER THAN THE VALUES SHOWN IN THE TABLE, COMPANY MUST REQUEST APPROVAL FROM THE F.E.R.C.

TYPICAL CONSTRUCTION WIDTHS NOT ACQUIRING NEW PERMANENT RIGHT-OF-WAY (SINGLE LINE SYSTEM)

FIGURE CW-4

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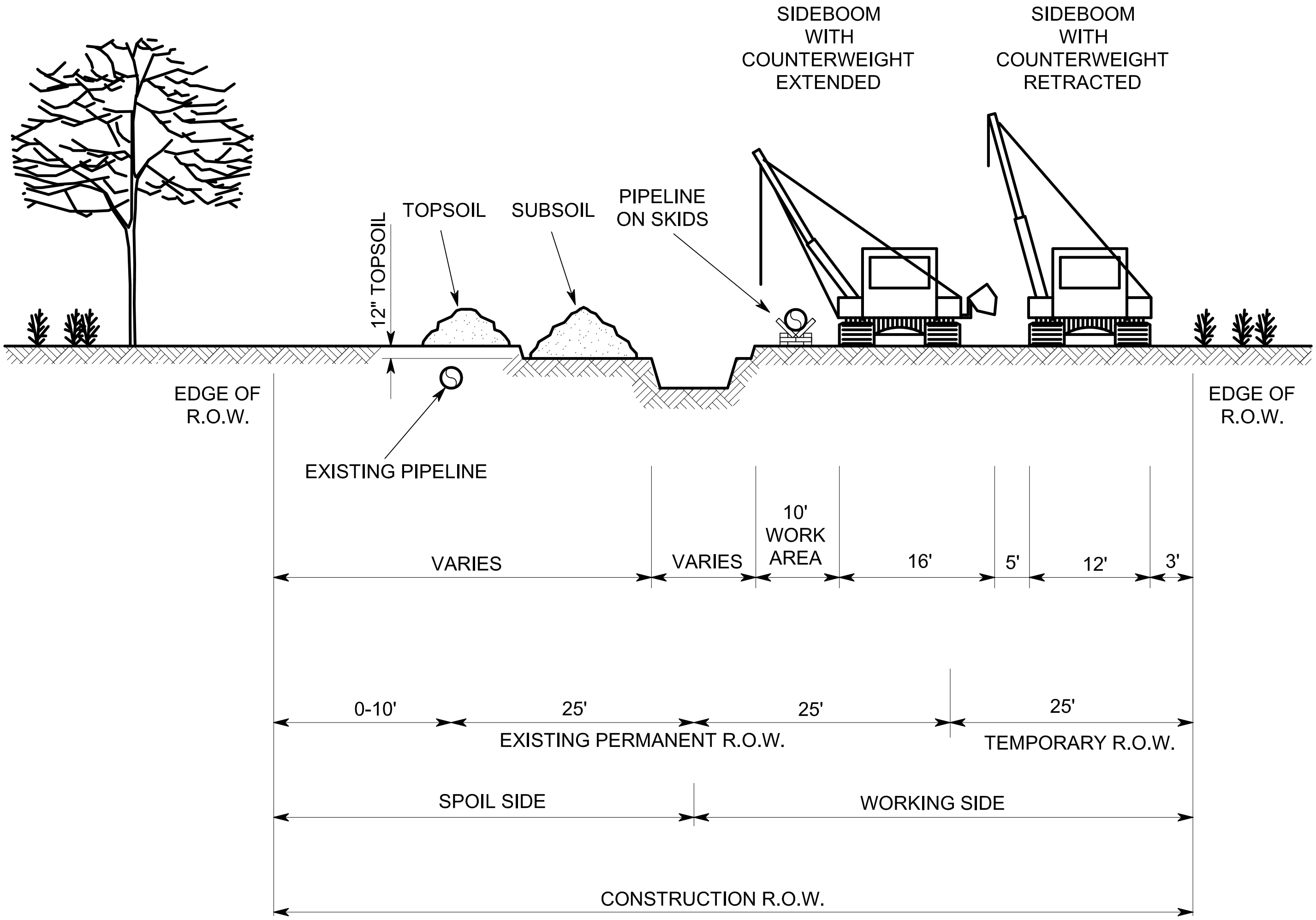

PIPE DIAMETER	SPOIL SIDE (FT.)	WORKING SIDE (FT.)	CONSTRUCTION R.O.W. (FT.)
12" OR LESS	25	50	75
14" - 30"	35	50	85
36" - 42"	35	50	85
WETLANDS	25	50	75

NOTES:

1. ALTHOUGH THE DIMENSIONS SHOWN ARE TYPICAL, SOME VARIATIONS MAY EXIST DUE TO SITE SPECIFIC CONDITIONS. UNLESS OTHERWISE INDICATED ON THE ALIGNMENT SHEETS, THE MAXIMUM WIDTH OF THE CONSTRUCTION RIGHT-OF-WAY SHALL BE AS SHOWN IN THE TABLE FOR THE APPROPRIATE PIPE DIAMETER.

2. TOPSOIL SEGREGATION METHODS WILL BE USED IN ALL RESIDENTIAL AREAS AND WHEN THE CONSTRUCTION ROW IS WIDER THAN 30 FEET IN CULTIVATED OR ROTATED AGRICULTURAL LANDS, MANAGED PASTURES, HAYFIELDS, AND OTHER AREAS AT THE LANDOWNER'S OR LAND MANAGEMENT AGENCY'S REQUEST. FOR WETLANDS, SEGREGATE THE TOP 12 INCHES OF TOPSOIL WITHIN THE DITCH LINE, EXCEPT IN AREAS WHERE STANDING WATER IS PRESENT OR SOILS ARE SATURATED.

3. IF THE WORKING SIDE MUST BE GREATER THAN 50 FEET (i.e. TEMPORARY WORKSPACE IS GREATER THAN 25 FEET), COMPANY MUST REQUEST APPROVAL FROM THE F.E.R.C.

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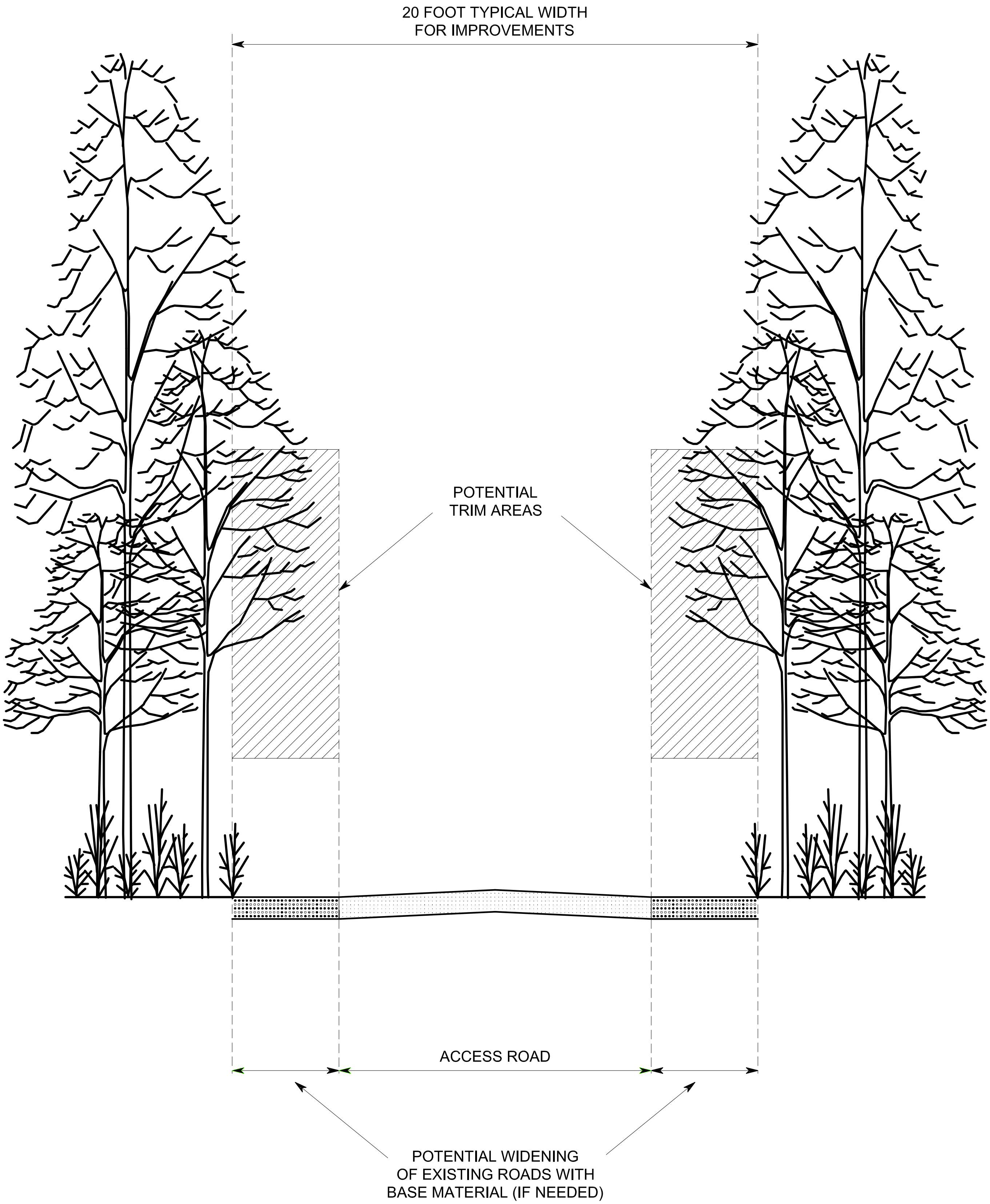
TYPICAL CONSTRUCTION WIDTHS NOT ACQUIRING NEW PERMANENT RIGHT-OF-WAY (MULTIPLE LINE SYSTEM)

FIGURE CW-5

DWG. ES-0005 REV.



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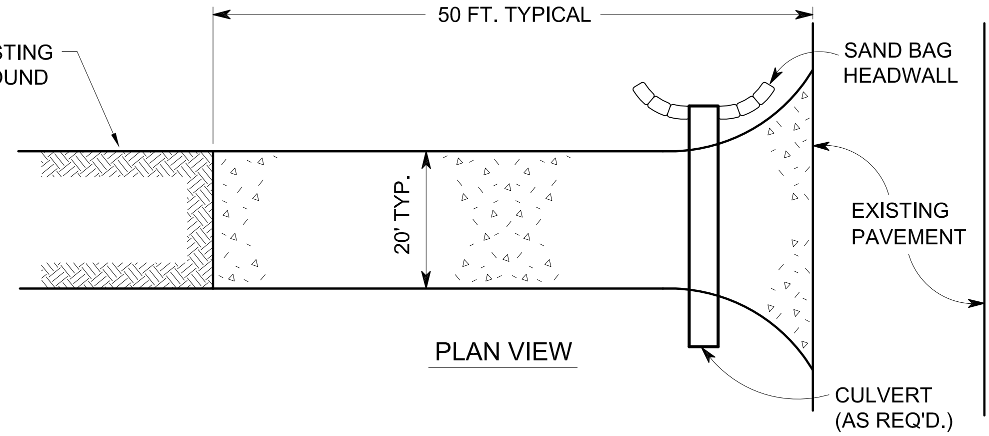
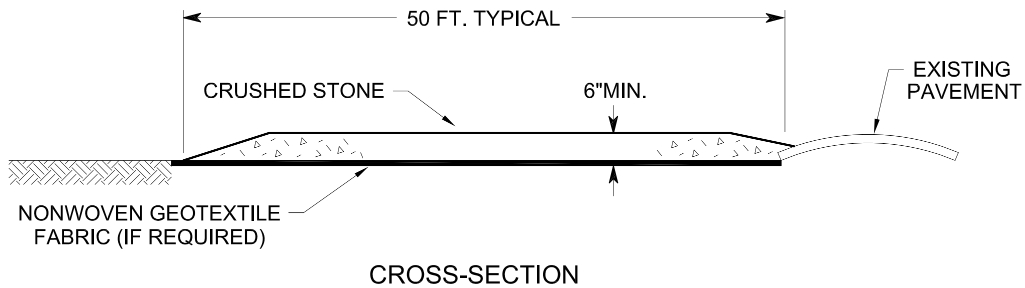
I.G. ES0006.DWG	ACCESS ROAD CROSS SECTION	FIGURE RD-1
		DWG. ES-0006 REV.





CONSTRUCTION SPECIFICATIONS:

1. STONE SIZE = 4" - 6" AVG. DIAMETER
2. ALL STONE MUST BE PLACED ON NON-WOVEN GEOTEXILE FABRIC IF USED IN RESIDENTIAL OR AGRICULTURAL AREAS.
3. LENGTH = FIFTY (50) FOOT TYPICAL (IF SITE CONDITIONS ALLOW)
4. WIDTH = TWENTY (20) FOOT TYPICAL.
5. THICKNESS = SIX (6) INCHES MINIMUM.
6. ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A DRIVEABLE BERM OR OTHER TEMPORARY EROSION CONTROL DEVICE CAN BE USED.
7. THE ENTRANCE SHALL BE PERIODICALLY INSPECTED AND MAINTAINED IN A CONDITION THAT MINIMIZES TRACKING OR FLOWING OF SEDIMENT ONTO ROADWAYS. MAINTENANCE MAY INCLUDE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR THE REPAIR / CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ANY SEDIMENT THAT IS SPILLED, DROPPED, WASHED OR TRACKED ONTO ROADWAYS MUST BE REMOVED AS SOON AS PRACTICAL.

	ROCK ACCESS PAD	FIGURE RD-2
		DWG. ES-0007 REV.

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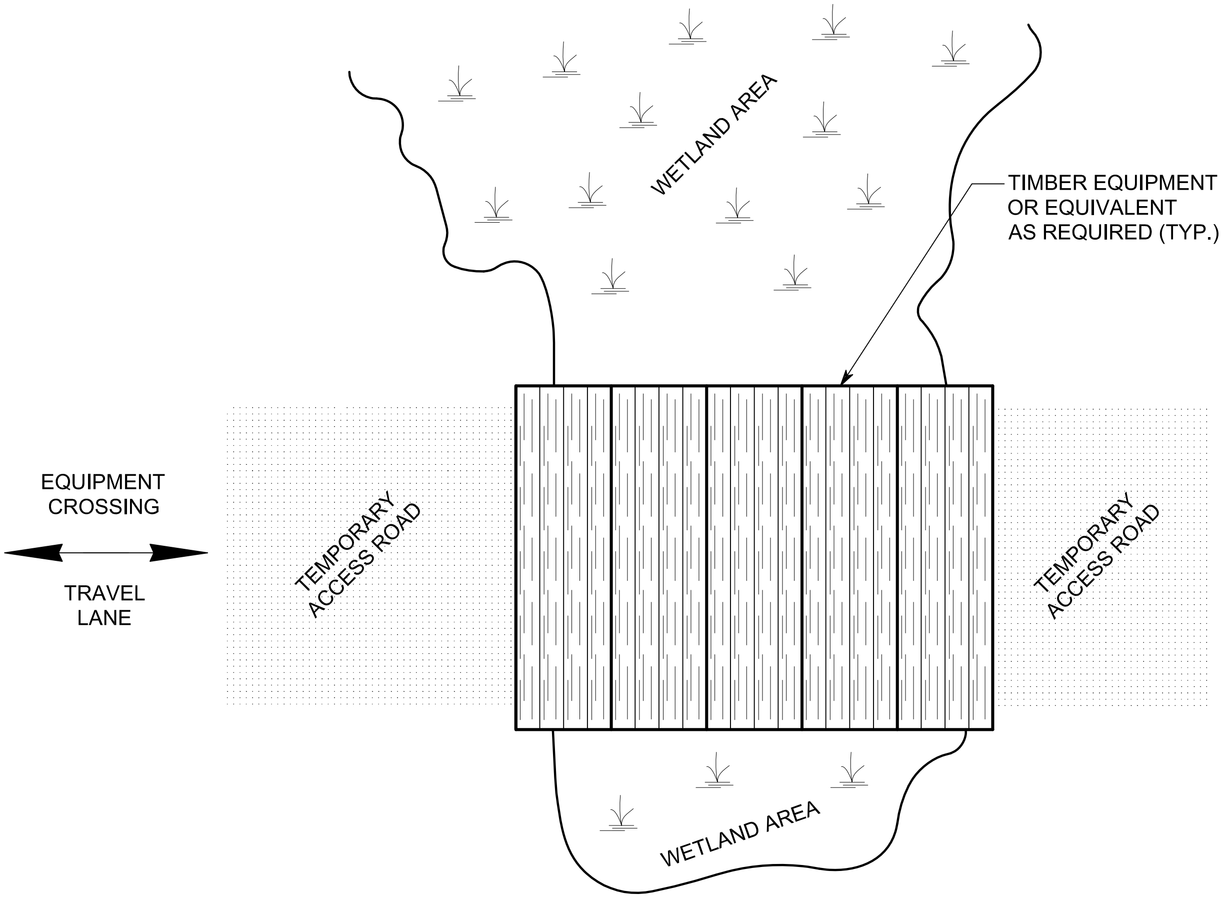
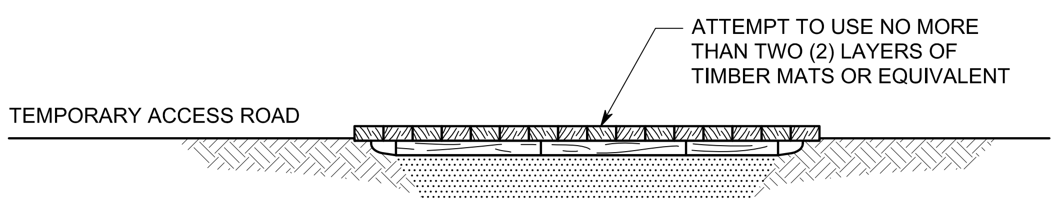


PLAN VIEW
NOT TO SCALE

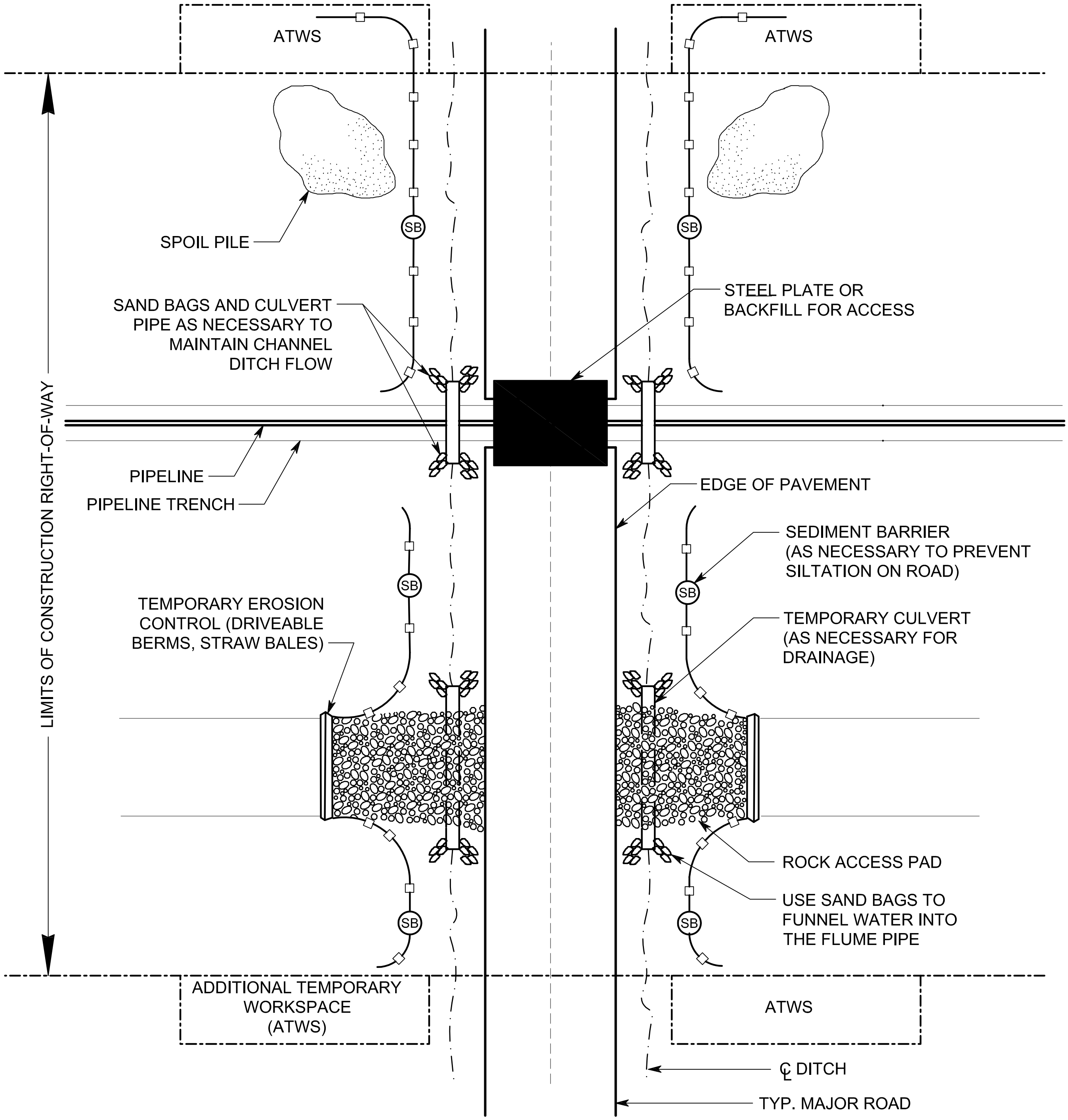


CROSS-SECTION
NOT TO SCALE

NOTE:

1. SILT FENCE OR STRAW BALES MAY BE USED, AS NECESSARY, TO PREVENT SEDIMENT FROM MIGRATING OUTSIDE OF ACCESS ROAD LIMITS.

	TYPICAL TEMPORARY ACCESS ROAD THROUGH WETLANDS	FIGURE RD-3
		DWG. ES-0008 REV.



NOTES:

1. FIRST LAY SAND BAGS IN DITCH, THEN PLACE END OF CULVERT IN THE MIDDLE OF THE SAND BAGS BEFORE BUILDING HEAD WALLS TO CULVERT.
2. (SB) TEMPORARY SEDIMENT BARRIER OF SILT FENCE AND/OR STRAW BALES, OR OTHER APPROPRIATE MATERIALS.

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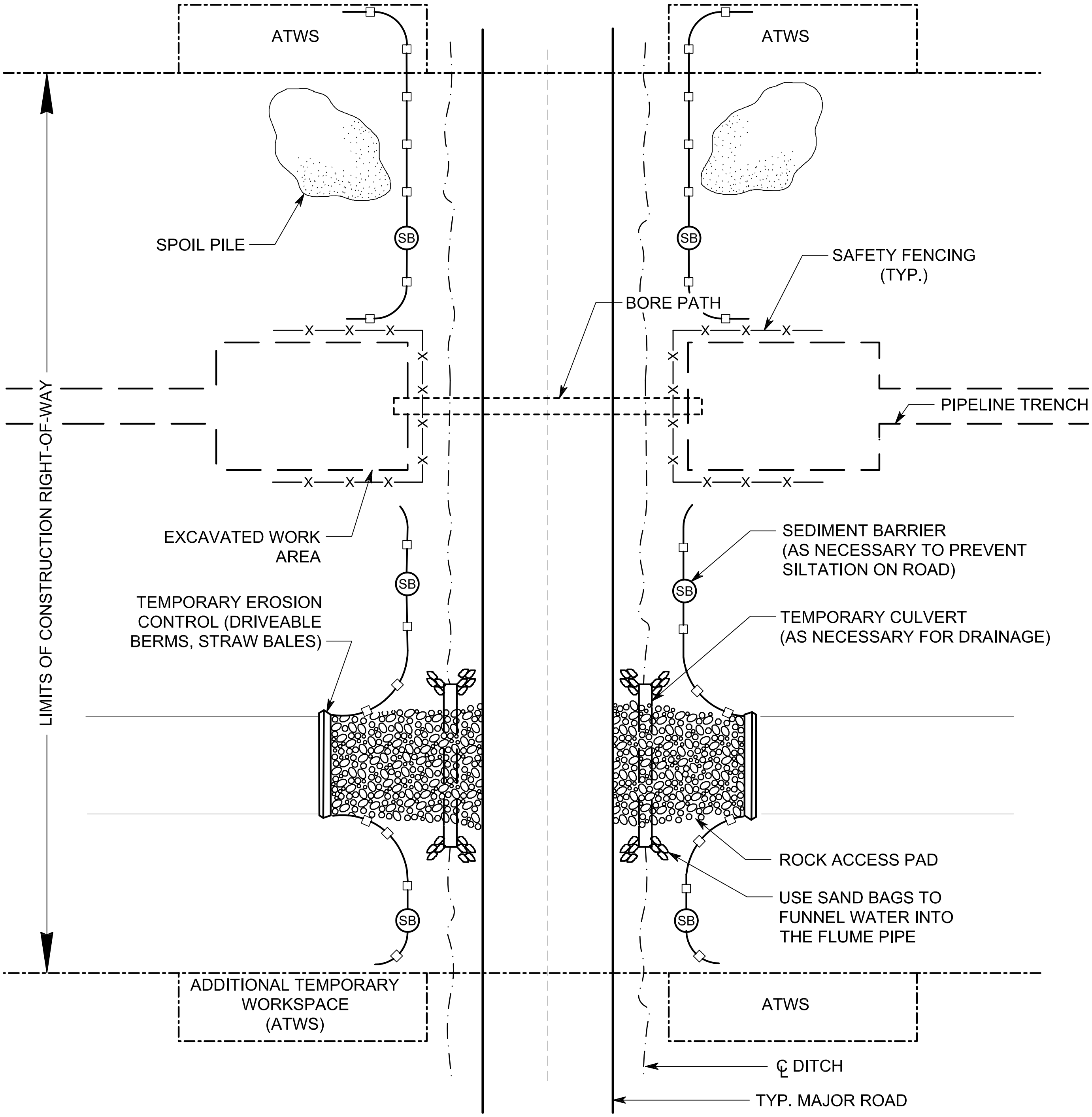
I.G. ES0009.DWG	TYPICAL PAVED ROAD CROSSING CONTROL MEASURES (OPEN CUT)	FIGURE RD-4
		DWG. ES-0009 REV.



NOTES:

1. BORE PIT DIMENSIONS WILL BE DICTATED BY SITE-SPECIFIC CONDITIONS (E.G. SOIL TYPE, WIDTH OF ROAD, DEPTH OF COVER).
2. SB TEMPORARY SEDIMENT BARRIER OF SILT FENCE AND/OR STRAW BALES, OR OTHER APPROPRIATE MATERIALS.

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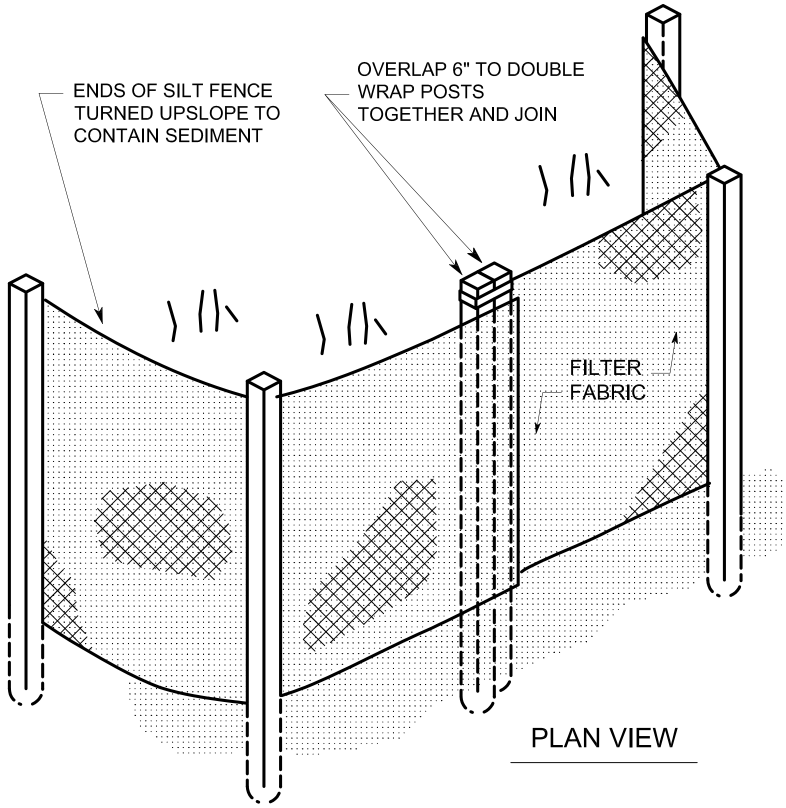
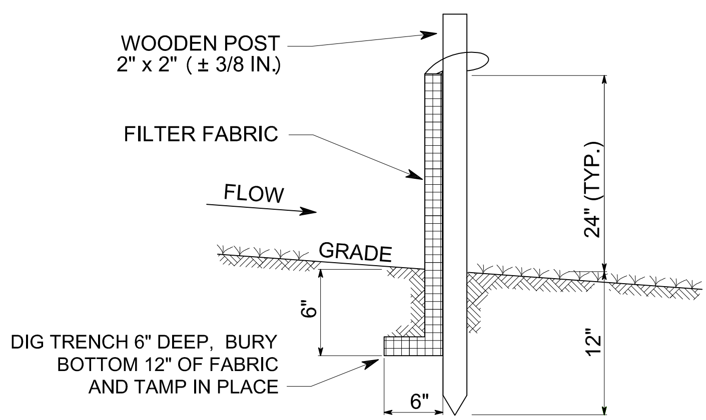
TYPICAL PAVED ROAD CROSSING
CONTROL MEASURES (BORED)

FIGURE RD-5

DWG. ES-0010 REV.



PLAN VIEW



CROSS SECTION

INSTALLATION REQUIREMENTS:

- WHEN USING SILT FENCE, PLACE IT:
  - BETWEEN DISTURBED AREAS AND DOWN-SLOPE ENVIRONMENTAL RESOURCE AREAS
  - AT THE BASE OF ALL SLOPES NEXT TO WETLANDS, WATERBODIES, AND ROAD CROSSINGS
  - AT THE INLET AND OUTLET OF OPEN DRAINAGE STRUCTURES
  - APPROXIMATELY 8 FEET BEYOND THE TOE OF THE SLOPE TO GIVE THE SEDIMENT ROOM TO COLLECT (IF POSSIBLE)
- USE SANDBAGS OR BACKFILLING TO KEY IN THE BOTTOM OF THE FABRIC WHERE IT IS NOT FEASIBLE TO TRENCH IT IN (LEDGES, ROCKY SOIL, LARGE ROOTS, ETC.)

MAINTENANCE REQUIREMENTS:

- INSPECT SILT FENCE:
  - DAILY IN AREAS OF ACTIVE CONSTRUCTION
  - WEEKLY IN AREAS WITH NO CONSTRUCTION
  - WITHIN 24 HOURS FOLLOWING EACH RAINFALL EVENT OF ≥ 0.5 INCH.
- REPAIR OR REPLACE SILT FENCE AS NEEDED
- REMOVE ACCUMULATED SEDIMENTS TO AN UPLAND AREA WHEN SEDIMENT REACHES 1/2 THE ABOVE GROUND HEIGHT OF THE SILT FENCE.

SILT FENCE DETAIL

FIGURE EC-1

DWG. ES-0011 REV.

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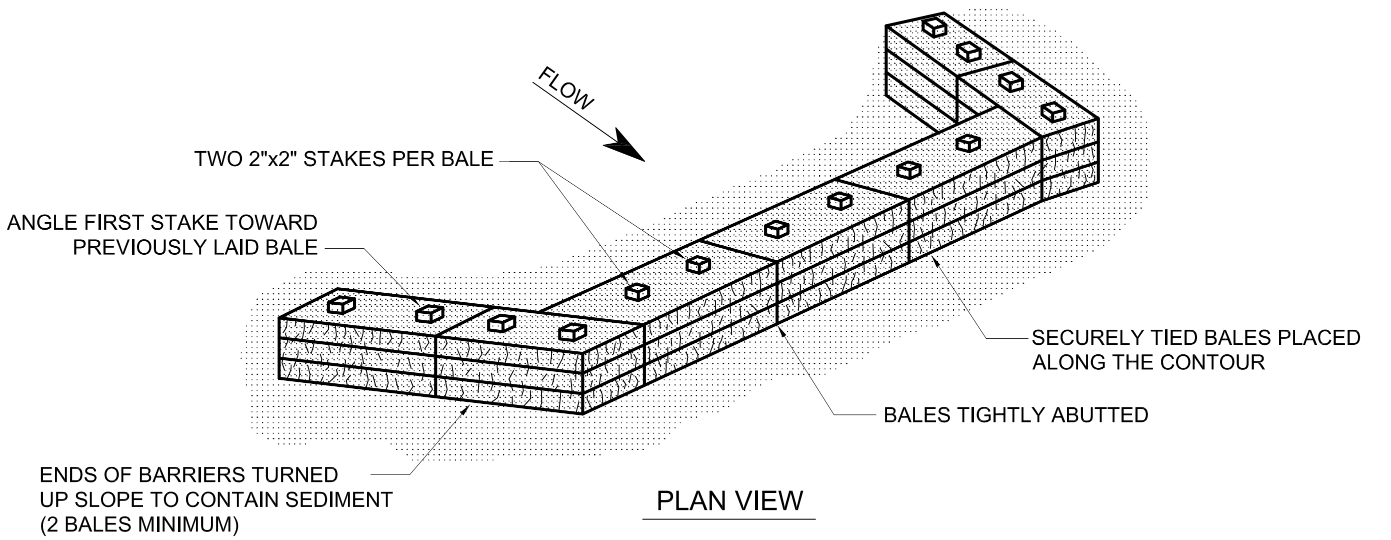
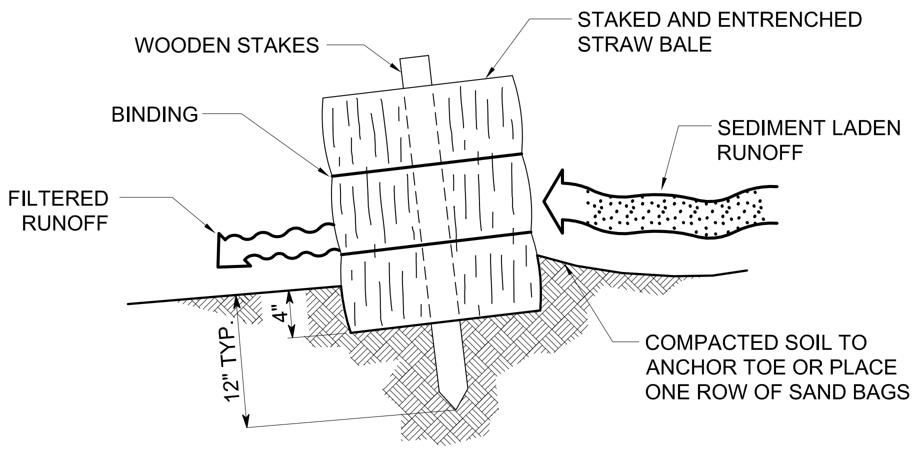


PLAN VIEW



CROSS-SECTION

INSTALLATION REQUIREMENTS:

- WHEN USING STRAW BALES, PLACE THEM:
  - WITH THEIR ENDS TIGHTLY ABUTTING AND EMBEDDED IN THE SOIL A TYPICAL OF 4".
  - BETWEEN DISTURBED AREAS AND DOWN-SLOPE ENVIRONMENTAL RESOURCE AREAS.
  - AT THE BASE OF ALL SLOPES NEXT TO WETLANDS, WATERBODIES, AND ROAD CROSSINGS
  - AT THE INLET AND OUTLET OF OPEN DRAINAGE STRUCTURES.
  - APPROXIMATELY 6 FEET BEYOND THE TOE OF THE SLOPE TO GIVE THE SEDIMENT ROOM TO COLLECT.
- KEY IN THE BOTTOM OF THE BALE. IN AREAS WHERE IT IS NOT FEASIBLE TO TRENCH IT IN (LEDGES, ROCKY SOIL, LARGE TREE ROOTS, ETC.), USE NATIVE SOIL AS BACKFILL UP-SLOPE OF THE BALE OR PLACE ONE ROW OF SAND BAGS.
- DO NOT STAKE OR TRENCH IN PLACE STRAW BALES USED ON EQUIPMENT BRIDGES OR ON MATS ACROSS THE TRAVEL LANE.
- IF USED IN CONJUNCTION WITH SILT FENCE, BALES ARE PLACED DOWNSLOPE / UPSLOPE OF THE SILT FENCE AND DO NOT NEED TO BE TRENCHED IN.

MAINTENANCE REQUIREMENTS:

- INSPECT BALES:
  - DAILY IN AREAS OF ACTIVE CONSTRUCTION.
  - WEEKLY IN AREAS WITH NO CONSTRUCTION.
  - WITHIN 24 HOURS FOLLOWING EACH RAINFALL EVENT OF ≥ 0.5 INCH.
- REPAIR OR REPLACE BALES AS NEEDED.
- REMOVE ACCUMULATED SEDIMENTS TO AN UPLAND AREA AS NEEDED.

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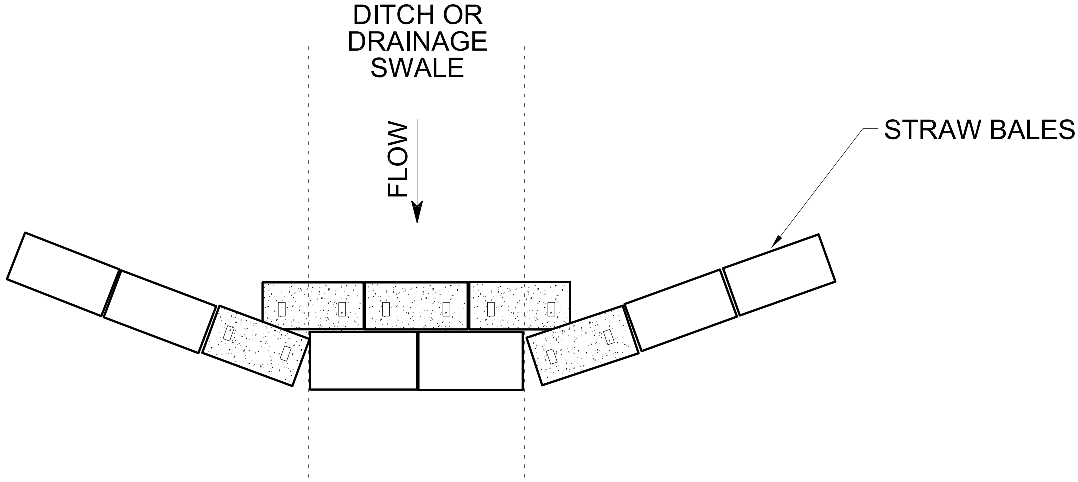
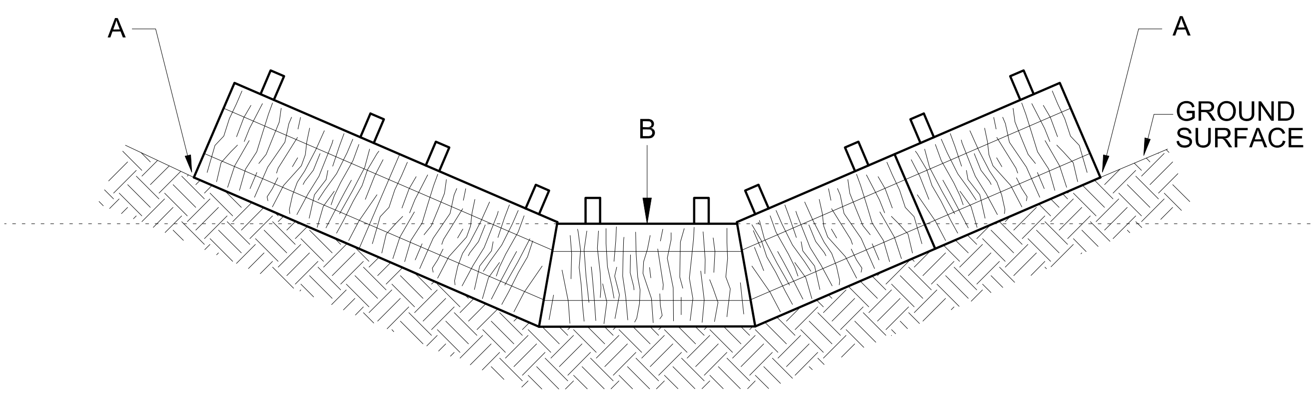
	STRAW BALE DETAIL	FIGURE EC-2
		DWG. ES-0012 REV.



PLAN VIEW
NOT TO SCALE

POINTS A SHALL BE HIGHER THAN POINT B

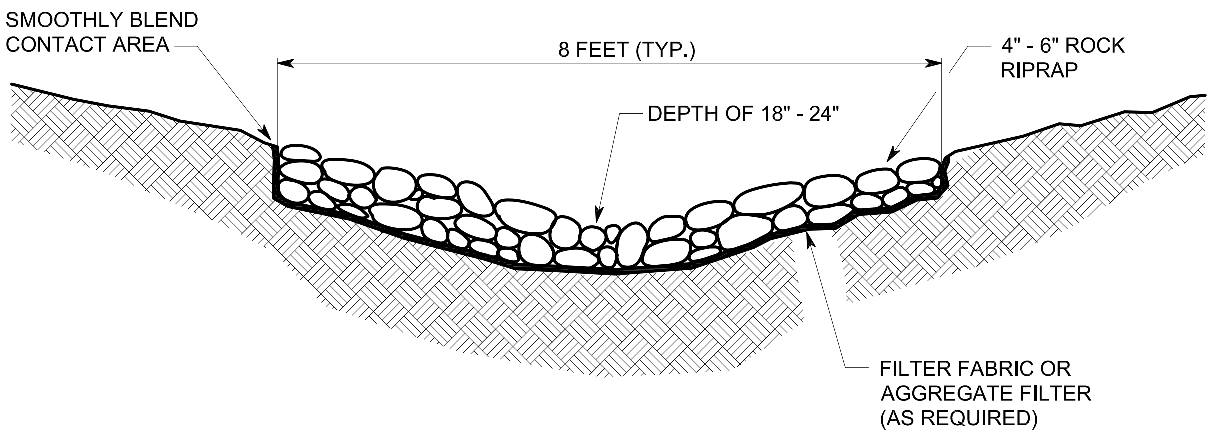


CROSS-SECTION
NOT TO SCALE

NOTE:

1. THE NUMBER OF BALES IS DETERMINED BASED ON SITE SPECIFIC FACTORS.

	STRAW BALE CHECK DAM IN A DRAINAGEWAY	FIGURE EC-3 DWG. ES-0013 REV.



INSTALLATION REQUIREMENTS:

1. RIPRAP CHANNELS CAN BE CONSTRUCTED WITH GRASS-LINED SLOPES WHERE SITE CONDITIONS WARRANT.

2. STABILIZE CHANNEL INLET POINTS AND INSTALL OUTLET PROTECTION (AS NEEDED) DURING CHANNEL INSTALLATION.

3. INSTALL ENERGY DISSIPATING DEVICE (AS NEEDED) TO PREVENT SCOUR TO THE RECEIVING OUTLET.

4. REMOVE ALL TREES, BRUSH, AND OTHER OBJECTIONABLE MATERIAL FROM THE CHANNEL.

5. INSTALL FILTER FABRIC OR GRAVEL LAYER TO PREVENT PIPING (AS REQUIRED)

MAINTENANCE REQUIREMENTS:

1. INSPECT CHANNEL DURING AND FOLLOWING CONSTRUCTION AND MAKE REPAIRS AS NEEDED.

2. KEEP THE CHANNEL FREE OF DEBRIS AND OBSTRUCTIONS.

	ROCK-LINED DRAINAGE SWALE	FIGURE EC-4	
		DWG. ES-0014	REV.

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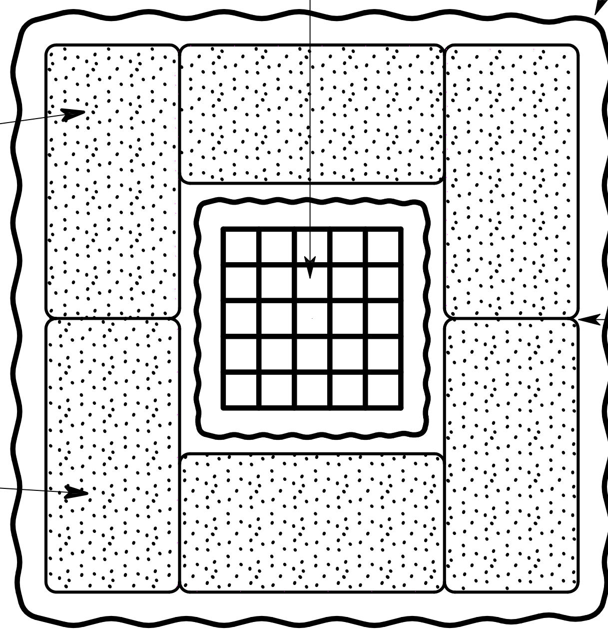

PLAN VIEW

NOTES:

1. SURROUND STREET DRAINAGE STRUCTURE INLET WITH STRAW BALES PRIOR TO CONSTRUCTION AND MAINTAIN UNTIL CONSTRUCTION IS COMPLETED.
2. FOR BALES PLACED ON PAVEMENT (OR COMPACT SURFACES), PLACE BURLAP OR COMPANY APPROVED EQUIVALENT BETWEEN PAVEMENT AND BALE.
3. REMOVE ACCUMULATED SEDIMENT.
4. AN ALTERNATIVE STORM DRAIN INLET PROTECTION MAY USE ONLY FABRIC LINING WITHOUT STRAW BALES BASED ON THE DISCRETION OF THE THE ENVIRONMENTAL INSPECTOR.

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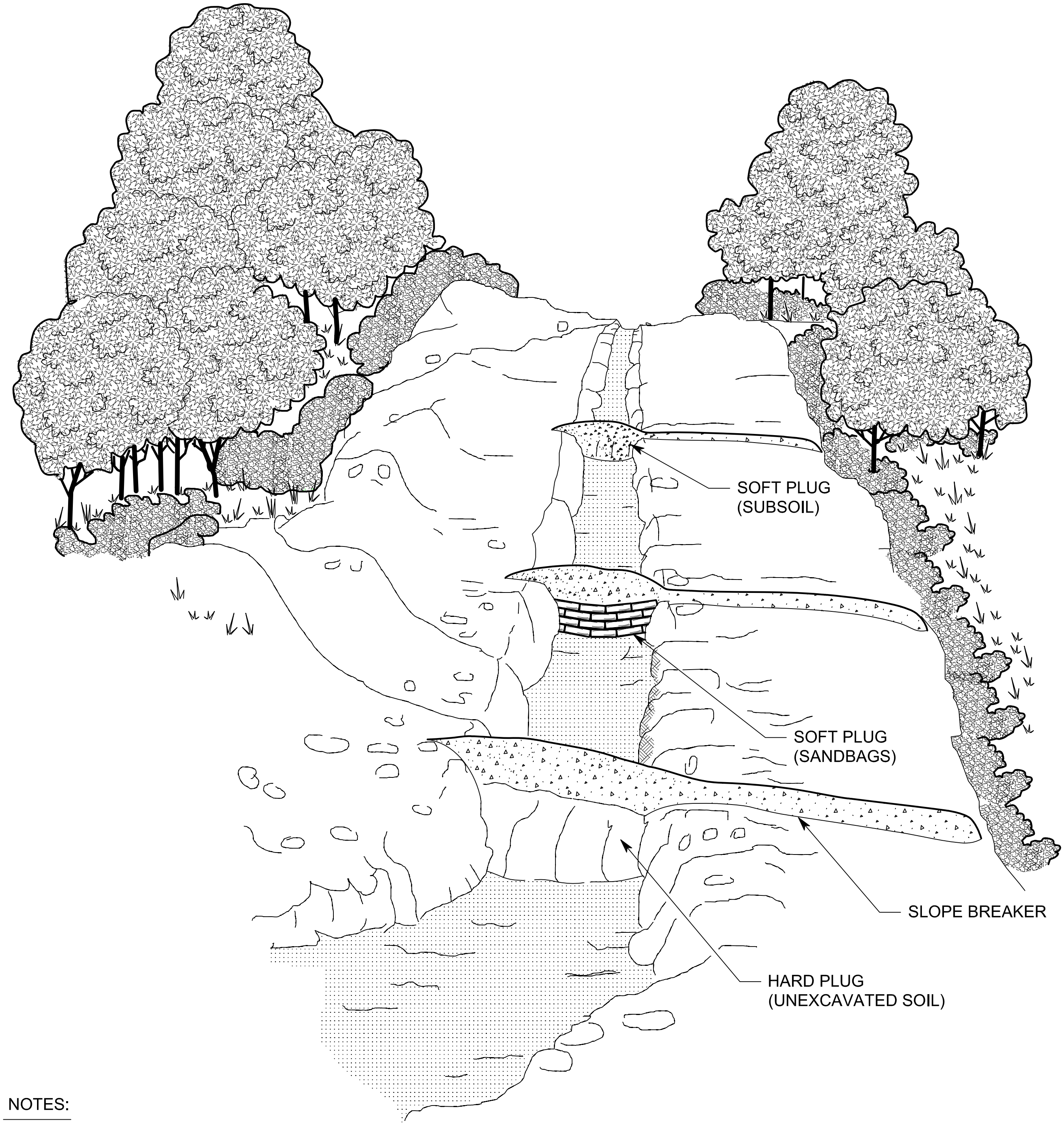
STORM DRAIN INLET PROTECTION

FIGURE EC-5

DWG. ES-0015 REV.



NOTES:

1. TEMPORARY TRENCH PLUG MATERIALS MAY CONSIST OF UNEXCAVATED PORTIONS OF THE TRENCH (HARD PLUG), COMPACTED SUBSOIL OR SANDBAGS PLACED ACROSS THE DITCH (SOFT PLUG), OR SOME FUNCTIONAL EQUIVALENT. THESE OPTIONS ARE DEPICTED ABOVE. DO NO USE TOPSOIL FOR TRENCH PLUGS.

2. POSITION TEMPORARY TRENCH PLUGS, AS NECESSARY, TO REDUCE TRENCHLINE EROSION AND MINIMIZE THE VOLUME AND VELOCITY OF TRENCH WATER FLOW AT THE BASE OF SLOPES.

3. TEMPORARY TRENCH PLUGS MAY BE USED IN CONJUNCTION WITH SLOPE BREAKERS TO DIVERT TRENCH WATER OVERFLOW AND PREVENT OVERFLOW INTO SENSITIVE RESOURCE AREAS.

4. DIVERT TRENCH OVERFLOW TO A WELL-VEGETATED OFF-R.O.W. LOCATION OR INSTALL APPROPRIATE ENERGY DISSIPATING DEVICE.

5. USE TEMPORARY TRENCH PLUGS AT WATERBODY CROSSINGS, AS NECESSARY.

	TEMPORARY TRENCH PLUG OPTIONS	FIGURE EC-6
		DWG. ES-0016 REV.

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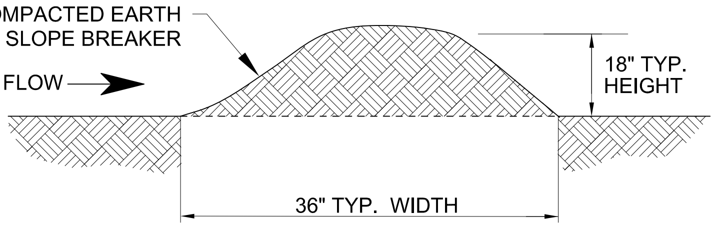

CROSS-SECTION

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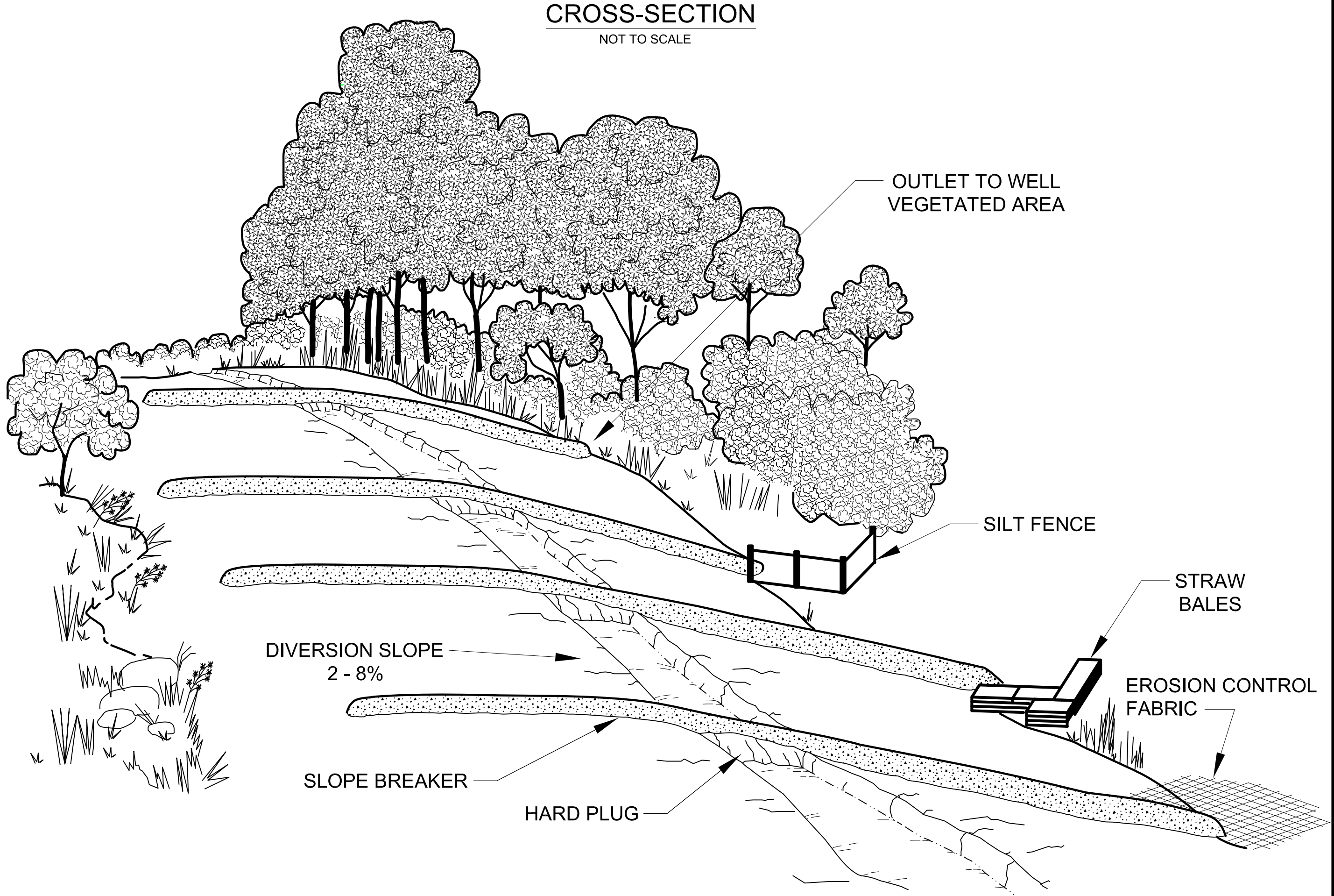

INSTALLATION REQUIREMENTS:

- INSTALL SLOPE BREAKERS IN ALL DISTURBED AREAS AS NECESSARY TO AVOID EXCESSIVE EROSION AT THE LOCATIONS SHOWN ON THE CONSTRUCTION DRAWINGS OR AS APPROVED BY THE ENVIRONMENTAL INSPECTOR (EI).
- MUST BE INSTALLED ON SLOPES GREATER THAN 5% WHERE THE BASE OF THE SLOPE IS LESS THAN 50 FEET FROM A WATERBODY, WETLAND OR ROAD CROSSING AT THE FOLLOWING MINIMUM SPACING:

SLOPE (%)	SPACING (FT.)
5 - 15	300
> 15 - 30	200
> 30	100

- CONSTRUCT USING SAND BAGS, STAKED STRAW BALES, SILT FENCE, OR SOIL.
- INSTALL WITH A 2 - 8% OUTFALL ANGLE.
- POSITION OUTFALL TO PREVENT SEDIMENT DISCHARGE INTO WETLANDS, WATERBODIES, OR OTHER SENSITIVE RESOURCES.
- FILTER RUN-OFF WATER BY CONSTRUCTING THE OUTLET IN A WELL VEGETATED STABLE AREA, OR BY USING AN ENERGY DISSIPATING DEVICE (SILT FENCE, STRAW BALES, EROSION CONTROL FABRIC). IF NEEDED, THE TYPE OF ENERGY DISSIPATION DEVICE WILL DEPEND ON SITE CONDITIONS (OPTIONS ARE DEPICTED ABOVE).

MAINTENANCE REQUIREMENTS:

- INSPECT DURING CONSTRUCTION AND MAKE REPAIRS AS NEEDED.
- KEEP THE CHANNEL FREE OF DEBRIS AND OBSTRUCTIONS.

TEMPORARY SLOPE BREAKERS

FIGURE EC-7

DWG. ES-0017 REV.

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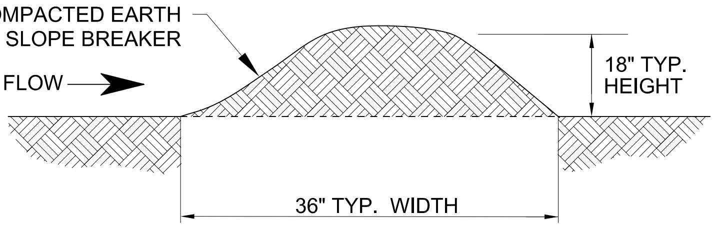

CROSS-SECTION
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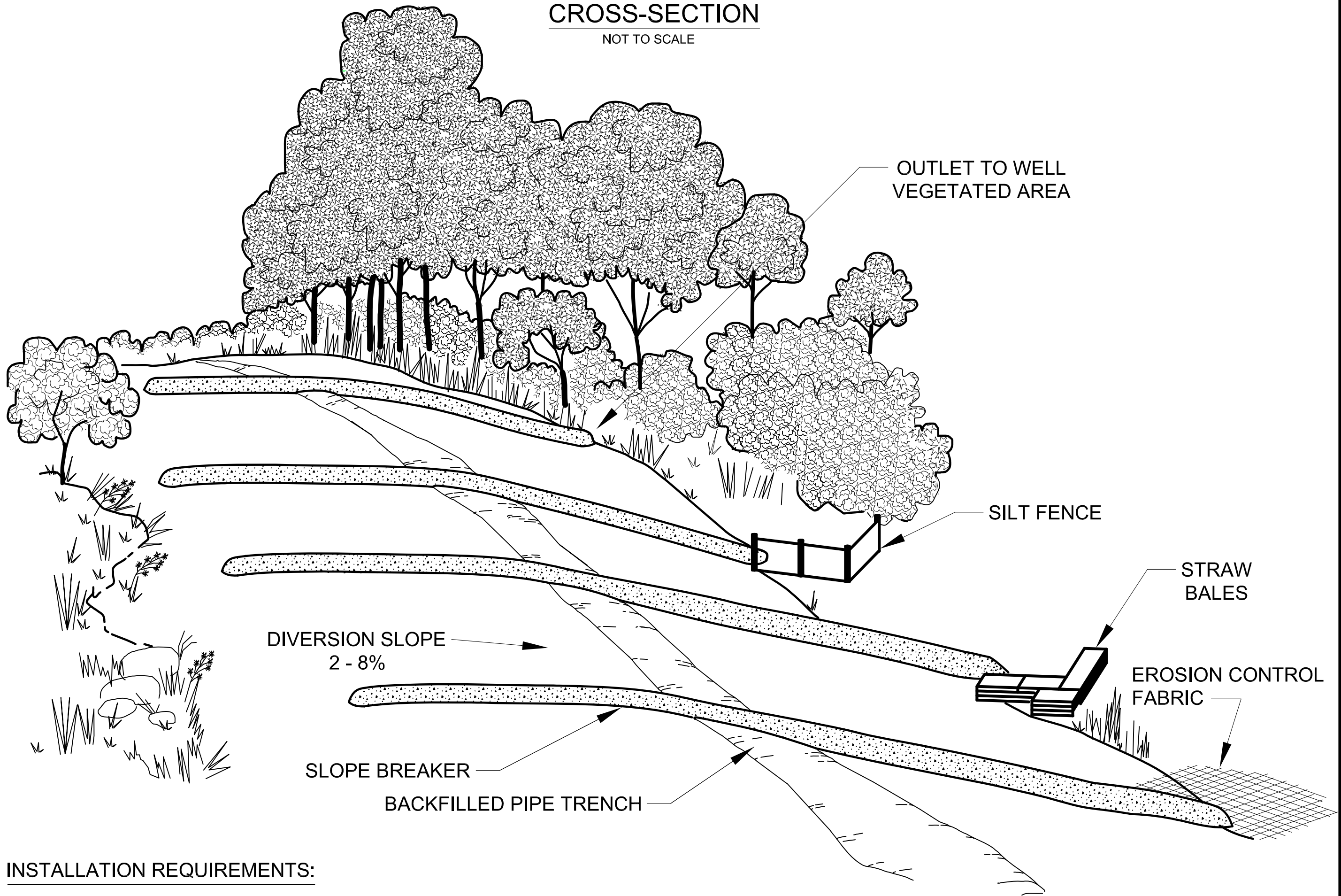

INSTALLATION REQUIREMENTS:

- INSTALL AND MAINTAIN IN ALL DISTURBED AREAS TO AVOID EXCESSIVE EROSION, EXCEPT CULTIVATED AREAS AND LAWNS (UNLESS REQUESTED BY THE LANDOWNER), USING SPACING RECOMMENDATIONS OBTAINED FROM THE LOCAL SOIL CONSERVATION AUTHORITY OR LAND MANAGEMENT AGENCY, AT THE LOCATIONS SHOWN ON THE CONSTRUCTION DRAWINGS OR AS APPROVED BY THE ENVIRONMENTAL INSPECTOR (EI).
- INSTALL ON SLOPES GREATER THAN 5% WHERE THE BASE OF THE SLOPE IS LESS THAN 50 FEET FROM A WATERBODY, WETLAND OR ROAD CROSSING AT THE FOLLOWING MINIMUM SPACING IN THE ABSENCE OF WRITTEN RECOMMENDATIONS:

SLOPE (%)	SPACING (FT.)
5 - 15	300
> 15 - 30	200
> 30	100

- CONSTRUCT USING SOIL, STONE, OR SOME FUNCTIONAL EQUIVALENT.
- INSTALL WITH A 2 - 8% OUTFALL ANGLE.
- POSITION OUTFALL TO PREVENT SEDIMENT DISCHARGE INTO WETLANDS, WATERBODIES, OR OTHER SENSITIVE RESOURCES.
- FILTER RUN-OFF WATER BY CONSTRUCTING THE OUTLET IN A WELL VEGETATED STABLE AREA, OR BY USING AN ENERGY DISSIPATING DEVICE (SILT FENCE, STRAW BALES, EROSION CONTROL FABRIC). IF NEEDED, THE TYPE OF ENERGY DISSIPATION DEVICE WILL DEPEND ON SITE CONDITIONS (OPTIONS ARE DEPICTED ABOVE).
- IF NECESSARY, OUTFALL MAY EXTEND SLIGHTLY, UP TO 4 FEET, BEYOND THE EDGE OF THE CONSTRUCTION RIGHT-OF-WAY, SUBJECT TO ALL APPLICABLE SURVEY REQUIREMENTS.

MAINTENANCE REQUIREMENTS:

- INSPECT DURING AND FOLLOWING CONSTRUCTION AND MAKE REPAIRS AS NEEDED.
- KEEP THE CHANNEL FREE OF DEBRIS AND OBSTRUCTIONS.
- SEED AND MULCH PERMANENT SLOPE BREAKERS FOLLOWING CONSTRUCTION.

PERMANENT SLOPE BREAKERS

FIGURE EC-8

DWG. ES-0018 REV.

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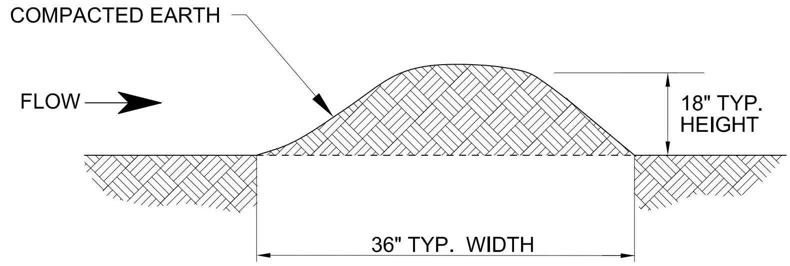

CROSS-SECTION
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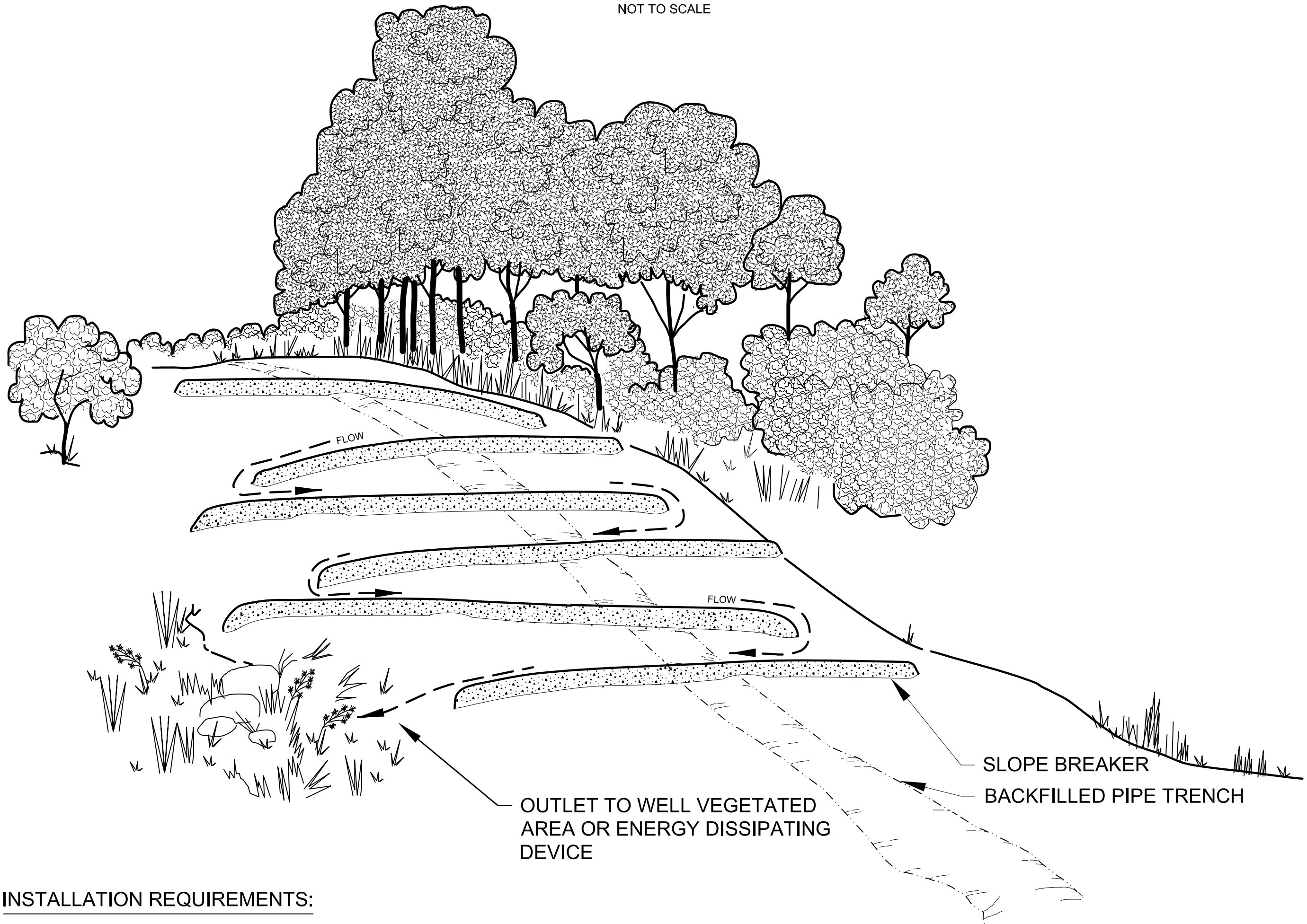

INSTALLATION REQUIREMENTS:

- INSTALL IN ALL AREAS EXCEPT RESIDENTIAL OR AGRICULTURAL (UNLESS AUTHORIZED BY LANDOWNER OR LAND MANAGING AGENCY).
- CONSTRUCT USING EARTH FILLED SACKS OR STAKED STRAW BALES FOR TEMPORARY OR COMPACTED EARTH AND ROCK FOR PERMANENT.
- INSTALL WITH A 2 - 8% OUTFALL ANGLE.
- FOR TEMPORARY CHEVRON SLOPE BREAKERS, POSITION OUTFALL TO PREVENT SEDIMENT DISCHARGE INTO WETLANDS, WATERBODIES, OR OTHER SENSITIVE RESOURCES.
- FILTER RUN-OFF WATER BY CONSTRUCTING AN OUTLET USING AN ENERGY DISSIPATING DEVICE (SILT FENCE, STRAW BALES, EROSION CONTROL FABRIC), AS APPROVED BY THE ENVIRONMENTAL INSPECTOR.

MAINTENANCE REQUIREMENTS:

- INSPECT DURING AND FOLLOWING CONSTRUCTION AND MAKE REPAIRS AS NEEDED.
- KEEP THE CHANNEL FREE OF DEBRIS AND OBSTRUCTIONS.
- SEED AND MULCH PERMANENT SLOPE BREAKERS FOLLOWING CONSTRUCTION.

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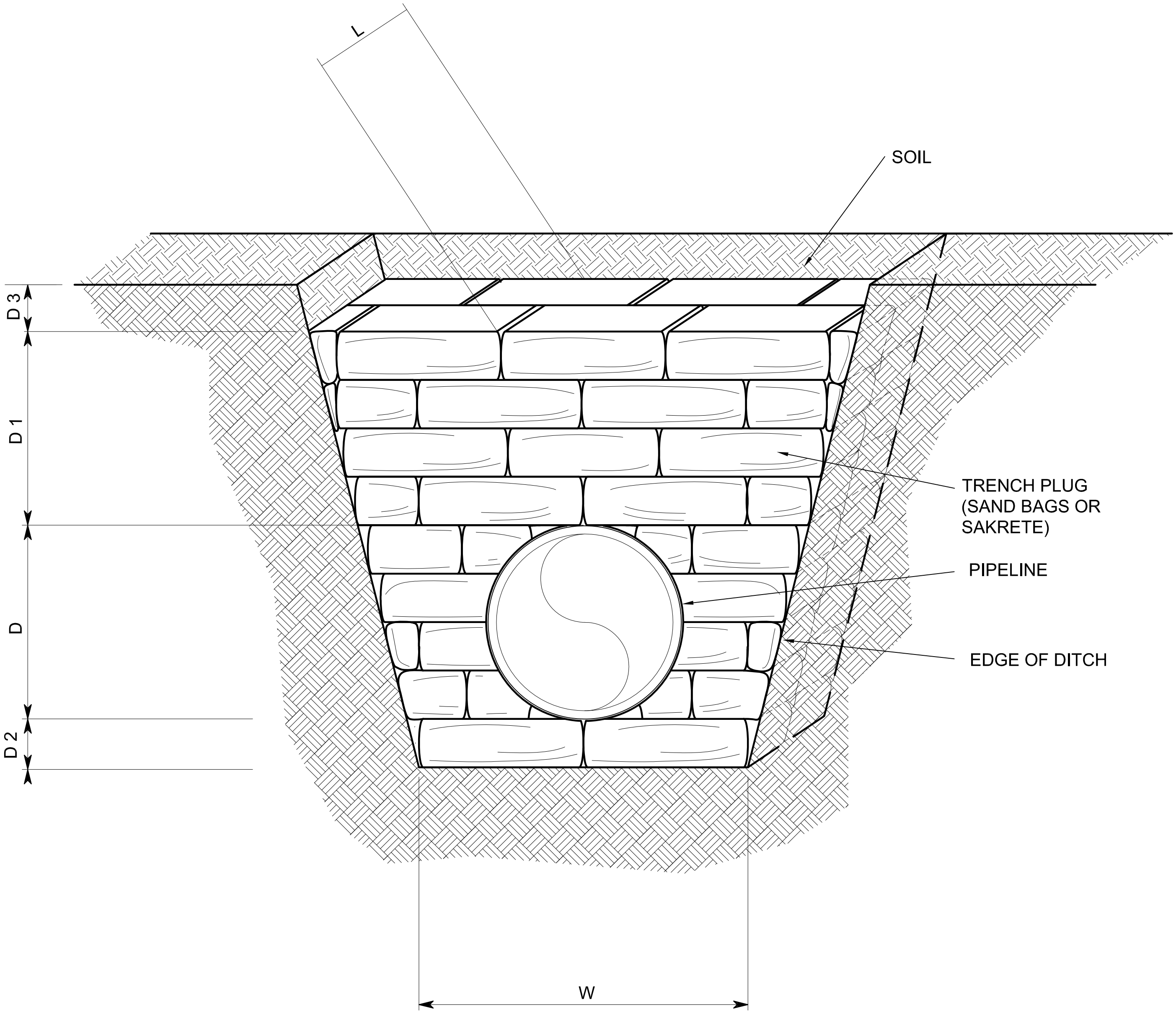
CHEVRON SLOPE BREAKER

FIGURE EC-9

DWG. ES-0019 REV.



D = PIPE DIAMETER
D1 = APPROXIMATELY 24"
D2 = APPROXIMATELY 6" (8" MIN. IN ROCK)
D3 = APPROXIMATELY 12"
W = D + 2 to 4 FEET
L = APPROXIMATELY 18" - 24"
D1 + D3 = 36" MINIMUM

NOTE:

1. USE OF SAKRETE SHALL REQUIRE PRIOR COMPANY APPROVAL.
2. TOPSOIL SHALL NOT BE USED TO CONSTRUCT BREAKERS.
3. DO NOT INSTALL TRENCH BREAKERS WITHIN A WETLAND.

	TRENCH BREAKER DETAIL (SACK)	FIGURE EC-10
		DWG. ES-0020 REV.

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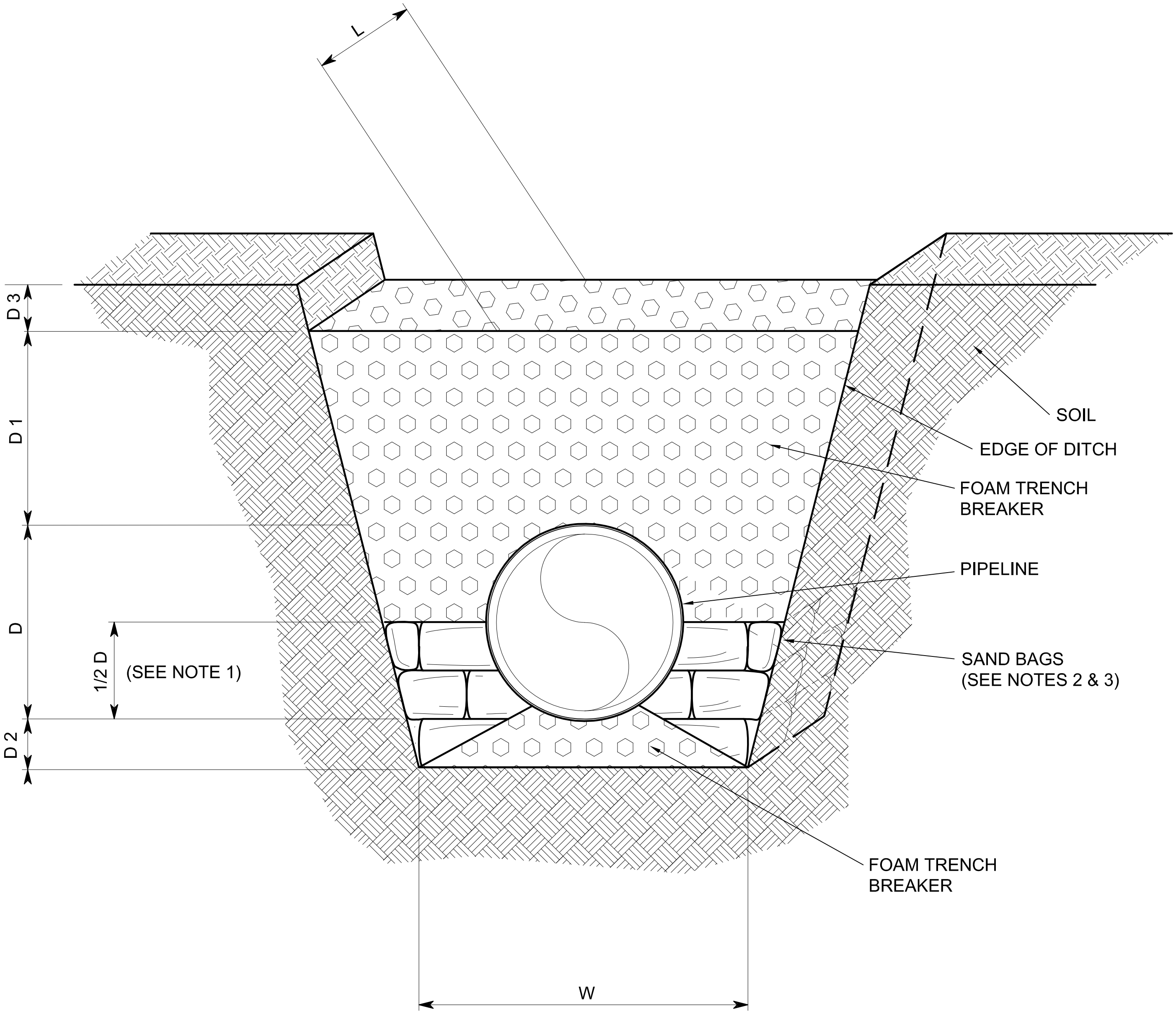

D = PIPE DIAMETER
D1 = APPROXIMATELY 24"
D2 = APPROXIMATELY 6" (8" MIN. IN ROCK)
D3 = APPROXIMATELY 12"
W = D + 2 to 4 FEET
L = APPROXIMATELY 18" - 24"
D1 + D3 = 36" MINIMUM

NOTE:

1. A MINIMUM OF TWO LAYERS OF BAGS SHALL BE INSTALLED.
2. THE ADDITION OF SAND BAGS UNDER THE FOAM WILL BE PLACED AS PRESCRIBED IN THE E&S PLAN OR AT THE DISCRETION OF THE ENVIRONMENTAL INSPECTOR (EI).
3. FOAM TRENCH BREAKERS ARE TO BE USED WITHIN UPLAND AREAS. DO NOT USE FOAM TRENCH BREAKERS AT WATERBODY OR WETLAND BOUNDARIES..

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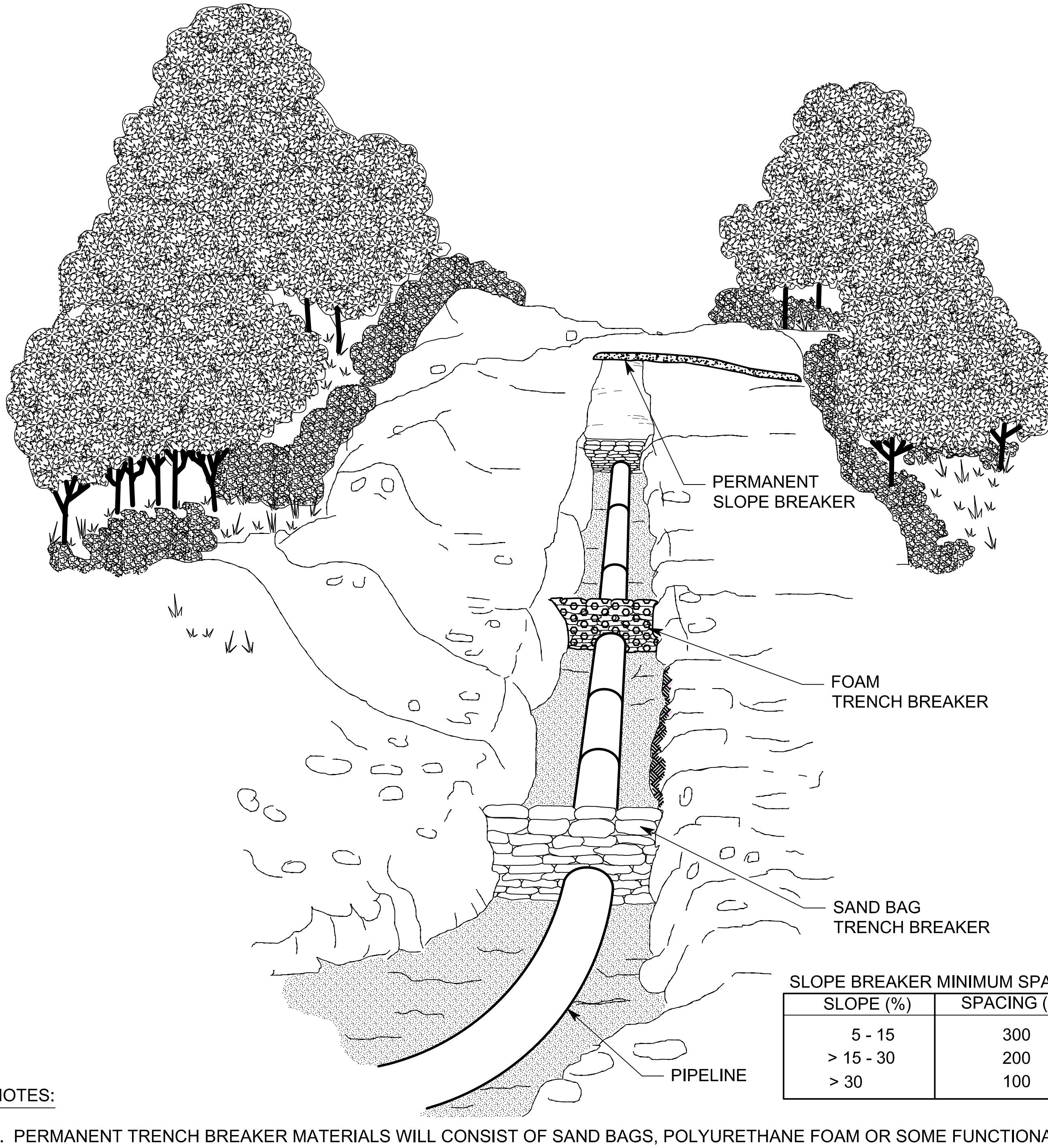
	TRENCH BREAKER DETAIL (FOAM)	FIGURE EC-11
		DWG. ES-0021 REV.



SLOPE BREAKER MINIMUM SPACING

SLOPE (%)	SPACING (FT)
5 - 15	300
> 15 - 30	200
> 30	100

NOTES:

1. PERMANENT TRENCH BREAKER MATERIALS WILL CONSIST OF SAND BAGS, POLYURETHANE FOAM OR SOME FUNCTIONAL EQUIVALENT PLACED ACROSS THE DITCH AS IDENTIFIED IN PERMIT REQUIREMENTS. DO NOT USE TOPSOIL FOR TRENCH BREAKERS. THESE OPTIONS ARE DEPICTED ABOVE.

2. PERMANENT TRENCH BREAKERS, WHICH ARE USED IN CONJUNCTION WITH SLOPE BREAKERS, SHALL BE INSTALLED AT THE LOCATIONS SHOWN ON THE CONSTRUCTION DRAWINGS OR AS DETERMINED IN THE FIELD BY THE ENVIRONMENTAL INSPECTOR.

3. AT A MINIMUM, INSTALL A TRENCH BREAKER AT THE BASE OF SLOPES GREATER THAN 5 PERCENT WHERE THE BASE OF THE SLOPE IS LESS THAN 50 FEET FROM A WATERBODY OR WETLAND AND WHERE NEEDED TO AVOID DRAINING A WATERBODY OR WETLAND.

4. INSTALL TRENCH BREAKERS AT WETLAND BOUNDARIES AND/OR SEAL THE TRENCH BOTTOM AS NECESSARY TO MAINTAIN THE ORIGINAL WETLAND HYDROLOGY. DO NOT INSTALL TRENCH BREAKERS WITHIN A WETLAND.

5. IN AGRICULTURAL FIELDS AND RESIDENTIAL AREAS WHERE SLOPE BREAKERS ARE NOT TYPICALLY REQUIRED, INSTALL TRENCH BREAKERS AT THE SAME SPACING AS IF PERMANENT SLOPE BREAKERS WERE REQUIRED.

PERMANENT TRENCH
BREAKER OPTIONS

FIGURE EC-12

DWG. ES-0022 REV.

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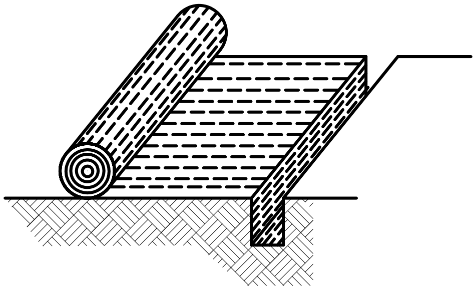
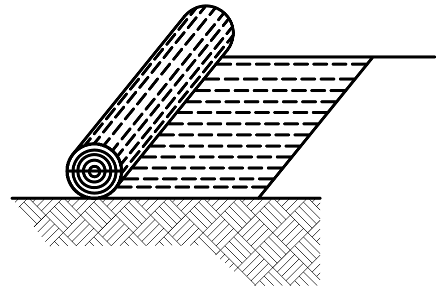
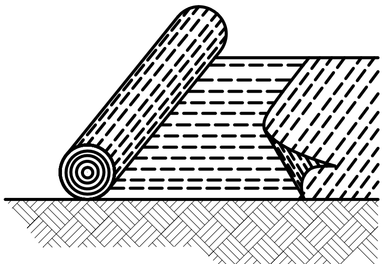
A. BURY THE TOP END OF THE ROLL
IN A 6" TRENCH (TYPICAL)



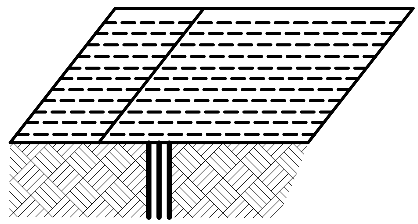
B. DOUBLE STAPLE EVERY 12" BEFORE
BACKFILLING AND COMPACTING.

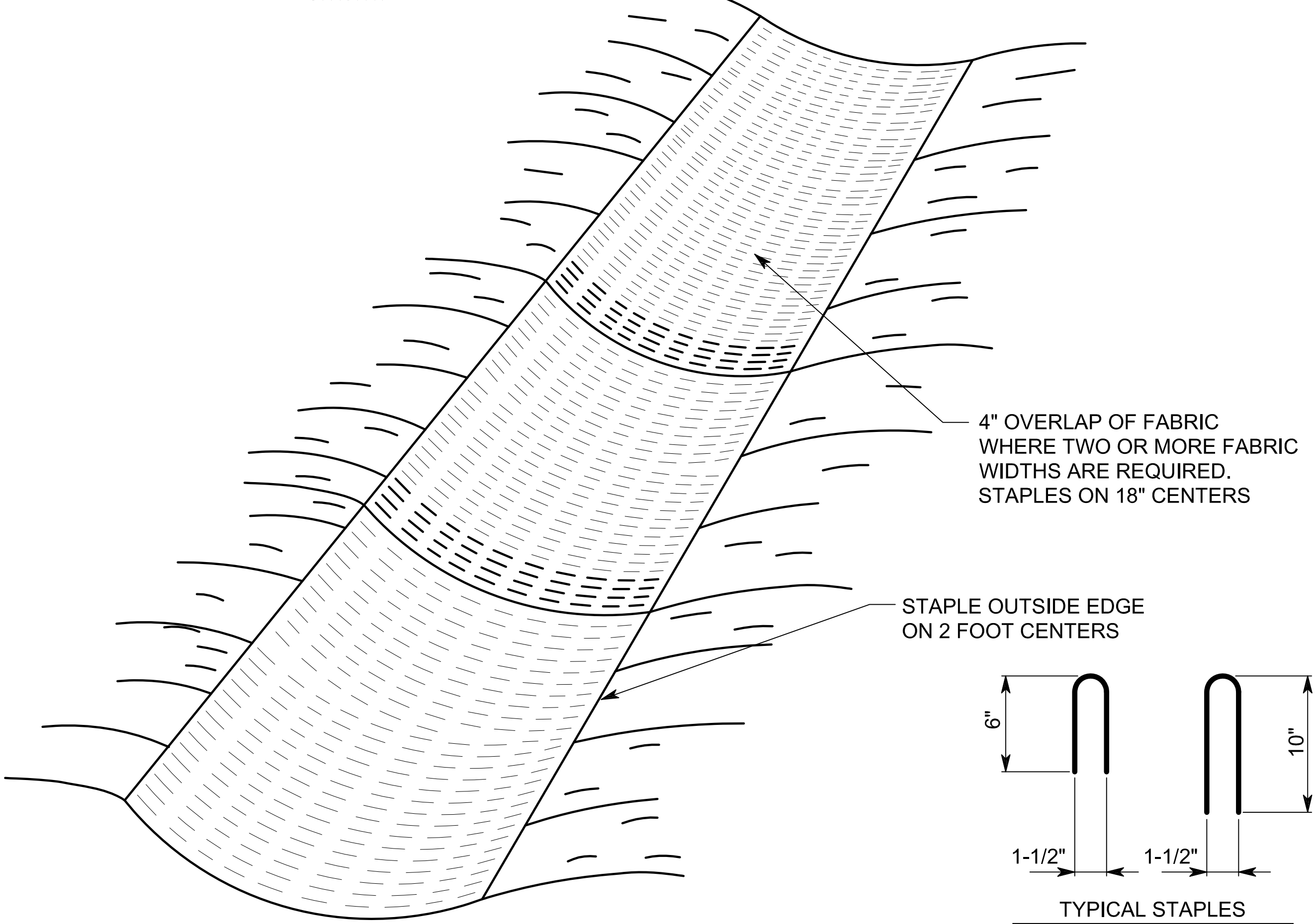


C. BURY AND TAMP UPPER END OF LOWER
STRIP AS IN "A" AND "B". OVERLAP END
OF TOP STRIP 4" AND STAPLE.



D. WHERE FABRIC STOPS, FOLD, BURY,
AND TAMP ROLL IN SLIT TRENCH.
PROVIDE DOUBLE ROW OF STAPLES





TYPICAL STAPLES
NO. 11 GAUGE WIRE

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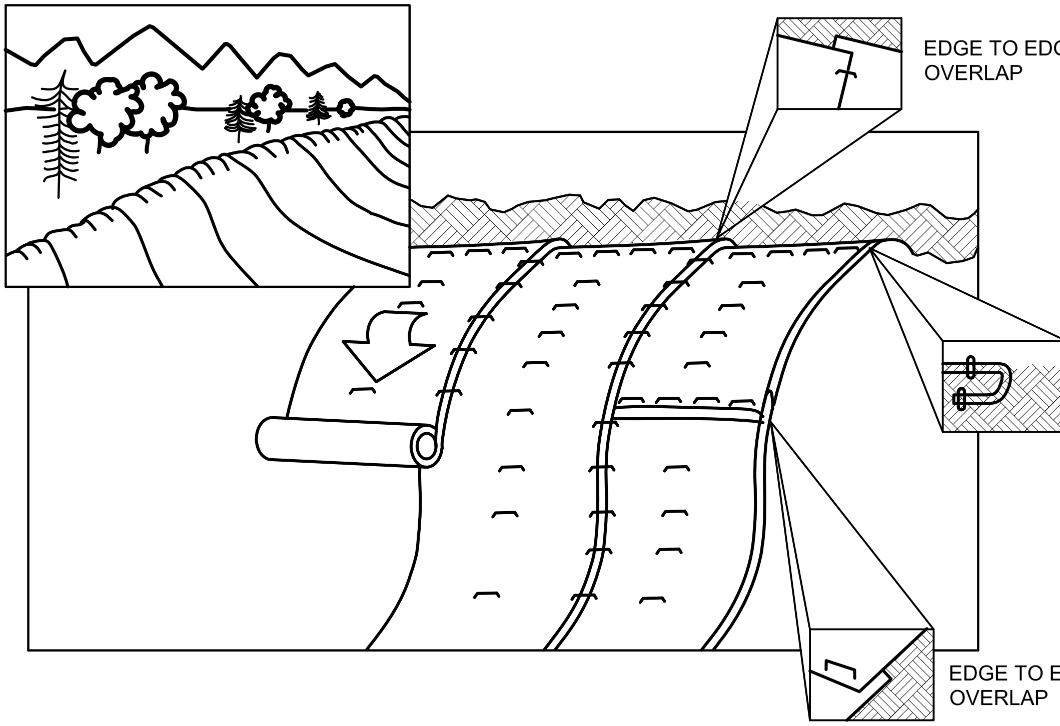
EROSION CONTROL
FABRIC INSTALLATION

FIGURE EC-13

DWG. ES-0023

REV.



NOTES:

1. EROSION CONTROL BLANKETS (FABRIC) SHALL BE USED AT LOCATIONS IDENTIFIED IN THE PLAN AND/OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

2. EROSION CONTROL BLANKETS SHALL MEET THE REQUIREMENTS SPECIFIED IN THE PLAN AND/OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

3. STAPLES SHALL BE MADE OF 11 GAUGE WIRE, U-SHAPED WITH 6" LEGS AND A 1" CROWN. STAPLES SHALL BE DRIVEN INTO THE GROUND FOR THE FULL LENGTH OF THE STAPLE LEGS.

4. BLANKETS SHALL BE INSTALLED ACCORDING TO MANUFACTURER SPECIFICATIONS OR AS STATED BELOW:
   - EXTEND TOP OF BLANKET 3 FEET PAST THE UPPER EDGE OF THE SLOPE.
   - ANCHOR ("KEY") THE UPPER EDGE OF THE BLANKET INTO THE SLOPE USING A 6" DEEP TRENCH AND ROLL THE BLANKET DOWN THE HILL. DOUBLE STAPLE EVERY 12" BEFORE BACKFILLING AND COMPACTING TRENCH.
   - INSTALL LOOSELY ON SLOPE AND AVOID STRETCHING EROSION CONTROL BLANKETS DURING INSTALLATION.
   - BRING ROLL BACK OVER THE TOP OF THE TRENCH AND CONTINUE TO ROLL DOWN SLOPE. STAPLE EVERY 12" WHERE BLANKETS EXIT THE TRENCH AT THE TOP OF THE SLOPE.
   - WHEN BLANKETS ARE SPLICED DOWN-SLOPE TO ADJOINING BLANKETS (SLOPE OR STREAMBANK MATS), THE UPPER BLANKET SHALL BE PLACED OVER THE LOWER (SHINGLE STYLE) WITH APPROXIMATELY 6" OF OVERLAP. STAPLE THROUGH THE OVERLAPPED AREA EVERY 12".
   - OVERLAP ADJACENT BLANKETS 6". STAPLE EDGES OF BLANKETS AND CENTER EVERY 36".

5. IN LIVESTOCK AREAS WHERE EROSION CONTROL BLANKETS ARE APPLIED TO THE SLOPES, FENCING WILL BE USED IF NECESSARY TO EXCLUDE LIVESTOCK, WITH PERMISSION OF THE LANDOWNER.

6. MONITOR WASHOUTS, STAPLE INTEGRITY OR BLANKET MOVEMENT. REPLACE OR REPAIR AS NECESSARY.

7. DO NOT USE SYNTHETIC MONOFILAMENT MESH / NETTED MATERIALS IN AREAS DESIGNATED AS SENSITIVE WILDLIFE HABITAT, UNLESS THE PRODUCT IS SPECIFICALLY DESIGNED TO MINIMIZE HARM TO WILDLIFE.

	TYPICAL EROSION CONTROL BLANKETS ON SLOPES	FIGURE EC-14 DWG. ES-0024 REV.

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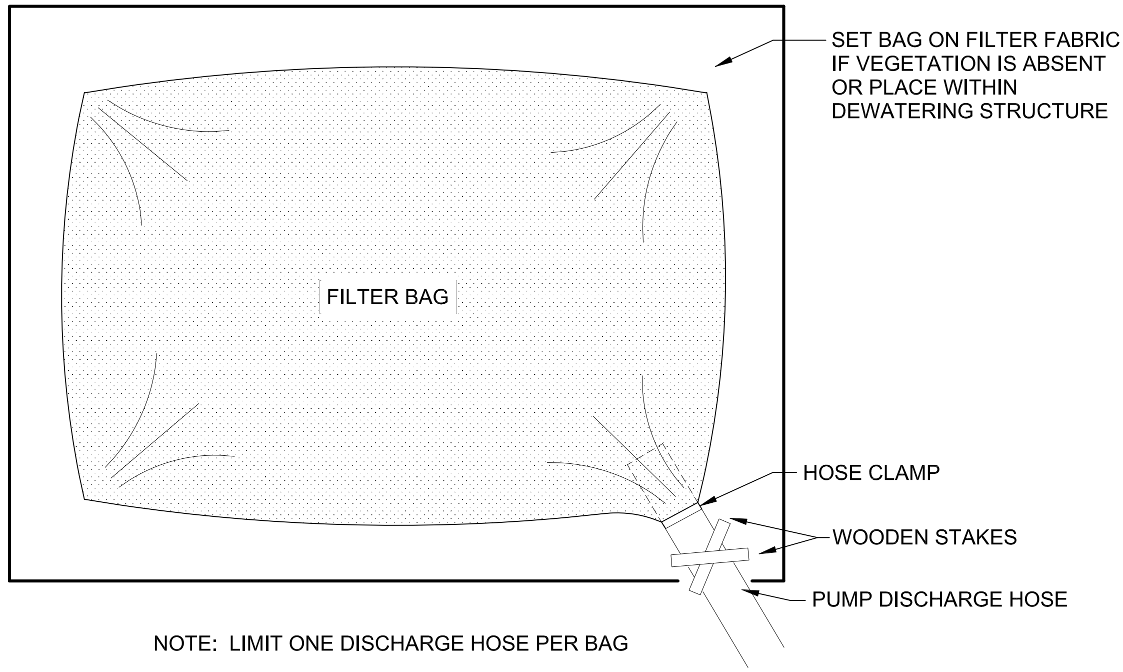
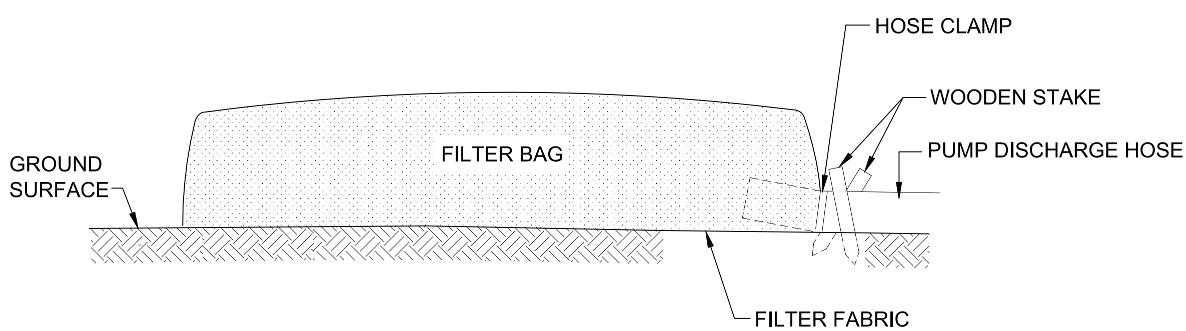


NOTE: LIMIT ONE DISCHARGE HOSE PER BAG

PLAN VIEW



CROSS-SECTION

NOTES:

1. THE FILTER BAG OR STRUCTURE MUST BE MANNED WHEN THE PUMPING IS INITIATED TO ENSURE PROPER OPERATION AND FUNCTIONALITY.

2. REMOVE DEWATERING STRUCTURE AS SOON AS PRACTICABLE AFTER COMPLETION OF DEWATERING ACTIVITIES.

3. PLACEMENT OF FILTERBAGS SHOULD BE IN A MANNER THAT BAG USE DOES NOT CAUSE EROSION. IF SITE CONDITIONS ALLOW, PLACE FILTER BAG IN WELL-VEGETATED AREA, A MINIMUM OF 50 FEET FROM WETLANDS OR WATERBODIES.

	FILTER BAG	FIGURE WD-1
		DWG. ES-0025 REV.

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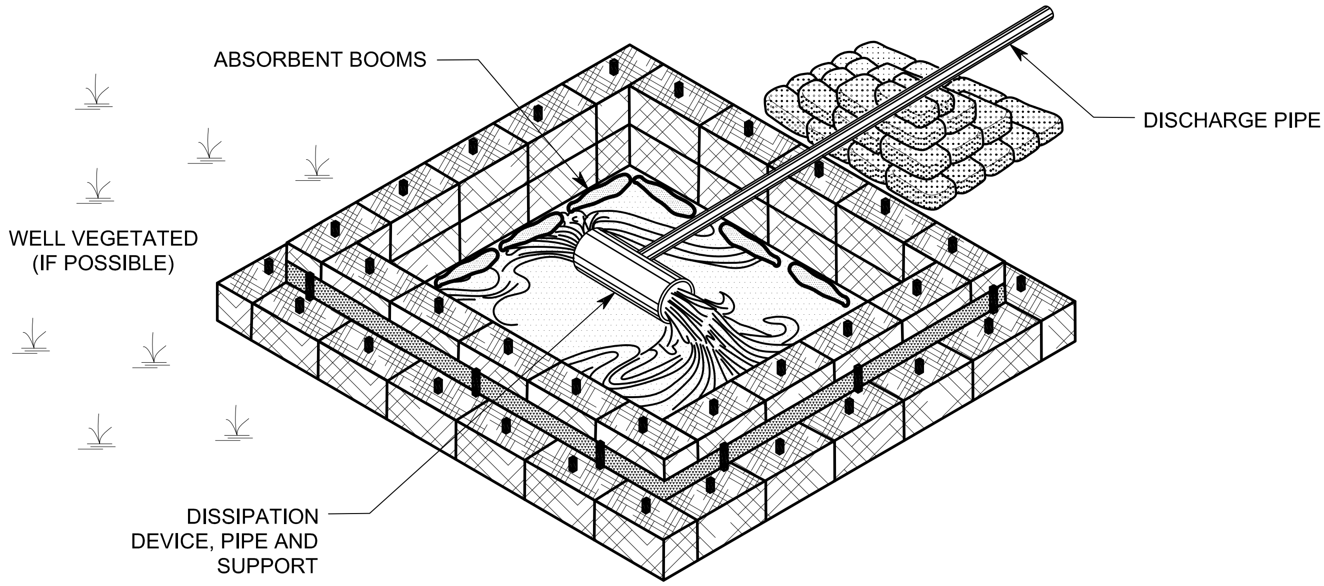
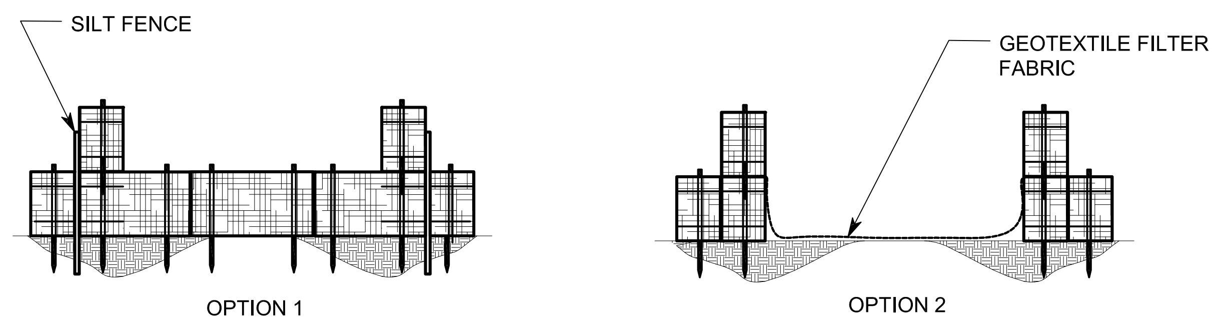


PLAN VIEW



CROSS SECTION VIEWS

NOTES:

1. SIZE AND DIMENSION OF DEWATERING STRUCTURE WILL VARY DEPENDING ON THE VOLUME AND RATE OF DISCHARGE. STAGGER PLACEMENT OF STRAW BALES WHEN TWO ROWS ARE USED.

2. COVER THE BASE OF THE DISCHARGE STRUCTURE EITHER WITH STRAW BALES (OPTION 1) OR LINE WITH GEOTEXTILE FABRIC (OPTION 2).

3. PROVIDE SUPPORT TO ENSURE THAT DISCHARGE PIPE DOES NOT REST ON STRAW BALES.

4. PLASTIC SHEETING, WOODEN MATS OR STEEL PLATES MAY ALSO BE USED, AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR, TO PREVENT EROSION, STREAMBED SCOUR, SUSPENSION OF SEDIMENTS OR EXCESSIVE STREAMFLOW.

5. ABSORBENT BOOMS MUST BE USED DURING DISCHARGES FROM EXISTING / USED PIPE OR AS DIRECTED BY PERMIT REQUIREMENTS.

6. PREVENT EROSION, STREAMBED SCOUR, SUSPENSION OF SEDIMENTS AND EXCESSIVE STREAMFLOW BY PROPER DESIGN OF STRUCTURE, REGULATING THE WATER DISCHARGE RATE AS WELL AS USE OF ENERGY DISSIPATION DEVICE(S) AND SEDIMENT BARRIERS, AS NECESSARY.

	DISCHARGE STRUCTURE FOR HYDROSTATIC TEST WATER	FIGURE WD-2 DWG. ES-0026 REV.

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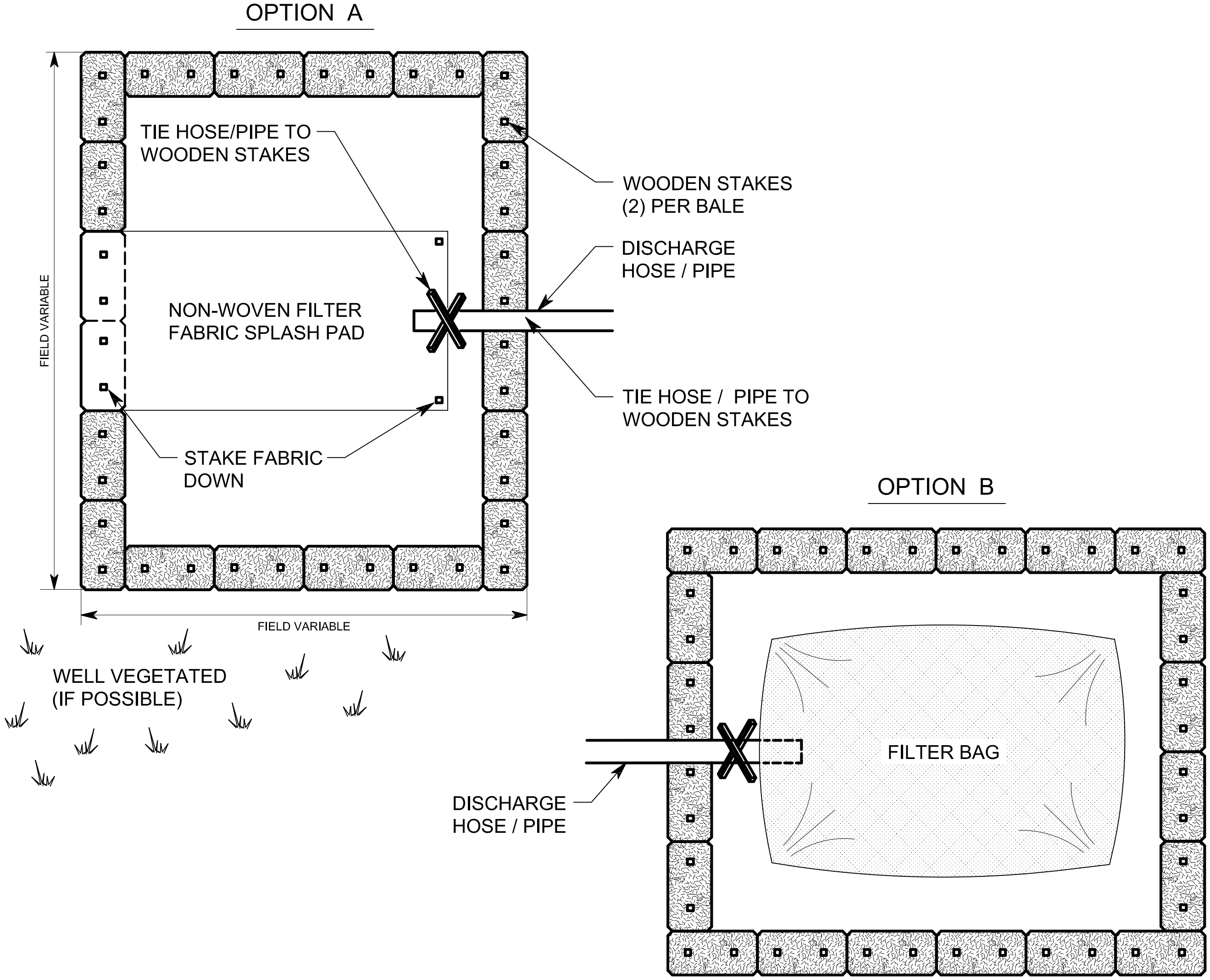

PLAN VIEW

NOT TO SCALE

NOTES:

1. SIZE AND DIMENSION OF DEWATERING STRUCTURE, INCLUDING NUMBER OF STRAW BALES USED, WILL VARY DEPENDING ON VOLUME OF WATER DISCHARGED, RATE OF DISCHARGE AND SITE CONDITIONS, SUCH AS THE TYPE AND AMOUNT OF SEDIMENT WITHIN THE DISCHARGE WATER.
2. PREVENT EROSION, STREAMBED SCOUR, SUSPENSION OF SEDIMENTS AND EXCESSIVE STREAMFLOW BY PROPER DESIGN OF STRUCTURE, REGULATING THE WATER DISCHARGE RATE AS WELL AS USE OF ENERGY DISSIPATION DEVICE(S) AND SEDIMENT BARRIERS, AS NECESSARY.
3. MONITOR AND CONDUCT DISCHARGES IN A MANNER THAT DOES NOT CAUSE EROSION AND DOES NOT RESULT IN SILT-LADEN WATER FLOWING INTO ANY WATERBODY OR WETLAND.
4. DO NOT DEPOSIT SAND, SILT, AND/OR SEDIMENT INTO SENSITIVE ENVIRONMENTAL RESOURCE AREAS, INCLUDING WETLANDS, WATERBODIES, CULTURAL RESOURCE SITES, AND SENSITIVE SPECIES HABITATS. STOP DEWATERING ACTIVITIES IF SUCH DEPOSITION IS OCCURRING AND ENSURE THE DESIGN OF THE DISCHARGE IS CHANGED TO PREVENT REOCCURRENCE.
5. ABSORBENT BOOMS MUST BE USED DURING DISCHARGES FROM EXISTING / USED PIPE OR AS DIRECTED BY PERMIT REQUIREMENTS.
6. FILTER BAGS SHOULD BE INSTALLED ACCORDING TO THE DETAILS SHOWN IN "FILTER BAG" FIGURE.
7. REMOVE STRUCTURE AS SOON AS PRACTICABLE AFTER COMPLETION OF WATER DISCHARGES.

	OPTIONS FOR SMALL WATER DISCHARGES	FIGURE WD-3
		DWG. ES-0027 REV.

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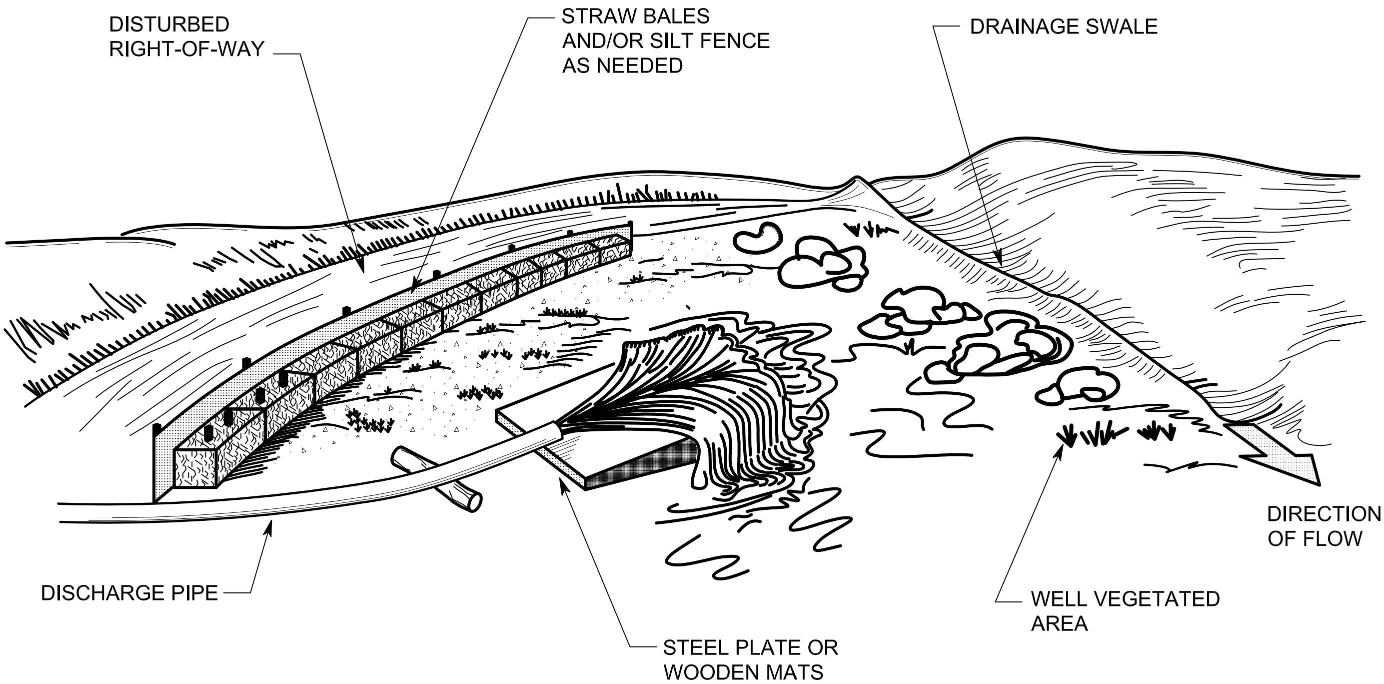

NOTES:

1. USE BACKHOE BUCKET OR DOZER BLADE TO ANCHOR DISCHARGE PIPE.

2. ON FLAT TERRAIN, USE STACKED STRAW BALES AND SILT FENCE AS NEEDED TO DIVERT WATER AWAY FROM DISTURBED RIGHT-OF-WAY.

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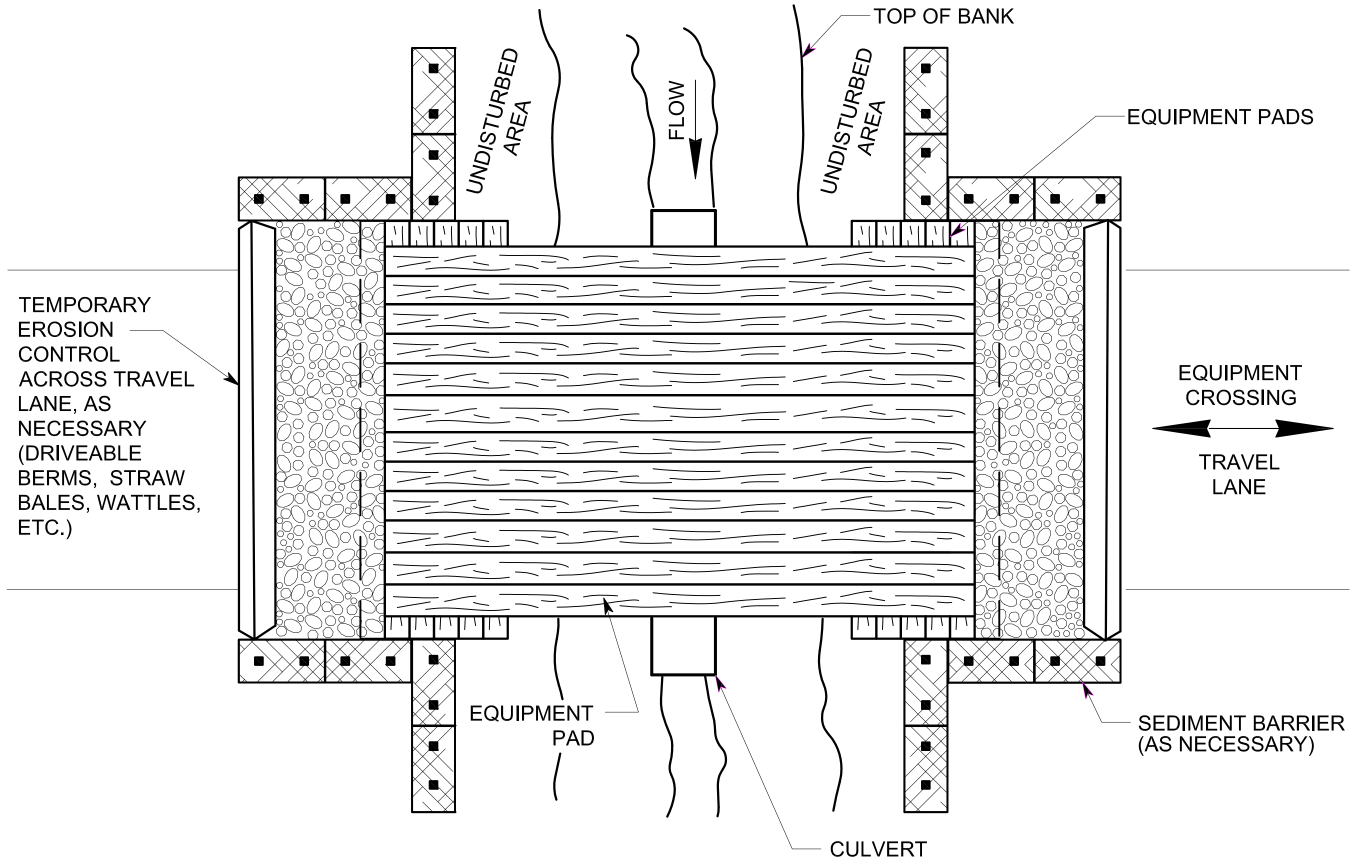
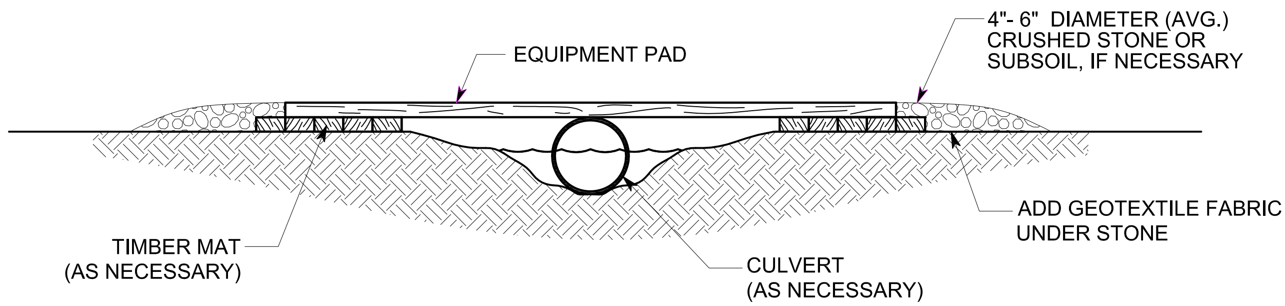
	DISCHARGE OF HYDROSTATIC TEST WATER TO A SURFACE WATER	FIGURE WD-4 DWG. ES-0028 REV.



PLAN VIEW



CROSS SECTION VIEW

NOTES:

1. TEMPORARY SEDIMENT BARRIER CONSISTS OF SILT FENCE AND/ OR STRAW BALES, OR OTHER APPROPRIATE MATERIAL.
2. NUMBER AND DIAMETER OF CULVERTS, AS WELL AS USE OF CULVERTS, WILL DEPEND ON SITE-SPECIFIC CONDITIONS.
3. EQUIPMENT PAD, TYPICALLY CONSTRUCTED OF HARDWOOD, SHALL BE IN GOOD CONDITION AND MUST ACCOMMODATE THE LARGEST EQUIPMENT USED. ADDITIONAL EQUIPMENT PADS CAN BE PUT SIDE BY SIDE IF EXTRA WIDTH IS REQUIRED. BRIDGE MUST SPAN FROM TOP OF BANK TO TOP OF BANK.
4. CRUSHED STONE OR SUBSOIL MAY BE USED AS ILLUSTRATED, IF NECESSARY, WITHIN TRAVEL LANE AS RAMP.
5. CONSTRUCT AND MAINTAIN BRIDGE TO WITHSTAND THE HIGHEST EXPECTED FLOW WHILE BRIDGE IS IN USE AND PREVENT SOIL FROM ENTERING WATERBODY. DO NOT USE SOIL TO CONSTRUCT OR STABILIZE BRIDGE.

TEMPORARY EQUIPMENT BRIDGE
(EQUIPMENT PADS WITH
OR WITHOUT CULVERTS)

FIGURE BR-1

DWG. ES-0029 REV.

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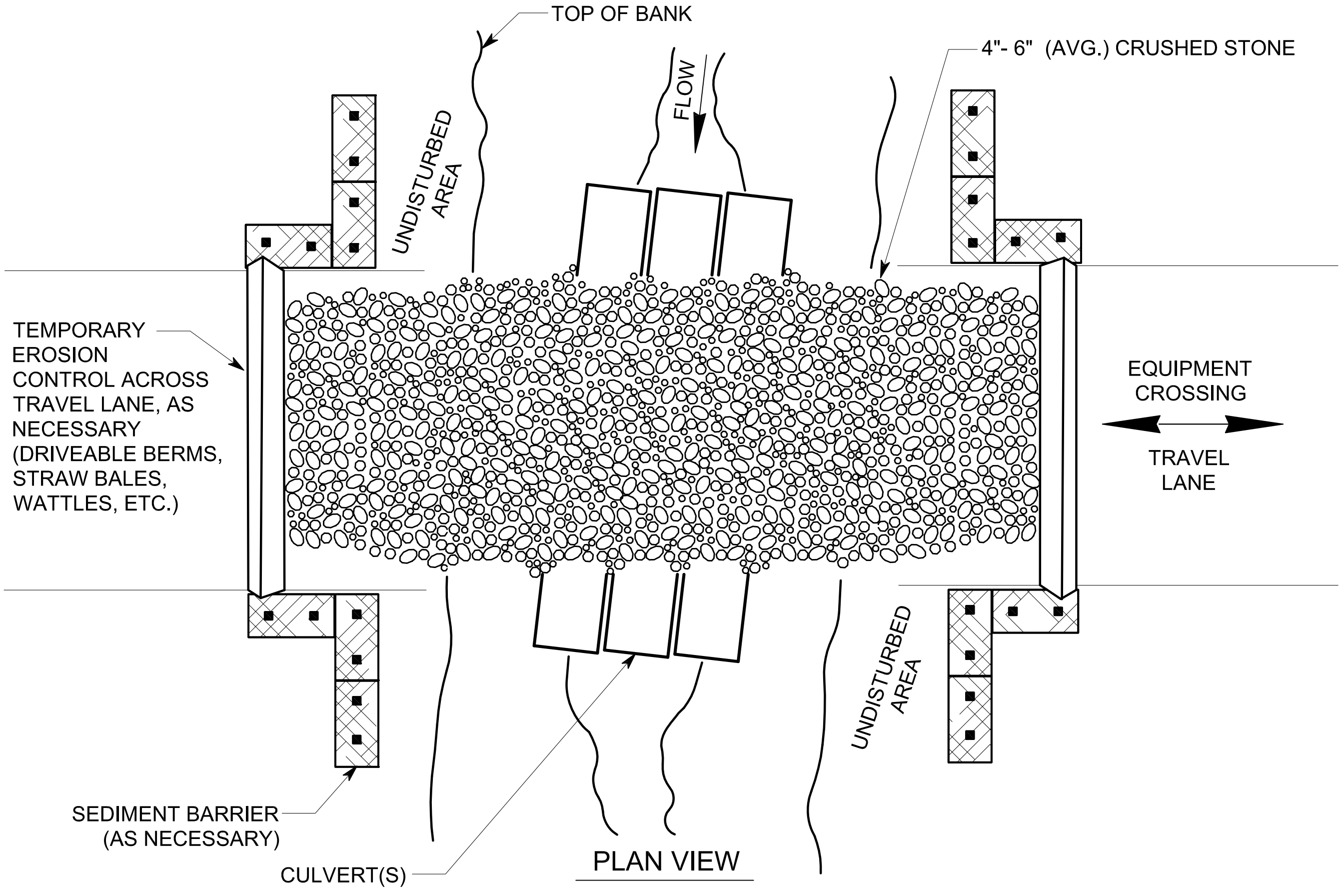
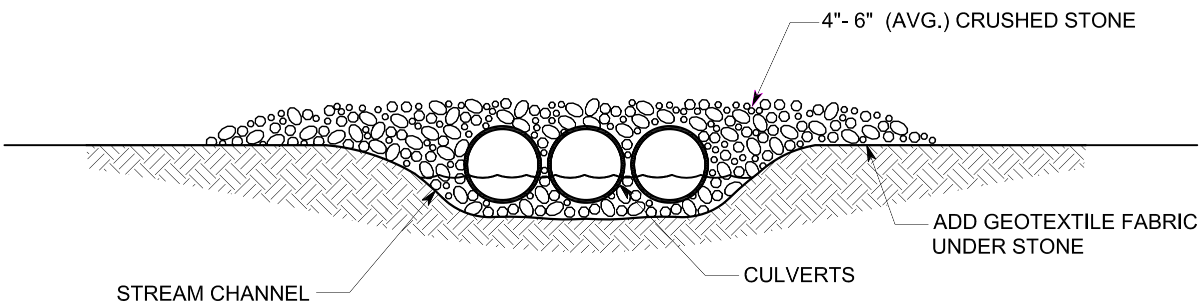


PLAN VIEW



CROSS SECTION VIEW

NOTES:

1. NUMBER AND DIAMETER OF CULVERTS WILL DEPEND ON SITE-SPECIFIC CONDITIONS. USE CULVERTS A MINIMUM OF 12-INCH DIAMETER.
2. ALIGN CULVERTS TO PREVENT EROSION AND STREAMBED SCOUR.
3. TEMPORARY SEDIMENT BARRIER CONSISTS OF SILT FENCES AND/OR STRAW BALES, OR OTHER APPROPRIATE MATERIALS.
4. ATTEMPT TO REMOVE ALL IMPORTED ROCK DURING REMOVAL OF THE BRIDGE.
5. DO NOT USE SOIL TO CONSTRUCT OR STABILIZE BRIDGES.

	TEMPORARY EQUIPMENT BRIDGE (CRUSHED STONE WITH CULVERTS)	FIGURE BR-2
		DWG. ES-0030 REV.

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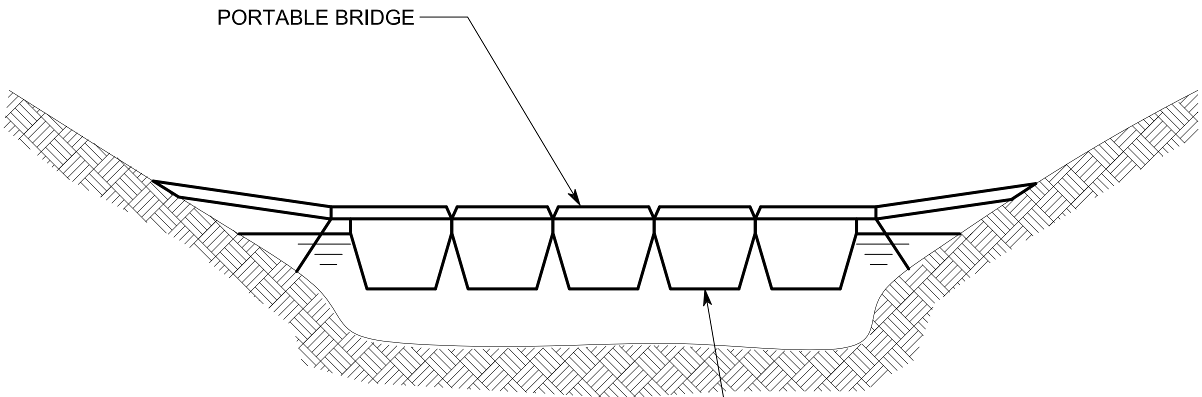

NOTES:

1. STABILIZE EDGES WITH SANDBAGS OR STONE.

2. REMOVE BRIDGE DURING CLEANUP.

TEMPORARY EQUIPMENT BRIDGE
(FLEXI-FLOAT OR PORTABLE BRIDGE)

FIGURE BR-3

DWG. ES-0031 REV.

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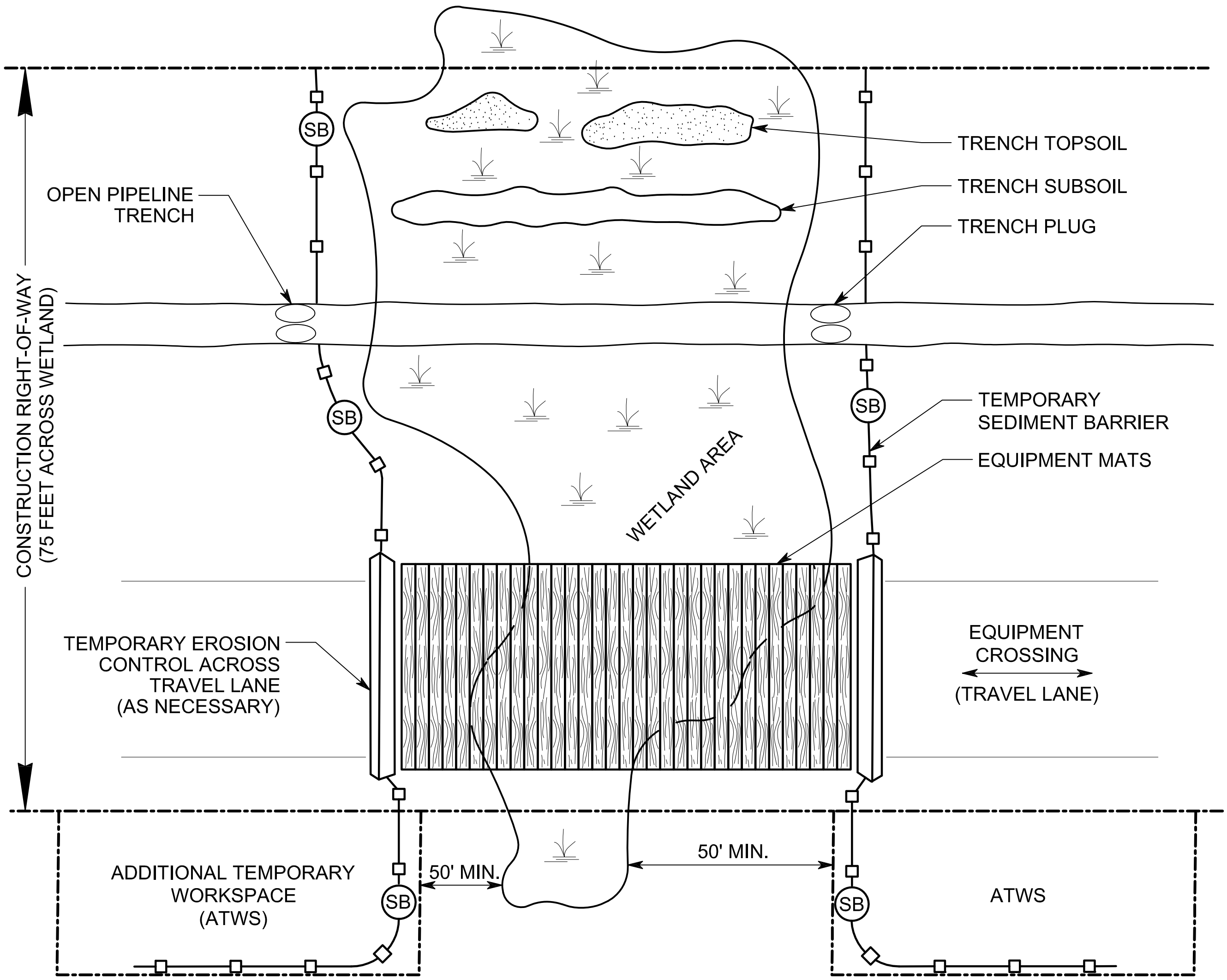

NOTES:

1. IN WETLANDS, EQUIPMENT MATS OR LOW GROUND WEIGHT EQUIPMENT SHALL BE UTILIZED IN SATURATED GROUND CONDITIONS.
2. LIMIT PULLING OF TREE STUMPS AND GRADING TO DIRECTLY OVER TRENCHLINE, EXCEPT IN SITUATIONS THAT THE CHIEF INSPECTOR AND ENVIRONMENTAL INSPECTOR DETERMINE SAFETY-RELATED CONSTRUCTION CONSTRAINTS REQUIRE GRADING OR THE REMOVAL OF STUMPS FROM UNDER THE WORKING SIDE.
3. SEGREGATE THE TOP 12 INCHES OF TOPSOIL WITHIN THE DITCHLINE IN WETLANDS, EXCEPT IN AREAS WHERE STANDING WATER IS PRESENT OR SOILS ARE SATURATED.
4. DO NOT TRENCH THE WETLAND UNTIL THE PIPELINE IS ASSEMBLED AND READY FOR LOWERING IN.
5. CONCRETE COATING OR PIPELINE WEIGHTS OF AN APPROPRIATE TYPE, WEIGHT AND SPACING WILL BE USED AS REQUIRED. NO CONCRETE COATING ACTIVITIES WITHIN 100 FEET OF A WETLAND OR WATERBODY BOUNDARY, UNLESS THE LOCATION IS AN EXISTING INDUSTRIAL SITE DESIGNATED FOR SUCH USE.
6. INSTALL SEDIMENT BARRIERS (SB) ALONG THE EDGE OF THE CONSTRUCTION RIGHT-OF-WAY AS NECESSARY TO CONTAIN SPOIL AND SEDIMENT WITHIN THE CONSTRUCTION RIGHT-OF-WAY THROUGH WETLANDS.
7. IN THE TRAVEL LANE, SEDIMENT BARRIERS MAY CONSIST OF REMOVABLE SEDIMENT BARRIERS OR DRIVABLE BERMS.
8. AT THE BASE OF SLOPES (GREATER THAN 5 PERCENT) THAT ARE LESS THAN 50 FEET FROM A WETLAND, INSTALL AND MAINTAIN TEMPORARY SEDIMENT BARRIERS ACROSS THE ENTIRE CONSTRUCTION RIGHT-OF-WAY UNTIL REVEGETATION IS SUCCESSFUL.
9. NO FERTILIZER OR LIME SHALL BE USED WITHIN WETLANDS.
10. DEWATER THE TRENCH IN A MANNER THAT DOES NOT CAUSE EROSION OR RESULT IN SILT-LADEN WATER FLOWING INTO ANY WETLAND.

	TYPICAL STANDARD WETLAND CROSSING	FIGURE WC-1
		DWG. ES-0032 REV.

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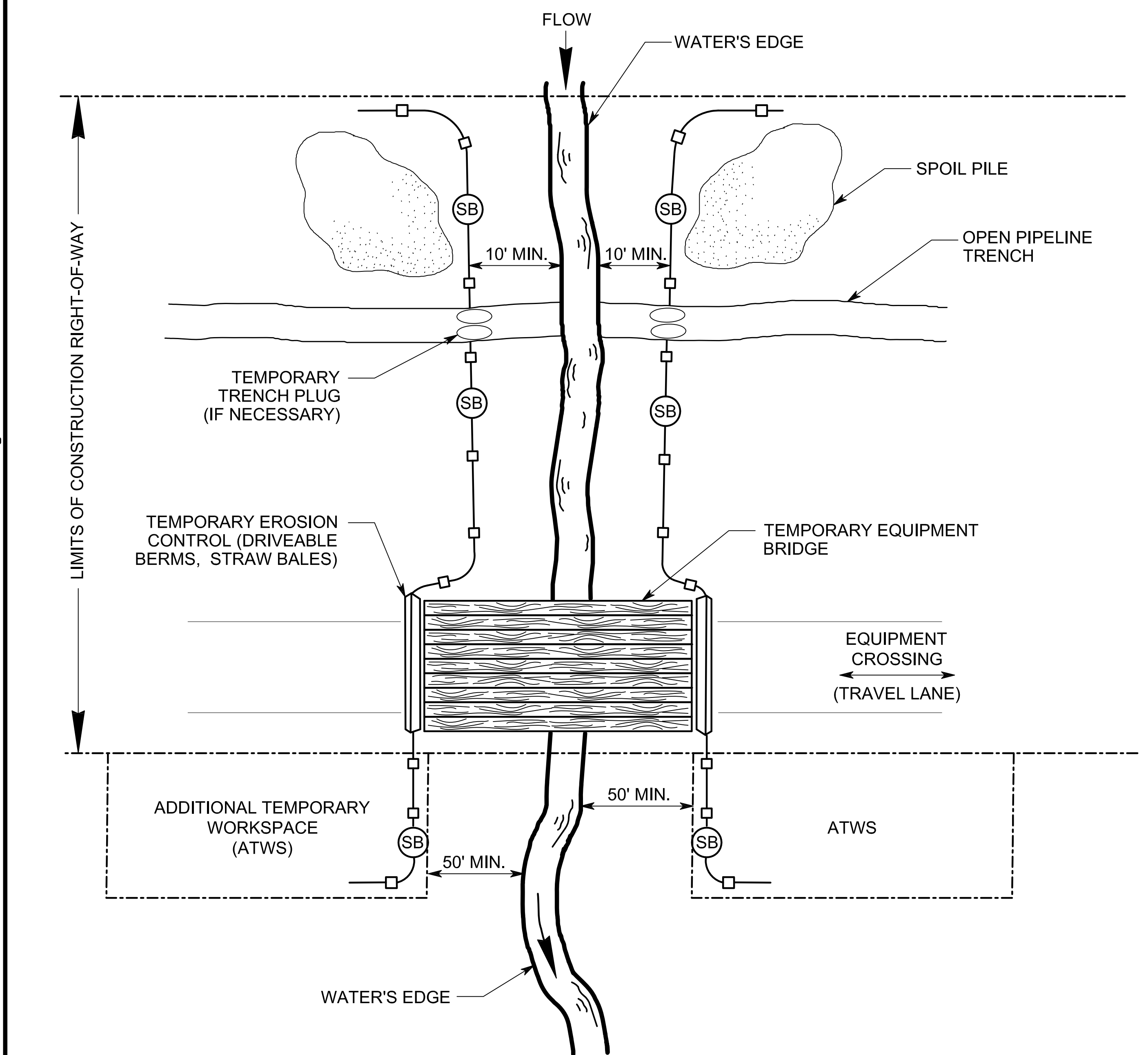

NOTES:

1. (SB) TEMPORARY SEDIMENT BARRIER OF SILT FENCE AND/OR STRAW BALES, OR APPROPRIATE MATERIALS.

2. FOR MINOR WATERBODIES, COMPLETE TRENCHING AND BACKFILLING IN THE WATERBODY (NOT INCLUDING BLASTING OR OTHER ROCK BREAKING MEASURES) WITHIN 24 CONTINUOUS HOURS. IF A FLUME IS INSTALLED WITHIN THE WATERBODY DURING MAINLINE ACTIVITIES, IT CAN BE REMOVED JUST PRIOR TO LOWERING IN THE PIPELINE. THE 24-HOUR TIMEFRAME STARTS AS SOON AS THE FLUME IS REMOVED.

3. FOR INTERMEDIATE WATERBODIES (>10 FEET TO 100 FEET WIDE MEASURED WATER'S EDGE TO EDGE), COMPLETE TRENCHING AND BACKFILLING IN THE WATERBODY (NOT INCLUDING BLASTING OR OTHER ROCK BREAKING MEASURES) WITHIN 48 CONTINUOUS HOURS, UNLESS SITE-SPECIFIC CONDITIONS MAKE COMPLETION WITHIN 48 HOURS INFEASIBLE.

	TYPICAL WET WATERBODY CROSSING	FIGURE WC-2
		DWG. ES-0033 REV.

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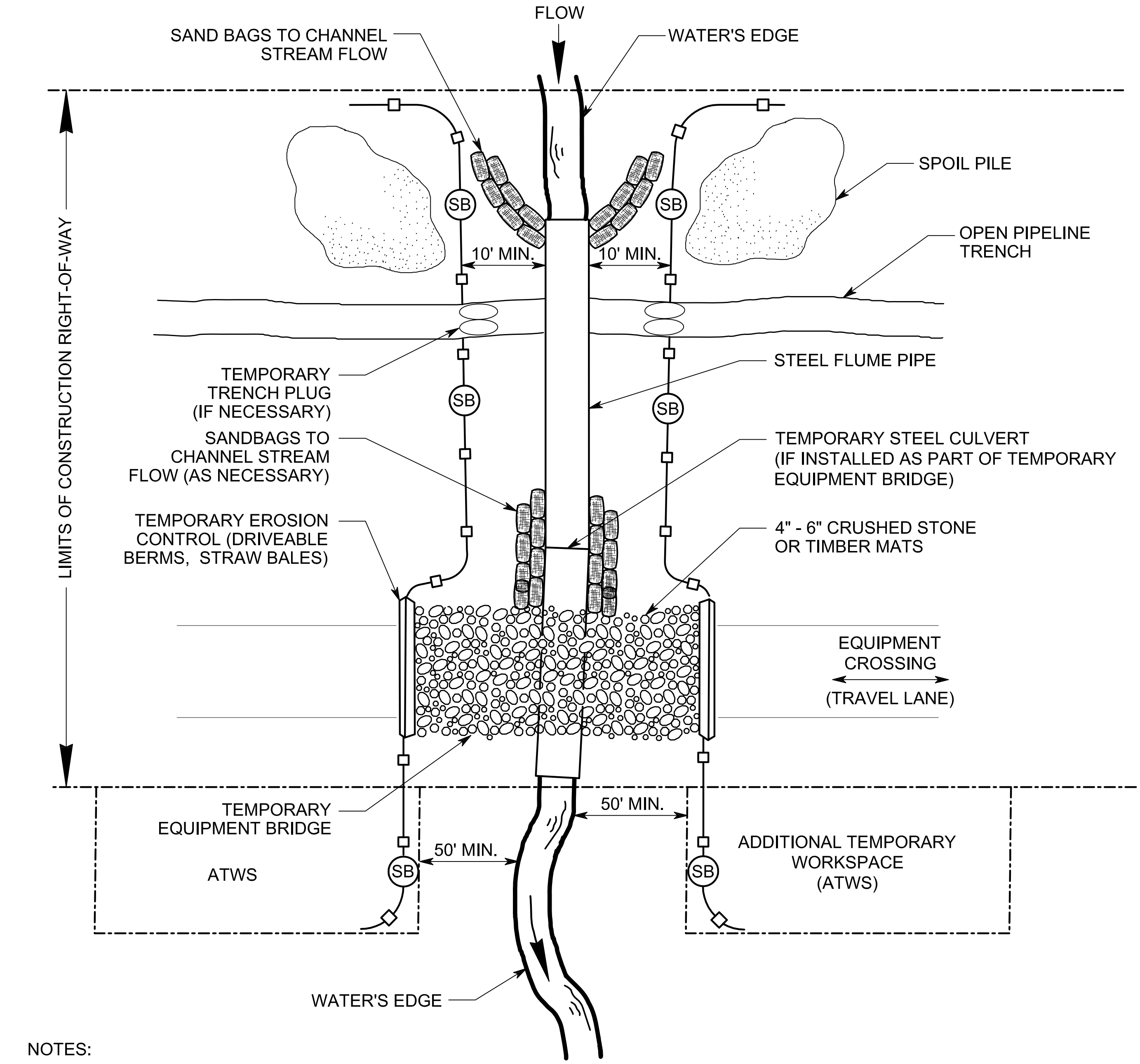

NOTES:

1. (SB) TEMPORARY SEDIMENT BARRIER OF SILT FENCE AND/ OR STRAW BALES, OR OTHER APPROPRIATE MATERIALS.
2. SAND BAGS MUST BE FILLED WITH SAND FREE OF SILT, ORGANICS, AND OTHER MATERIAL.
3. ENSURE SANDBAGS ARE INSTALLED BEFORE PLACING FLUME PIPE.
4. ALIGN FLUME(S) TO PREVENT BANK EROSION AND STREAM SCOUR.
5. CONDUCT ALL IN-STREAM ACTIVITY (EXCEPT BLASTING OR OTHER ROCK BREAKING MEASURES) WITH THE FLUME(S) IN PLACE. FLUME PIPE(S) MAY NOT BE REMOVED FOR LOWERING IN PIPE OR INITIAL STREAMBED RESTORATION EFFORTS.
6. THE ENDS OF THE FLUME AND CULVERT MUST EXTEND TO AN UNDISTURBED AREA.
7. CONTRACTOR TO DETERMINE ACTUAL NUMBER AND SIZE OF FLUMES AND CULVERTS REQUIRED BASED ON STREAM WIDTH AND STREAM FLOW RATE AT THE TIME OF CROSSING.
8. WATER ACCUMULATING WITHIN THE WORK AREA SHALL BE PUMPED TO A FILTER BAG OR DEWATERING STRUCTURE PRIOR TO DISCHARGING INTO ANY SURFACE WATER.

	TYPICAL FLUME WATERBODY CROSSING	FIGURE WC-3 DWG. ES-0034 REV.

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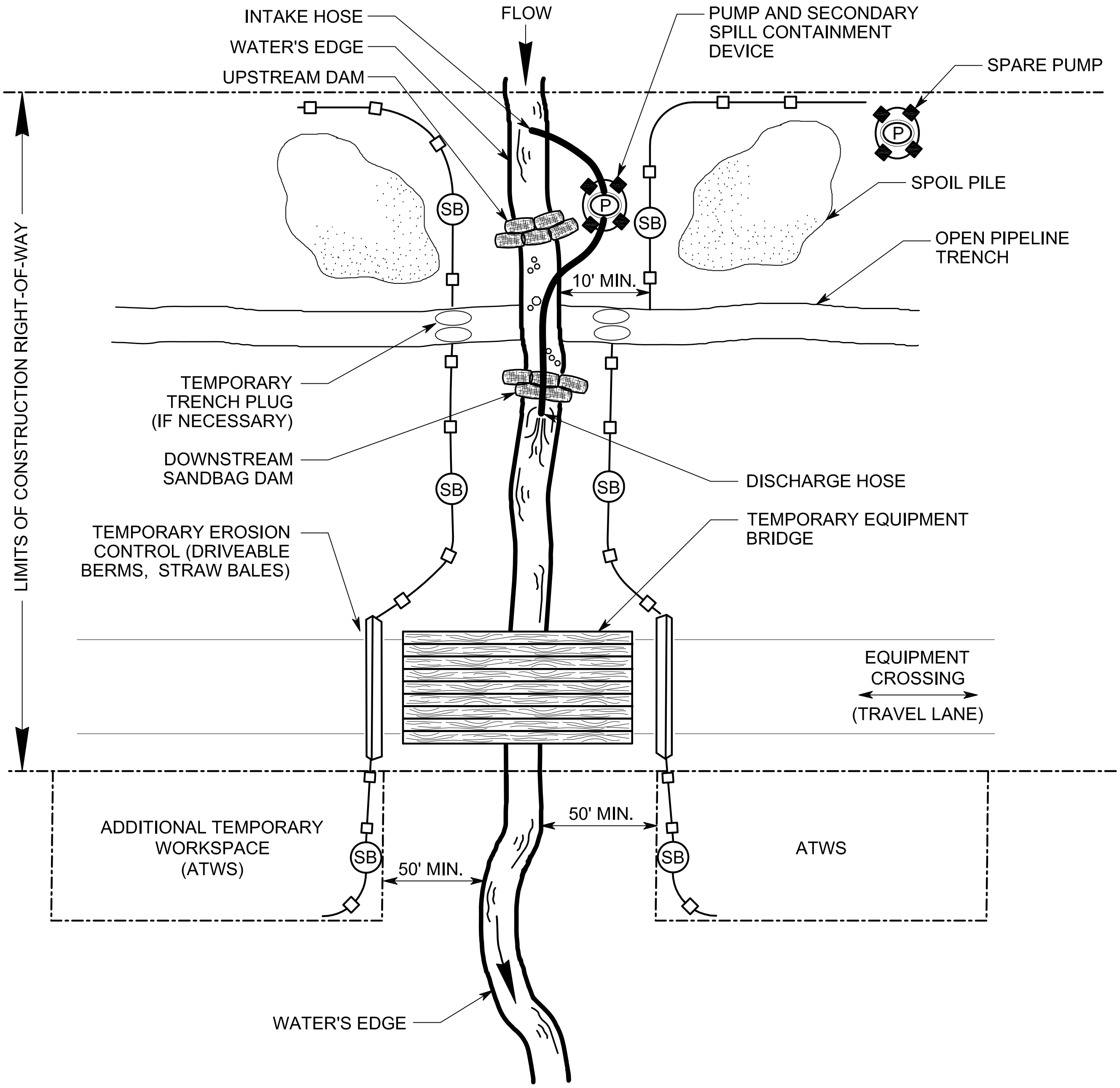

NOTES:

1. (SB) TEMPORARY SEDIMENT BARRIER OF SILT FENCE AND/ OR STRAW BALES, OR OTHER APPROPRIATE MATERIALS
2. INSTALL AND SEAL SANDBAGS UPSTREAM AND DOWNSTREAM OF THE CROSSING.
3. CREATE AN UPSTREAM SUMP USING SANDBAGS IF NATURAL SUMP IS UNAVAILABLE FOR THE INTAKE HOSE.
4. EXCAVATE ACROSS STREAM CHANNEL FOLLOWING WATER REROUTING.
5. DO NOT REFUEL OR STORE FUEL WITHIN 100 FEET OF THE WATERBODY. IF NOT FEASIBLE, ALTERNATIVE METHODS MUST BE APPROVED BY ENVIRONMENTAL INSPECTOR.
6. MONITOR PUMPS AT ALL TIMES DURING STREAM CROSSING PROCEDURE.
7. (P) USE SUFFICIENT PUMPS, INCLUDING ONSITE BACKUP PUMPS, TO MAINTAIN DOWNSTREAM FLOW.
8. SCREEN PUMP INTAKES. PREVENT SCOURING WITHIN WATERBODY BY HOSE DISCHARGE.

TYPICAL DAM-AND-PUMP
WATERBODY CROSSING

FIGURE WC-4

DWG. ES-0035 REV.

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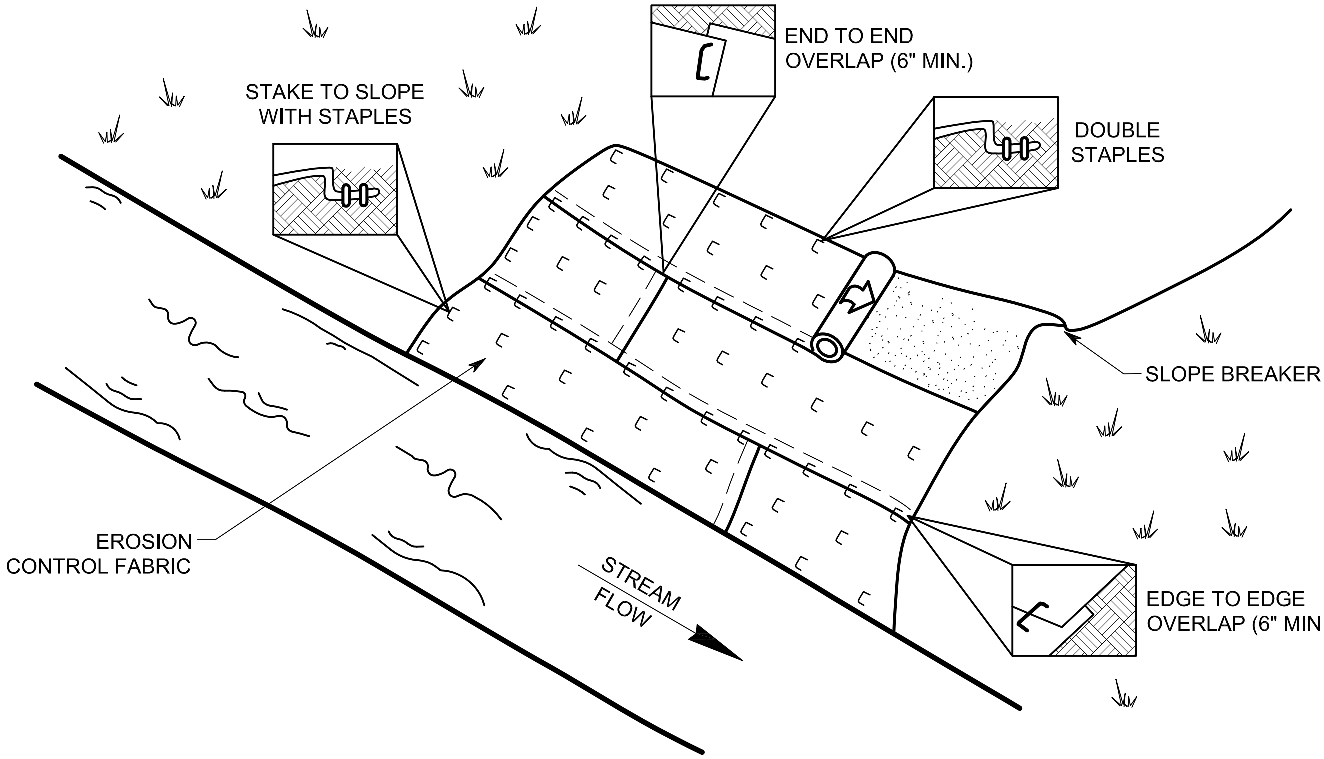

NOTES:

1. EROSION CONTROL BLANKETS (FABRIC) SHALL BE PLACED ON THE BANKS OF FLOWING STREAMS WHERE VEGETATION HAS BEEN REMOVED OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

2. EROSION CONTROL BLANKETS SHALL MEET THE REQUIREMENTS SPECIFIED IN THE E&S PLAN AND/OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

3. STAPLES SHALL BE MADE OF 11 GAUGE WIRE, U-SHAPED WITH 6" LEGS AND A 1" CROWN. STAPLES SHALL BE DRIVEN INTO THE GROUND FOR THE FULL LENGTH OF THE STAPLE LEGS. ALTERNATELY 1" WOODEN PEGS 6" LONG AND BEVELED TO SECURE MATTING.

4. BLANKETS SHALL BE INSTALLED ACCORDING TO MANUFACTURER SPECIFICATIONS OR AS STATED BELOW:

   - EXTEND TOP OF BLANKET 2 FEET PAST THE UPPER EDGE OF THE HIGH WATER MARK. IF A SLOPE BREAKER IS PRESENT ON THE APPROACH SLOPE, BEGIN THE BLANKET ON THE UPHILL SIDE OF THE SLOPE BREAKER.
   - INSTALL BLANKET(S) ACROSS THE SLOPE IN THE DIRECTION OF THE WATER FLOW.
   - ANCHOR ("KEY") THE UPSTREAM EDGE OF THE BLANKET(S) INTO THE SLOPE USING A 6" DEEP TRENCH. DOUBLE STAPLE EVERY 12" BEFORE BACKFILLING AND COMPACTING TRENCH
   - OVERLAP THE EDGES OF PARALLEL BLANKETS A MINIMUM OF 6". PLACE THE UPPER BLANKET OVER THE LOWER BLANKET (SHINGLE STYLE) AND STAPLE EVERY 12" ALONG THE LENGTH OF THE EDGE.
   - WHEN BLANKET ENDS ARE ADJOINED, PLACE THE UPSTREAM BLANKET OVER THE DOWNSTREAM BLANKET (SHINGLE STYLE) WITH APPROXIMATELY 6" OF OVERLAP AND STAPLE THROUGH THE OVERLAPPED AREA EVERY 12".
   - STAPLE DOWN THE CENTER OF THE BLANKET(S), THREE STAPLES IN EVERY SQUARE YARD.

5. IN LIVESTOCK AREAS WHERE EROSION CONTROL BLANKETS ARE APPLIED TO THE STREAMBANKS, FENCING MAY BE USED IF NECESSARY TO EXCLUDE LIVESTOCK, WITH PERMISSION OF THE LANDOWNER.

6. MONITOR WASHOUTS, STAPLE INTEGRITY OR BLANKET MOVEMENT. REPLACE OR REPAIR AS NECESSARY.

7. DO NOT USE SYNTHETIC MONOFILAMENT MESH / NETTED MATERIALS IN AREAS DESIGNATED AS SENSITIVE WILDLIFE HABITAT, UNLESS THE PRODUCT IS SPECIFICALLY DESIGNED TO MINIMIZE HARM TO WILDLIFE.

NOT TO SCALE

	TYPICAL EROSION CONTROL BLANKETS ON STREAMBANKS	FIGURE WC-5
		DWG. ES-0036 REV.

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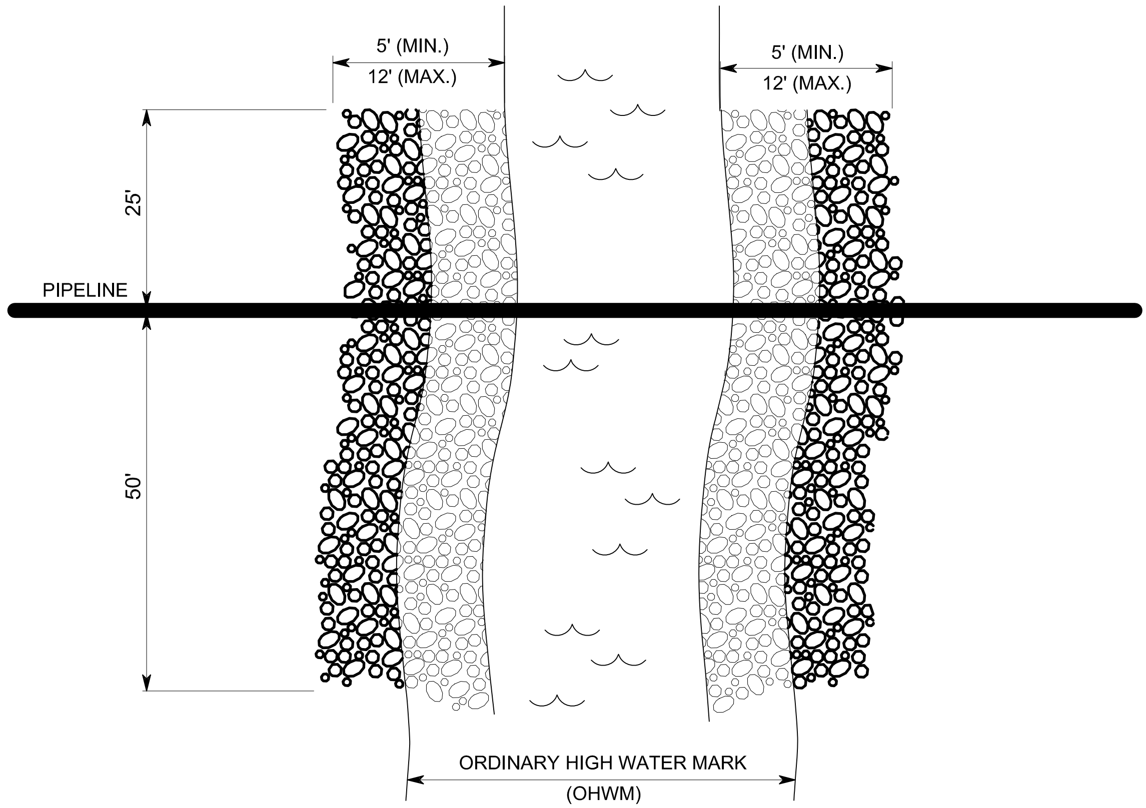
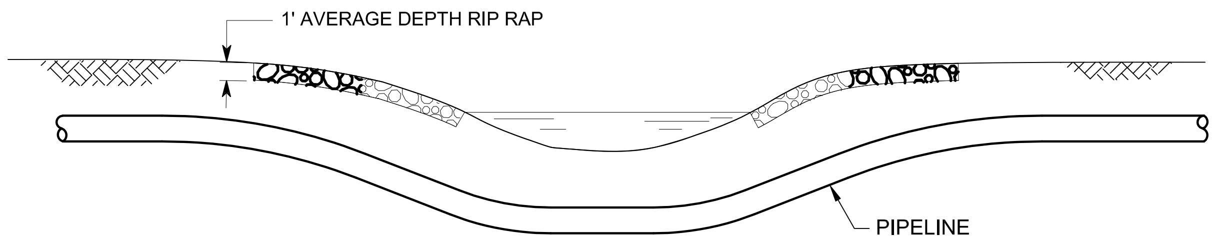


PLAN VIEW



CROSS-SECTION VIEW

NOTES:

1. RIP-RAP SHALL NOT EXCEED 500 FEET IN LENGTH ALONG THE BANK.
2. RIP-RAP WILL NOT EXCEED AN AVERAGE OF ONE CUBIC YARD PER RUNNING FOOT BELOW THE OHWM.
3. RIP-RAP INSTALLATION SHALL BE IN COMPLIANCE WITH ALL APPLICABLE PERMITS.
4. RIP-RAP MUST BE CLEAN AND FREE OF SOIL AND DEBRIS.
5. RIP-RAP SHALL NOT BE PLACED IN A MANNER THAT IMPAIRS SURFACE WATER FLOW.
6. GEOTEXTILE FABRIC MAY BE INSTALLED BELOW RIP-RAP.

NOT TO SCALE

	TYPICAL RIP-RAP PLACEMENT	FIGURE WC-6
		DWG. ES-0037 REV.

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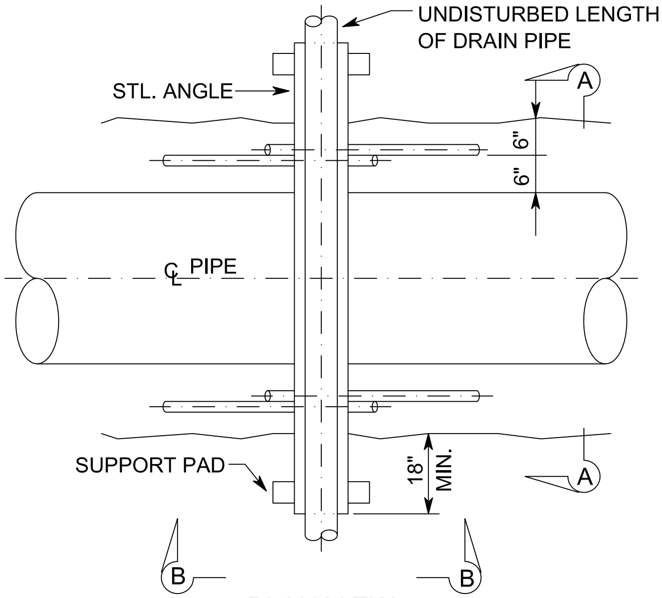
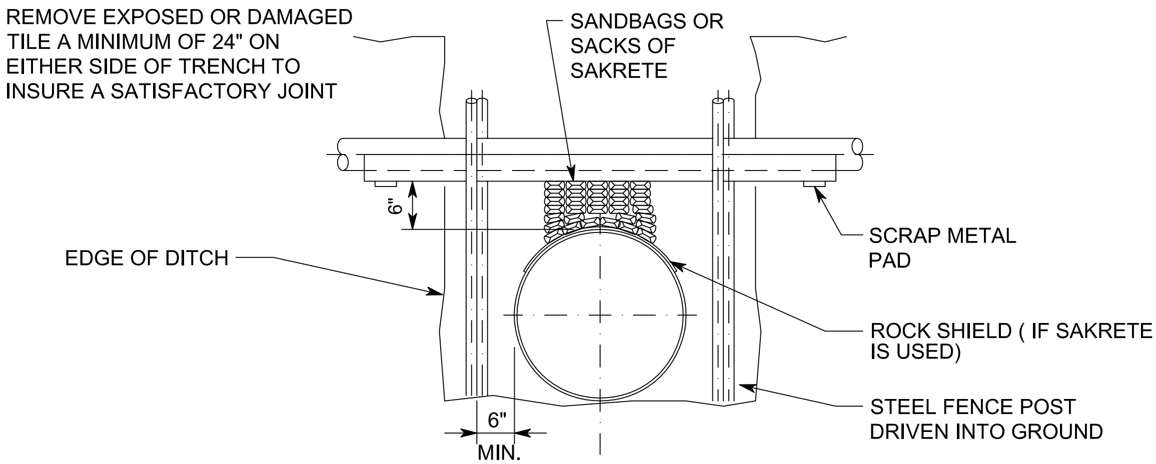


PLAN VIEW

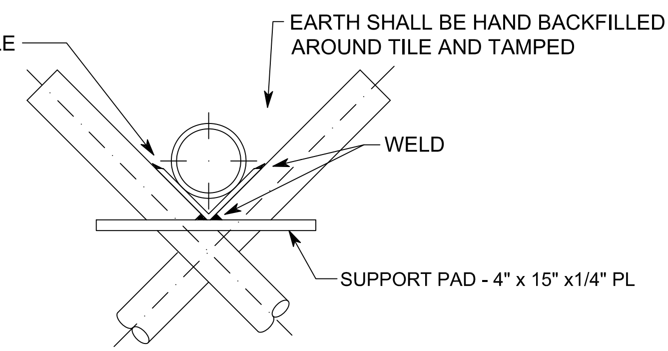
N.T.S.



SECTION "A-A"

N.T.S.

TO SUPPORT	4" & 6"	TILE USE	4" x 1 / 4"	ANGLE
"	8"	"	6" x 7/ 16"	"
"	10"	"	6" x 7/ 16"	"
"	12"	"	8" x 1 / 2"	"
"	16"	"	8" x 1 / 2"	"



SECTION "B-B"

N.T.S.

NOTE:
USE OF SAKRETE SHALL REQUIRE PRIOR
COMPANY APPROVAL.

DRAIN TILE REPAIR PROCEDURE	FIGURE SU-1	
	DWG. ES-0038	REV.

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SEED MIX RECOMMENDATIONS: *"SOUTHERN ZONE"*

The Southern Zone is generally defined as areas south of the northern borders of Arkansas and Tennessee.

UPLAND AREAS

Lime (agricultural limestone)	2.5 tons/acre
Fertilizer (6-12-12)	950 lbs./acre
Mulch (Oats, Wheat or Bermudagrass Straw)	3.0 tons/acre

Seed Mixture[1]

Sorghum, Sudangrass, or Sudangrass Hybrids[2]	40 lbs/acre Pure Live Seed (PLS)
Kentucky 31 Tall Fescue[3]	10 lbs/acre PLS
Big Bluestem	10 lbs/acre PLS
Indiangrass	10 lbs/acre PLS
Bermudagrass	10 lbs/acre PLS
Sericea Lespedeza[4]	10 lbs/acre PLS
White Clover[4]	5 lbs/acre PLS
Birdsfoot Trefoil[4]	10 lbs/acre PLS

[1] An alternative seed mixture may be requested by the landowner(s).

[2] These species may be sold under the following trade names: DeKalb SX17, Greentreat II, Greentreat III, Tastemaker DR, Tastemaker III, FFR202, or Sordan 79.

[3] Fescue must be endophyte-free.

[4] Legumes should be treated with a species specific inoculate prior to seeding. Legume seed and soil should be scarified.

Recommended seeding dates

(For establishment of temporary or permanent vegetation.)

Spring: March 15 - May 30
Fall: August 1 - October 15

WINTER STABILIZATION

If restoration does not occur prior to October 15, seed the construction ROW with 1.5 bushels per acre of winter rye or similar variety of rye as requested by the landowner. Mulch construction ROW at 3.0 tons per acre with wheat straw, including areas adjacent to stream and wetland crossings. Seed segregated topsoil piles with winter rye and mulch at a rate of 3.0 tons per acre.

WETLAND AREAS

DO NOT USE LIME OR FERTILIZER !!!

Do not use fertilizer, lime, or mulch within wetlands unless required in writing by the appropriate federal or state agency (as identified in the Clearance Package/Permit Book). Mulch consists of weed-free straw, wood fiber hydromulch or some functional equivalent as approved by the EI and Chief Inspector. When used, apply mulch (Oats, Wheat, or Bermudagrass straw) at a rate of 3.0 tons/acre.

Wetland Seed Mix:

Annual Ryegrass	40 lbs/acre PLS

APPENDIX B

WATERBODY REFERENCE CITING FERC REQUIREMENTS

NEXUS GAS TRANSMISSION

APPENDIX B: Waterbody Reference Citing FERC Requirements

Waterbodies may be specifically identified or recognized by the States or authorized Indian Tribe for water use, value or quality, such as fisheries. FERC's *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures) contain specific requirements with regards to state-designated fisheries which are summarized in the table below. This table is a general reference of waterbody construction techniques and restrictions required by the FERC Procedures, 2013 version. Project-specific permits obtained for a given project may be more restrictive and must be followed (Refer to project-specific Clearance Package/Permit Book).

FERC Waterbody Type[a]	Crossing Width[b]	Construction Crossing Method[c]	Seasonal Timing Restriction[d]	Waterbody Construction Duration[e]
Not Designated Fisheries				
MINOR	*≤ 10 feet*	Dry or Wet	No	24 hours
INTERMEDIATE	*> 10 feet but ≤ 100 feet*	Dry or Wet	No	48 hours
MAJOR	*> 100 feet*	Refer to site-specific plan	No	N/A
Designated Fisheries				
MINOR	*≤ 10 feet*	Dry only	Yes	N/A
INTERMEDIATE	*> 10 feet but ≤ 100 feet*	Dry or Wet	Yes	N/A
MAJOR	*> 100 feet*	Refer to site-specific plan	Yes	N/A

a) Waterbody types or classifications as defined in the FERC Procedures. Refer to Section 5.3 of E&SCP.

b) Measured from the water's edge at the time of crossing.

c) "Dry" = Dry crossing includes dam-and-pump or flume crossing methods where the stream flow is isolated from the construction area. A dry crossing is generally required for crossings up to 30 feet wide for state designated fisheries or federally designated critical habitat.
"Wet" = Wet crossing generally refers to the open-cut method that allows continuous flow of the stream across the construction area.
"Refer to site-specific plan" = A plan is required for each major crossing as well as each waterbody or wetland that would be crossed using the HDD method requires a project-specific HDD Plan (refer to Section 4.4).

d) For designated fisheries, instream work must occur during the following seasonal time windows, unless expressly permitted or further restricted by the appropriate federal or state agency in writing on a site-specific basis:

- coldwater fisheries construction must occur from June 1 through September 30.
- coolwater and warmwater fisheries construction must occur from June 1 through November 30.

NOTE: project-specific waterbody crossings may have other federal and state agency timing restrictions. Seasonal timing windows will be indicated within the project-specific waterbody crossing table and/or within the Environmental Clearance/Permit Book for the project. The FERC seasonal timing window restrictions do not apply to the installation or removal of equipment bridges.

e) The construction duration of the crossing officially begins with in-stream activities, including in-stream trenching, pipe installation, backfill, and restoration of the streambed contours. Duration does not apply to in-stream work for dry crossings, and does not apply to blasting activities.

APPENDIX C

SEED MIX RECOMMENDATIONS

SEED MIX RECOMMENDATIONS: *"NORTHERN ZONE"*

The Northern Zone is generally defined as areas north of the northern borders of Arkansas and Tennessee.

UPLAND AREAS

Lime	4.0 tons/acre
Fertilizer	1000 lbs./acre (10-20-20)
Mulch (Wheat Straw)	3.0 tons/acre

Upland Seed Mix	75 lbs./acre Pure Live Seed (PLS)
Kentucky Bluegrass	20%
Red Fescue [1]	20%
Kentucky 31 Tall Fescue [1]	15%
Redtop	10%
Perennial ryegrass	20%
White clover	5%
Birdsfoot Trefoil (Minimum 20% hard seed)	10%

[1] Fescue must be endophyte-free.

Pasture Mix	20 lbs./acre PLS
(For use only in disturbed pasture areas with landowner's permission.)	
Kentucky Bluegrass	31%
Medium Red clover	26%
Norcen Trefoil	17%
Poly Perennial Rye	26%

Recommended Seeding Dates

(For the establishment of temporary or permanent vegetation.)

Spring: March 15 - May 30

Fall: August 1 - October 15

WINTER STABILIZATION

If restoration does not occur prior to October 15, seed the construction ROW with 1.5 bushels per acre of winter rye or similar variety of rye as requested by the landowner. Mulch the construction ROW at 3.0 tons per acre with wheat straw, including areas adjacent to streams and wetland crossings. Seed segregated topsoil piles with winter rye and mulch at a rate of 3.0 tons per acre.

WETLAND AREAS

DO NOT USE LIME OR FERTILIZER !!!

Do not use fertilizer, lime, or mulch within wetlands unless required in writing by the appropriate federal or state agency (as identified in the Clearance Package/Permit Book). Mulch consists of weed-free straw, wood fiber hydromulch or some functional equivalent as approved by the EI and Chief Inspector. When used, apply mulch (wheat straw) at a rate of 3.0 tons/acre.

Wetland Seed Mix

Annual Ryegrass	40 lbs./acre PLS

SEED MIX RECOMMENDATIONS: *“SOUTHERN ZONE”*

The Southern Zone is generally defined as areas south of the northern borders of Arkansas and Tennessee.

UPLAND AREAS

Lime (agricultural limestone)	2.5 tons/acre
Fertilizer (6-12-12)	950 lbs./acre
Mulch (Oats, Wheat or Bermudagrass Straw)	3.0 tons/acre

Seed Mixture[1]

Sorghum, Sudangrass, or Sudangrass Hybrids[2]	40 lbs/acre Pure Live Seed (PLS)
Kentucky 31 Tall Fescue[3]	10 lbs/acre PLS
Big Bluestem	10 lbs/acre PLS
Indiangrass	10 lbs/acre PLS
Bermudagrass	10 lbs/acre PLS
Sericea Lespedeza[4]	10 lbs/acre PLS
White Clover[4]	5 lbs/acre PLS
Birdsfoot Trefoil[4]	10 lbs/acre PLS

[1] An alternative seed mixture may be requested by the landowner(s).

[2] These species may be sold under the following trade names: DeKalb SX17, Greentreat II, Greentreat III, Tastemaker DR, Tastemaker III, FFR202, or Sordan 79.

[3] Fescue must be endophyte-free.

[4] Legumes should be treated with a species specific inoculate prior to seeding. Legume seed and soil should be scarified.

Recommended seeding dates

(For establishment of temporary or permanent vegetation.)

Spring: March 15 - May 30

Fall: August 1 - October 15

WINTER STABILIZATION

If restoration does not occur prior to October 15, seed the construction ROW with 1.5 bushels per acre of winter rye or similar variety of rye as requested by the landowner. Mulch construction ROW at 3.0 tons per acre with wheat straw, including areas adjacent to stream and wetland crossings. Seed segregated topsoil piles with winter rye and mulch at a rate of 3.0 tons per acre.

WETLAND AREAS **DO NOT USE LIME OR FERTILIZER !!!**

Do not use fertilizer, lime, or mulch within wetlands unless required in writing by the appropriate federal or state agency (as identified in the Clearance Package/Permit Book). Mulch consists of weed-free straw, wood fiber hydromulch or some functional equivalent as approved by the EI and Chief Inspector. When used, apply mulch (Oats, Wheat, or Bermudagrass straw) at a rate of 3.0 tons/acre.

Wetland Seed Mix:

Annual Ryegrass	40 lbs/acre PLS

APPENDIX 1B2

Spill Prevention Control and Countermeasure Plan

SPILL PREVENTION CONTROL AND COUNTERMEASURE (SPCC) PLAN &

PREPAREDNESS, PREVENTION, AND CONTINGENCY (PPC) PLAN for CONSTRUCTION PROJECTS

Project: **NEXUS Gas Transmission Project**

<u>Prepared By:</u>

NEXUS Gas Transmission, LLC
Environmental Construction Permitting
5400 Westheimer Court
Houston, TX 77056-5310

Effective February 18, 2003

<u>Updated</u>: October 2015

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ABBREVIATIONS AND DEFINITIONS

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CI	Chief Inspector (Company employee or Contractor Employee performing the duties of the onsite Construction Manager or Engineer)
Company	NEXUS Gas Transmission, LLC
Company SC	Company Spill Coordinator (The Environmental Inspector or the Chief Inspector)
Contractor	Third party service provider performing construction activities for the Company on property owned or under the control of the Company. This role may be filled by the Company on small projects constructed by Company personnel and equipment.
Contractor SC	Contractor Spill Coordinator
CWA	Clean Water Act
DOT	U. S. Department of Transportation
E&C	Engineering & Construction
ECP	Environmental Construction Permitting
EHS, EH&S	Environmental Health and Safety
EI	Environmental Inspector (Company employee or Contractor Employee performing the duties of onsite environmental specialist overseeing Contractor compliance with environmental permit conditions, laws and regulations)
E&SCP	Erosion & Sedimentation Control Plan
FERC	Federal Energy Regulatory Commission
FWPC	Federal Water Pollution Control Act
HDD	Horizontal Directional Drill
JSA	Job Safety Analysis
MSDS	Material Safety Data Sheets
ppm	Parts per Million
Environmental Lead	Environmental Construction Permitting specialist assigned to the project
OPA	Oil Pollution Act
RCRA	Resource Conservation and Recovery Act
SPCC Plan or Plan	Spill Prevention, Control and Countermeasure Plan
TSCA	Toxic Substances Control Act

1.0 PURPOSE/PLAN OBJECTIVE

NEXUS Gas Transmission, LLC ("Company") has prepared this Spill Prevention, Control and Countermeasure ("SPCC") Plan ("Plan") for construction projects in the United States. The purpose of this Plan is to reduce the probability and risk of a potential spill or release of oil or hazardous materials by the Company or Contractor during construction-related activities, by providing training to the Company and Contractor and expediting spill response and cleanup. This plan is not intended to meet the requirements of existing facility operations.

The Plan's specific objectives are to identify and address:

- The type and quantity of material handled, stored, or used on site during construction;
- The measures to be taken for spill preparedness and prevention;
- Emergency response procedures;
- Spill incident reporting/notification procedures; and
- Local emergency response team arrangements.

This plan has been prepared to meet the requirements of the Federal Energy Regulatory Commission's ("FERC's") *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures), the Oil Pollution Act ("OPA"), the Federal Water Pollution Control Act ("FWPC"), the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA") of 1980, the Resource Conservation and Recovery Act ("RCRA"), the Toxic Substances Control Act ("TSCA") and the Clean Water Act ("CWA").

The Company Environmental Construction Permitting ("ECP") group is responsible for the development and maintenance of this Plan. The Plan will be distributed to the Company Engineering & Construction ("E&C") Department's teams and associated Company personnel and will be included in the construction contract. It is the responsibility of the E&C teams to distribute to any necessary Contractors for implementation.

This Plan outlines both Company and Contractor responsibilities by topic. The Contractor is responsible for implementation of the Plan. In the absence of a Contractor, the Company will be responsible for both Company and Contractor responsibilities as they are laid out in this Plan.

A copy of the Plan must be on site during active construction and should also be maintained at the closest construction field office.

2.0 TRAINING

The Company requires all Contractor and Company personnel engaged in any construction activity to receive training in the implementation of the Plan prior to the commencement of on-site construction related activities.

Site visitors are to be given a brief review of the Plan as part of their orientation on safety and emergency procedures prior to the start of any on-site activities.

Contractor Responsibility

The Contractor will be responsible for the following:

- Keep training records
- Perform training briefings through ongoing meetings like tailgates and the daily project Job Safety Analysis ("JSA") that include:
  - Precautionary measures to prevent spills;
  - Potential sources of spills, including equipment failure or malfunction;
  - Standard operating procedures in the event of a spill;
  - Applicable notification requirements;
  - Equipment, materials and supplies available for clean-up of a spill;
  - Hazardous waste identification procedures;
  - Generation and proper handling of all non-hazardous waste, hazardous waste, and other toxic substances;
  - Proper storage, labeling, transportation and disposal of non hazardous and hazardous waste; and
  - Sample collection procedures.

Company Responsibility

The Company Chief Inspector ("CI"), Environmental Inspector ("EI"), or their designate will perform the following:

- Teach awareness-level training at the initial project environmental training session;
- Ensure further training is available for other new project personnel; and
- Audit training records kept by the Contractor as necessary.

3.0 PRE-PLANNING - MATERIAL INVENTORY AND DOCUMENTATION

Contractor Responsibility

The Contractor will be responsible for the following **prior** to the start of construction:

- Develop an inventory of all oil/hazardous material stored or used during construction;
- Complete Tables I, II, IV, V and VI (see Appendix A);
- Obtain material safety data sheets ("MSDS") (Appendix B) for all hazardous and non-hazardous substances listed in Table I (see Appendix A);
- Prepare a basic facility diagram or sketch for any storage areas, including pipe yards and temporary storage areas. The diagram should include locations of oil-filled containers, direction of run-off, emergency evacuation routes and assembly areas (see Appendix E); and
- Submit the required Tables, MSDS, and signature pages to the ECP's Environmental Lead for review and approval.

Company Responsibility

- Complete Tables III (see Appendix A);
- Review the Tables, MSDS, and signature pages submitted by the Contractor for approval; and
- Distribute approved Tables, MSDS, and signature pages to include in Plan as Appendices A, B and D.
- Fill out any signature pages or forms (see Appendix D)
    - Management Approval and Cleanup Commitment
    - Certificate of Determination of Substantial Harm Criteria

4.0 SPILL AND LEAK PREPAREDNESS AND PREVENTION

4.1 Prevention and Preparedness

Contractor Responsibility

- Complete Appendix A, Table I, Material and Waste Storage Inventory, and Table VI, Areas for Potential Leaks and Spills, prior to construction;
- Provide spill prevention, containment, and clean up equipment, and keep it available on-site;
- Perform daily inspections of all equipment, storage tanks, and/or container storage areas;
- Repair all leaking equipment, machinery or tools immediately. If items cannot be repaired, remove them immediately from the project site;
- Maintain a minimal spill kit (absorbent diapers, plastic bags, gloves, etc.) for each piece of hydraulically operated equipment and personnel vehicles within the project area;
- Store materials as indicated in the storage facility diagram or sketch provided by the Contractor in Appendix E;
- Submit a secondary containment plan for any hazardous material storage within the project area to the Company for approval **prior** to storage; and
- Obtain written approval from an appropriate government authority for hazardous material storage within 100 feet of a wetland or waterbody.

Company Responsibility

- Review any secondary containment or storage plans submitted by the Contractor for approval.

4.1.1 Secondary Containment

Contractor Responsibility

- Single wall tanks shall be provided with temporary secondary containment that will hold at least 110% of the tank capacity of the largest tank inside the containment area;
    - This includes pumps, generators, compressors or other petroleum powered equipment used on site for dewatering and other activities during construction.
- PCB (50 parts per million ("ppm") or greater) storage tanks shall be double-walled or have secondary containment that will hold 200 percent of the tank capacity;
- All containers with a storage capacity greater than 55 gallons shall have temporary containment (see Appendix A, Table I for type of temporary containment); and
- All pumps and other portable fuel burning equipment used during construction will be sited in secondary containment.

4.1.2 Storage/Inspection (Tanks/Containers)

Contractor Responsibility

- Operate only those tanks for fuel and material storage that meet the approval of the Company;
- Elevate tanks a maximum of two feet above grade;
- Inspect vehicle-mounted tanks to ensure all are equipped with flame/spark arrestors on all vents to prevent self-ignition;

- Locate tank storage in areas that are at least 100 feet from all waterbodies, wetlands, and designated municipal watershed areas, with certain exceptions as approved by ECP and listed in Appendix A, Table IV;
- Complete Appendix A, Table IV, Tank and Container Storage Exception Areas, and submit to the Company for approval prior to construction;
- Inspect all tanks daily for leaks and deterioration. The results of all inspections shall be made available to the Company upon request;
- Do not store incompatible materials in sequence in tanks prior to decontamination (A general list of potentially incompatible materials that may be used during construction are included in Appendix A, Table I);
- Store small cans of gasoline, diesel, solvents, etc., within the temporary secondary containment or within secured trailers or vehicles when not in use;
- Replace leaking and/or deteriorated containers as soon as the condition is first detected; and
- Ensure that all container storage and containment areas being used to store hazardous materials or wastes are in compliance with applicable local, state and federal requirements.

4.1.3 Loading/Unloading Areas

Contractor Responsibility

- Transfer liquids and refuel only in pre-designated and pre-approved locations that are at least 100 feet from all waterbodies and wetlands, with certain exceptions as approved by the EI and listed in Appendix A;
- Inspect the area beneath loading/unloading location for spills before and after each use;
- Utilize drip pans at all hose connections while loading/unloading liquids. If a leak or spill occurs, the loading/unloading operation will be stopped and the spill will be contained, cleaned up and collected prior to continuing the operation;
- Inspect all outlets of the tank trucks prior to leaving the loading and unloading area to prevent possible leakage from the truck while in transit;
- Equip any service vehicle used to transport lubricants and fuel with an emergency response spill kit. At a minimum, this kit must include:
  - 25 lbs of granular oil absorbent
  - 10, 48" x 3" oil socks
  - 5, 17" x 17" oil pillows
  - 1, 10" x 4" oil boom
  - 20, 24" x 24" x 3/8" oil mats
  - Garden size, 6 mil, polyethylene bags
  - 10 pair of latex gloves
  - 1, 55-gallon polyethylene open-head drum;
- Equip any service vehicle used to transport lubricants and fuel with a chemical response kit. At a minimum, this kit must include:
  - 1 bag of loose chemical pulp
  - 2 to 3, 17" x 17" chemical pillows
  - 2, 48" x 3" chemical socks
  - 5, 18" x 18" x 3/8" adsorbent mats
  - garden-size, 6 mil, polyethylene bags
  - 10 pair of latex gloves
  - 1, 30-gallon polyethylene open-head drum
  - hazardous waste labels

Company Responsibility

- Personnel shall be present during loading and unloading activities.

5.0 CONTINGENCY PLAN AND EMERGENCY PROCEDURES

All Company and Contractor personnel have responsibilities for spill prevention, control, and countermeasure.

Contractor Responsibility

- Maintain adequate manpower and equipment at the pipe yard or contractor ware yard necessary to divert any spill from reaching waterbodies and wetland areas; and
- Complete Appendix A, Table I, Emergency Response and Personal Protective Equipment, with a list of emergency equipment and storage location.

Company Responsibility

- Complete Appendix A, Table III, Key Emergency Contacts, prior to construction, and update as necessary.

First Responder Responsibility

The first responder is the person who first observes a spill or release of oil or other hazardous materials to the environment.

This person will take the following steps:

- Assess the situation to determine if the situation poses an immediate threat to human health or the environment;
- Identify hazardous material involved, if any;
- Report the spill to the Company Spill Coordinator ("Company SC") and Contractor Spill Coordinator ("Contractor SC") immediately; and
- Standby at a safe distance and keep others away.

Contractor SC Responsibility

- Coordinate the response to all spills which occur as a result of Contractor operations;
- Report the spill to the Company;
- Coordinate with the Company SC; and
- Conduct subsequent site investigations and associated incident reports unless otherwise directed by the Company.

The Contractor SC may be removed by the Company SC as spill response coordinator at the discretion of the Company.

The Contractor SC will direct Contractor personnel to:

- Shut off source of spill or leak as quickly as possible;
- Minimize affected area with appropriate containment or dike/berm;
- Assemble required spill response equipment as required (protective clothing, gear, heavy equipment, pumps, absorbent material, empty drums, etc.);
- Ensure that spilled material is placed in appropriate containers, in accordance with the best management practices and applicable laws and regulations;

- Properly label and store containers in accordance with applicable requirements; and
- Ensure that all spill response equipment is fully functional. Any equipment that cannot be reused shall be replaced.

Company SC Responsibility

The Company SC will be responsible for overseeing the Contractor SC's clean up of all spills of oil or hazardous materials.

Upon notification, the Company SC shall:

- Assess situation for potential threat to human health, environment and the neighboring community;
- Implement evacuation, if necessary;
- Activate emergency shutdown, if necessary;
- Control source as conditions warrant;
- Ensure that incompatible materials are kept away from the impacted area;
- Keep any potential ignition source away from the impact area, if spilled material is flammable;
- Coordinate sampling, disposal and equipment decontamination with Environmental Health and Safety ("EHS") in Houston, if necessary;
- For spills of PCBs, contact EHS for special spill response requirements related to PCB spills;
- Assist with the coordination of cleanup and disposal activities;
- If necessary, contact outside remediation services, in coordination with EHS, to assist with clean up;
- Notify EHS of all quantities and description of wastes to be handled by EHS;
- Complete the *EH&S Incident Investigation Form* (see Appendix C) and distribute accordingly;
- For unanticipated release of hydrostatic test waters, notify state contact if required by state permit, in accordance with timeframes required by state permit;
- Review permits to determine if immediate water sampling of test water is required and arrange if necessary; and
- Determine if local Right of Way agent will notify public officials (e.g. township manager and/or mayor).

6.0 SPILL CLEAN-UP/WASTE DISPOSAL PROCEDURES OF HYDROSTATIC TEST WATER

6.1 Oil/Fuel and Hazardous Material Spills and Unanticipated Releases

Contractor Responsibility

- Ensure no immediate threat to surrounding landowners or environment;
- Identify/verify the material and quantity released;
- Review MSDS to determine the proper handling;
- Ensure that Personal Protective Equipment and containers are compatible with the substance;
- Remediate small spills and leaks as soon as feasible. Use adsorbent pads whenever possible to reduce the amount of contaminated articles;
- Restrict the spill by stopping or diverting flow to the oil/fuel tank;
- If the release exceeds the containment system capacity, immediately construct additional containment using sandbags or fill material. Every effort must be made to prevent the seepage of oil into soils, wetlands and surface waters;
- Block off drains and containment areas to limit the extent of the spill. For chemical spills, never wash down a spill with water;
- If a release occurs into a storm drain or stream, immediately pump any floating layer into drums. For high velocity streams, place oil booms or hay bales between the release area and the site boundary and downstream of affected area. As soon as possible, excavate contaminated soils and sediments within approved work areas;
- Collect and reclaim as much of the spill as possible using a hand pump or similar device. Containerize contaminated soils in an appropriate Department of Transportation ("DOT") container in accordance with applicable requirements. Never place incompatible materials in the same drum;
- For larger quantities of soils, construct temporary waste piles using plastic liners placing the contaminated soils on top of the plastic and covered by plastic. Plastic-lined roll-off bins should be leased for storing this material as soon as feasible;
- Properly label any drums, containers or storage piles in accordance with applicable requirements;
- Move drum to secure staging or storage area;
- Decontaminate all equipment in a contained area and collect fluids in drums;
- Document and report cleanup activities to the Company SC as soon as feasible; and
- If environmentally sensitive resources (wetlands, waterbodies) exist in the area, ensure that Best Management Practices as described in Company's Erosion &Sedimentation Control Plan ("E&SCP") are utilized to minimize impact to these resources.

Company Responsibility

- If necessary, arrange for sampling the substance for analysis and waste profiling, according to instructions from the Company Standard Operating Procedures, and/ or EHS;
- Document and report activities to EHS as soon as feasible.

6.2 Disposal of Contaminated Materials/Soils

For Company and Contractor protocol on the disposal of contaminated materials, soils, or any other waste materials, please see the Company Waste Management Plan.

6.3 Notification

Company Responsibility

- The Company SC shall notify the Emergency Spill Hotline at (800) 735-6364 and those listed in Appendix A, Table III, immediately for spills that meet any of the following criteria:
  - one pound or more of a solid material (excluding Horizontal Directional Drill ("HDD") mud) spilled on land;
  - five gallons or more of a liquid spilled on land;
  - creates a sheen on water; or
  - unanticipated release of hydrostatic test water.
- If necessary, notify the local fire department, law enforcement authority, or health authority as appropriate. The following information should be provided:
  - the name of the caller and callback number;
  - the exact location and nature of the incident;
  - the extent of personnel injuries and damage;
  - the extent of release; and
  - the material involved and appropriate safety information.
- An incident report form should be filled out following containment and cleanup of the spill or release. Incident data should be gathered using the *EH&S Incident Investigation Form* (see Appendix C) and should be sent to the appropriate ECP project manager for records retention and entry into the EPASS/ILP database.

7.0 HOUSEKEEPING PROGRAM

7.1 Construction Area

Contractor Responsibility

- Maintain construction area in neat and orderly manner; and
- Routinely collect and properly dispose of all trash off-site.

7.2 Contractor Yards/Ware Yards

Contractor Responsibility

- Produce a "site specific" plan to address storage, spill prevention and overall yard organization for all contractor yards and ware yards. Contractor yard "site specific" plans should include the following:
  - facility name;
  - physical address;
  - longitude and latitude coordinates;
  - directions to facility (including road names);
  - date of first oil and hazardous material storage;
  - location of oil and hazardous material containers greater than 55 gallons;
  - loading/unloading areas;
  - direction of drainage flow; and
  - primary and secondary evacuation routes.
- Provide adequate aisle spacing to allow unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment as necessary in storage areas;
- Ensure similar housekeeping practices enforced in construction areas are also implemented in storage areas; and
- Any facility with an aggregate aboveground oil storage capacity greater than 1,320 US gallons but less than 10,000 gallons must have the plan self-certified by the owner or operator of the qualified facility or a licensed Professional Engineer. Any facility with an aggregate aboveground oil storage capacity greater than 10,000 gallons must have the plan reviewed and certified by a licensed Professional Engineer.

7.3 Security

Contractor Responsibility

- Hazardous wastes and waste containing PCBs greater than 50 ppm will be stored in a secured location (i.e. fenced, locked, etc.). Fuel storage areas will be located to minimize, as much as possible, tampering by unauthorized personnel during non-operational hours.
- Complete Table V, Waste Storage Security Information, in Appendix A, prior to construction.

Company Responsibility

- Review Table V, Waste Storage Security Information in Appendix A, that has been prepared by the Contractor prior to construction.

Project Signatures:

Company Spill Coordinator:

Print Name

Signature Date

Contractor Spill Coordinator

Print Name

Signature Date

APPENDIX A - TABLES

TABLE I – MATERIAL AND WASTE INVENTORY

Oil and Fuel to be used or stored on site during construction:

STORAGE CAPACITY OF OIL FILLED-CONTAINERS

Container Number[a/]	Storage capacity (volume)	Location

[a/] The reference container numbers should correspond to the facility diagram in Appendix E.

Commercial Chemicals to be used or stored on site during construction:

Hazardous and Non-Hazardous Wastes to be used or stored on site during construction:

Incompatible Materials to be used or stored on site during construction:

Type of Temporary Containment containers to be used:

TABLE I TO BE COMPLETED BY CONTRACTOR
Prior to the Start of Construction and updated as necessary

TABLE II – EMERGENCY RESPONSE AND PERSONAL PROTECTIVE EQUIPMENT

Spill Response:

Equipment	Quantity	Location

Fire Protection:

Equipment	Quantity	Location

Personnel Protection:

Equipment	Quantity	Location

TABLE II TO BE COMPLETED BY CONTRACTOR
Prior to the Start of Construction and updated as necessary

TABLE III – KEY EMERGENCY CONTACTS

The list of key personnel who will be contacted in the event of an emergency or spill incident include:

1. ***Company Emergency Contacts*** Contact Name Phone Number

Company Spill Coordinator & Environmental Inspector (within 15 minutes identifying of incident)

24-hour Emergency Spill Hotline -- 1-800-735-6364 (within 15 minutes of identifying incident)

Regional Environmental Coordinator (within 15 minutes of identifying incident)

ECP's Project Environmental Lead / PM (notify within 60 minutes of incident & submit Spill Report Form within 24 hours to ECP PM)

Company Project Manager

Company Environmental Coordinator

Field Construction
Company Construction Coordinator

2. ***Contractor Emergency Contact***

Contractor Spill Coordinator

3. ***Local Authorities*** – As necessary

Emergency contact for Police, Fire & Medical assistance ***Dial 911***

Non-Emergency Local Authorities or Contacts		
Location	**Contact**	**Phone Number**

4. Environmental Agencies

Notification to be made by Regional Environmental Coordinator and ECP's PM

5. Potential Environmental Remedial Service Contractors

Clean Harbors Environmental Services, Inc.	Howard Alexander	(800) 782-8805
Safety-Kleen (FS), Inc	Edward A. Mitchell	(281) 478-7700
U.S.A. Environment	Cesar Garcia	(713) 425-6925 or (832) 473-5354
WRS Infrastructure and Environment Inc	Steve Maxwell	(281) 731-0886

TABLE III TO BE COMPLETED BY COMPANY
Prior to the Start of Construction and updated as necessary

TABLE IV – TANK AND CONTAINER STORAGE EXCEPTION AREAS

Tank and container storage shall be located in areas that are at least 100 feet from all waterbodies and wetlands.

The below exceptions have been approved by ECP and EHS:

1.
2.
3.
4.

TABLE IV TO BE COMPLETED BY CONTRACTOR Prior to the Start of Construction and updated as necessary

TABLE V – WASTE STORAGE SECURITY INFORMATION

TABLE V TO BE COMPLETED BY CONTRACTOR
Prior to the Start of Construction and updated as necessary

TABLE VI–AREAS FOR POTENTIAL LEAKS AND SPILLS

1.

2.

3.

4.

TABLE VI TO BE COMPLETED BY CONTRACTOR Prior to the Start of Construction and updated as necessary

NEXUS GAS TRANSMISSION

APPENDIX B - MSDS

APPENDIX C – EH&S INCIDENT INVESTIGATION FORM

APPENDIX D – REQUIRED SIGNATURE FORMS

Management Approval and Cleanup Commitment
40 CFR §112.7

This Spill Prevention, Control and Countermeasures Plan (Plan), including the Spill Procedures Chart and Supplemental Document, which has been prepared in accordance with 40 CFR 112, has been reviewed and approved by the Project Manager. The Project Manager has the level of authority to commit the necessary resources to fully implement this Plan and to contain and clean up any oil discharged at this facility. By signing below, the **Project Manager** also **authorizes station supervisors to expediently commit manpower, equipment, and materials necessary to contain and remove any harmful quantity of oil discharged from this facility** (40 CFR §112.7). **This commitment includes the authority to use company and/or contract personnel and equipment.**

Facility Name: ________________________

Location: ______________________________

Signature: ____

Name: ____

Date: ____

Title: ____

CERTIFICATE OF DETERMINATION OF SUBSTANTIAL HARM CRITERIA

Facility Name: ____

Location: ____

Does the facility transfer oil over water to or from vessels and does the facility have a total oil storage capacity greater than or equal to 42,000 gallons? Yes___ No ___

Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and does the facility lack secondary containment that is large enough to contain the capacity of the largest aboveground oil storage tank plus sufficient freeboard to allow for precipitation within any aboveground oil storage tank area? Yes___ No ___

Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance (as calculated using the appropriate formula in rule 40 CFR 112 Attachment C-III or a comparable formula) such that a discharge from the facility could cause injury to fish and wildlife and sensitive environments? For further description of fish and wildlife and sensitive environments, see Appendices I, II, and III to DOC/NOAA's "Guidance for Facility and Vessel Response Plans: Fish and Wildlife and Sensitive Environments" (see Appendix E to this Part, Section 13, for availability) and the applicable Area Contingency Plan.
Yes___ No ___

Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance (as calculated using the appropriate formula in Attachment C-III to this appendix or a comparable formula) such that a discharge from the facility would shut down public drinking water intake? For the purpose of 40 CFR 112, public drinking water intakes are analogous to public water systems as described in 40 CFR 143.2(c)
Yes___ No ___

Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and has the facility experienced a reportable oil discharge in an amount greater than or equal to 10,000 gallons within the last five years?
Yes___ No ___

Certification

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document, and that based on my inquiry of those individuals responsible for this information, I believe that the submitted information is true, accurate, and complete.

Signature: ____

Title: ____

Name (please type or print): ____

Date: ________________________________

APPENDIX E – PIPEYARD / FACILITY STORAGE DRAWING

APPENDIX 1B3

NEXUS Blasting Plan

NEXUS Gas Transmission, LLC

NEXUS Project

FERC Docket No. CP16-__-000

BLASTING PLAN

November 2015

NEXUS GAS TRANSMISSION

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***

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.

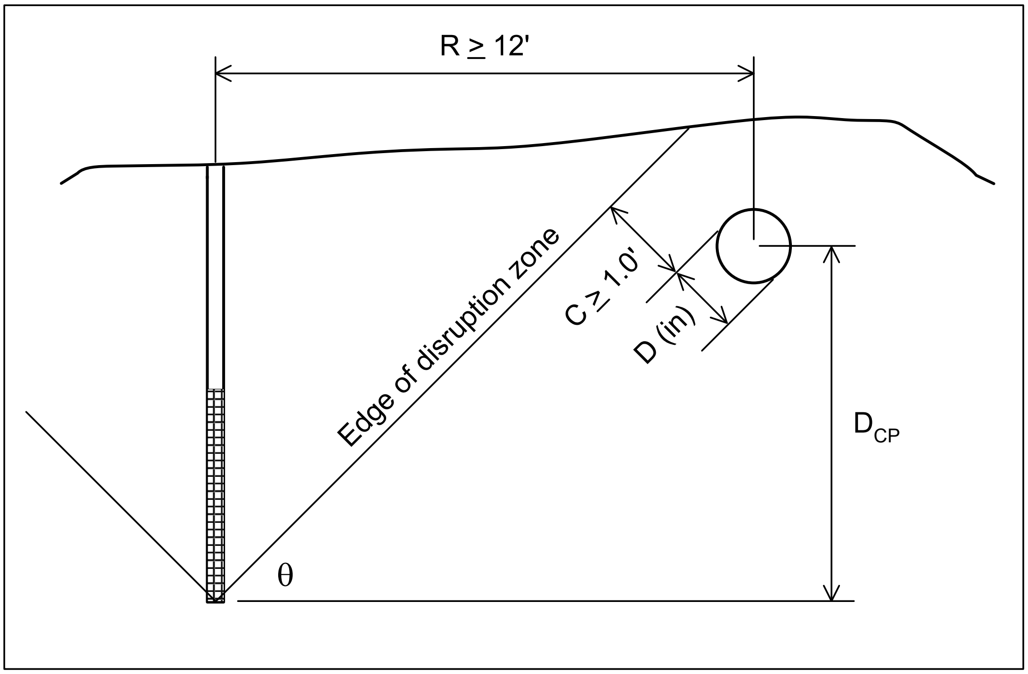


FIGURE BLAST1 – SEPARATION FROM BLAST HOLE

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°: $R = 1.887\,ft + \dfrac{D}{12.718} + 1.6 \times D_{cp}$
- θ = 45°: $R = 1.414\,ft + \dfrac{D}{16.971} + D_{cp}$

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 1B4

Drain Tile Mitigation Plan

NEXUS Gas Transmission Proposed Pipeline Project

DRAFT

Drain Tile Mitigation Plan

TABLE OF CONTENTS

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.

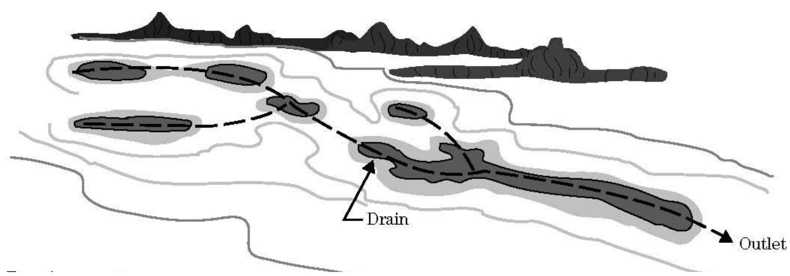
Conduits support the overall makeup of drain tile systems and are intended to facilitate water drainage. Laterals are smaller drain tile – typically 4” in diameter – aligned as much as possible with field contours in order to intercept or capture water as it flows down slope.

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).

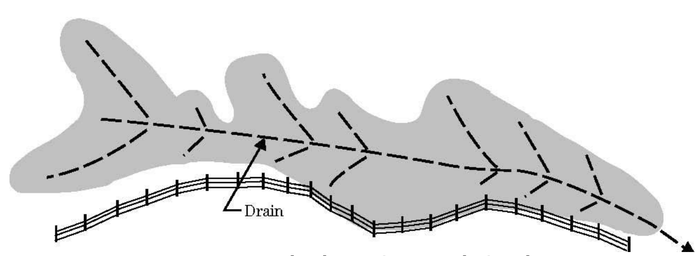
Because sub-surface drainage is used primarily to lower the water table or remove excess water percolating through the soil, drain tile is typically laid out in a pattern that best fits the soil and topography of the area. There are two basic ways to lay out drain tile: random and systematic. It is expected 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).



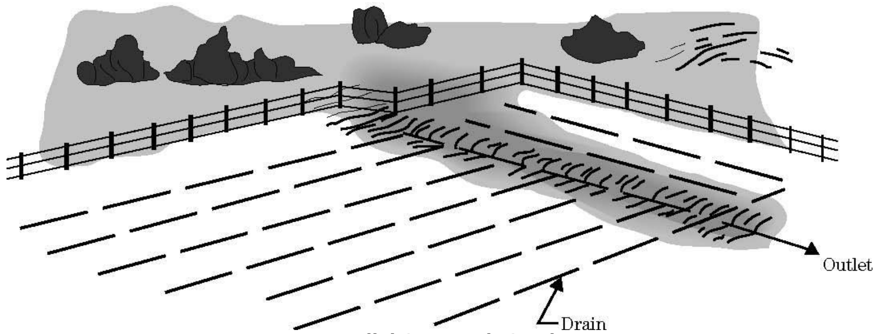
Random System (USDA)

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.



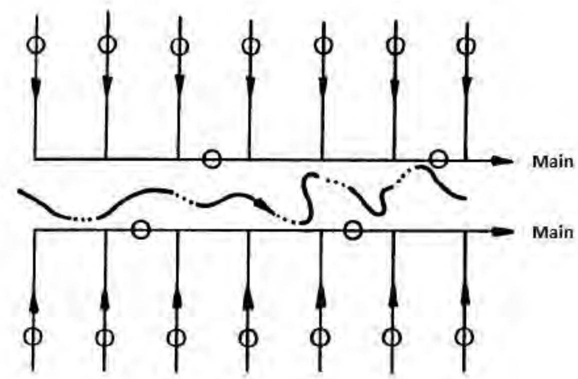
Herringbone System (USDA)

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 of 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.

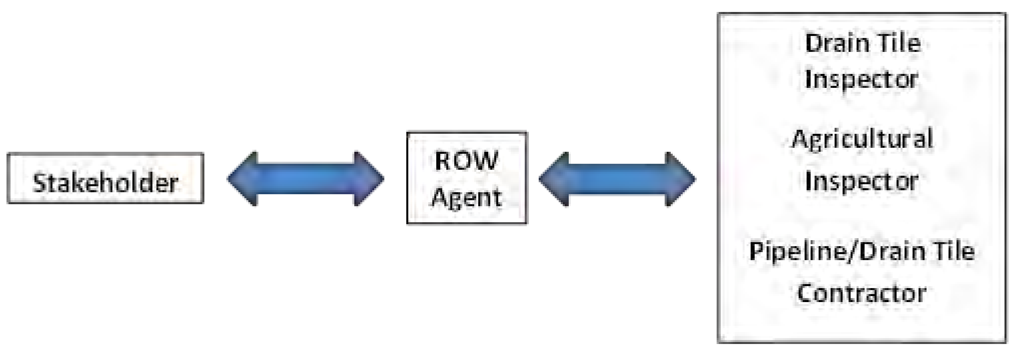
It is anticipated that many of the drainage systems in the proposed Project area are designed like a spider web: drain tile and surface drains funnel water to a main tile or area on or off the property, and the water is moved to a ditch, creek, or other waterbody.

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.

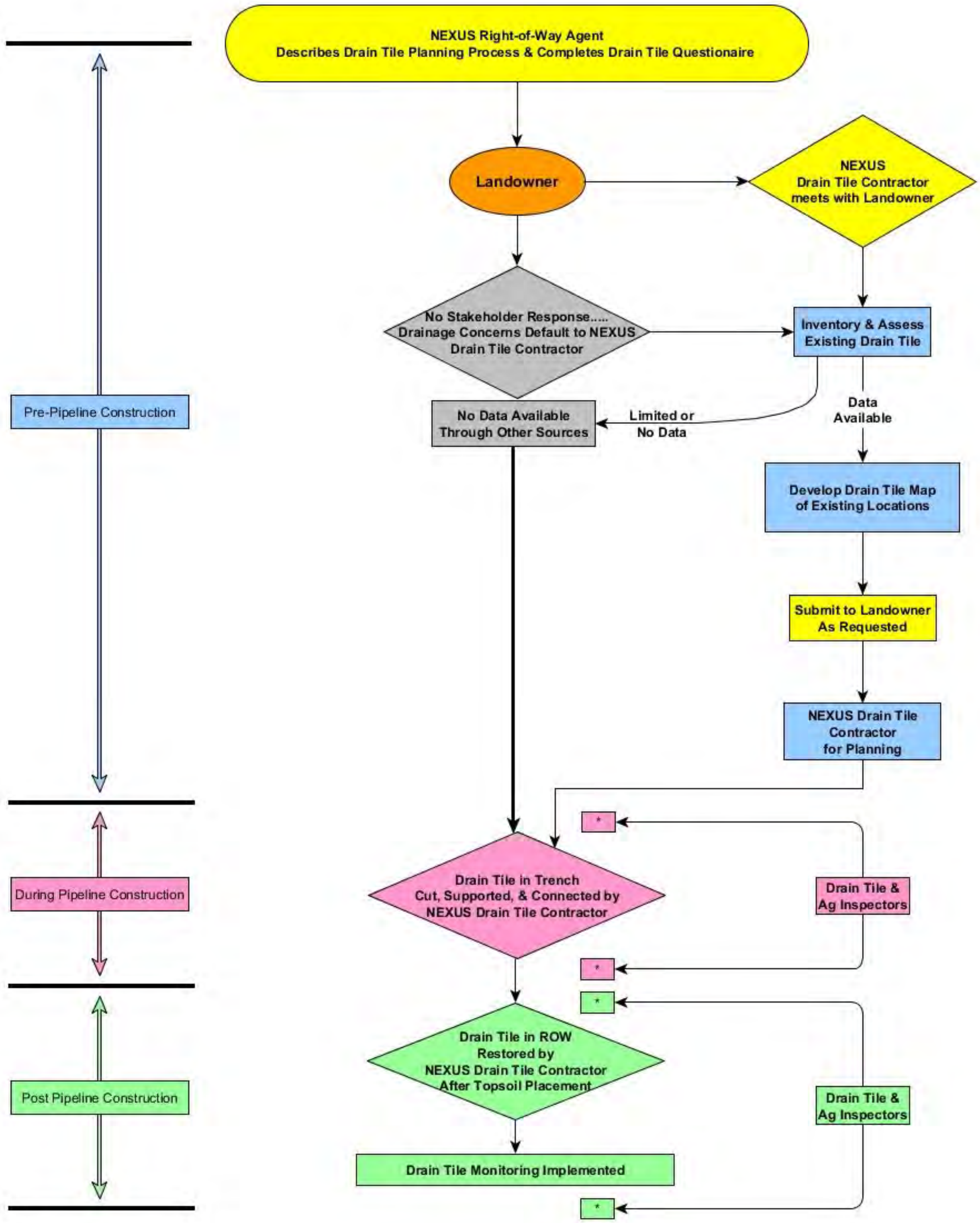
3. Are you aware of any multiple landowner (public or private group) drainage projects associated with this tract? **Y or N**

   If yes, please describe.

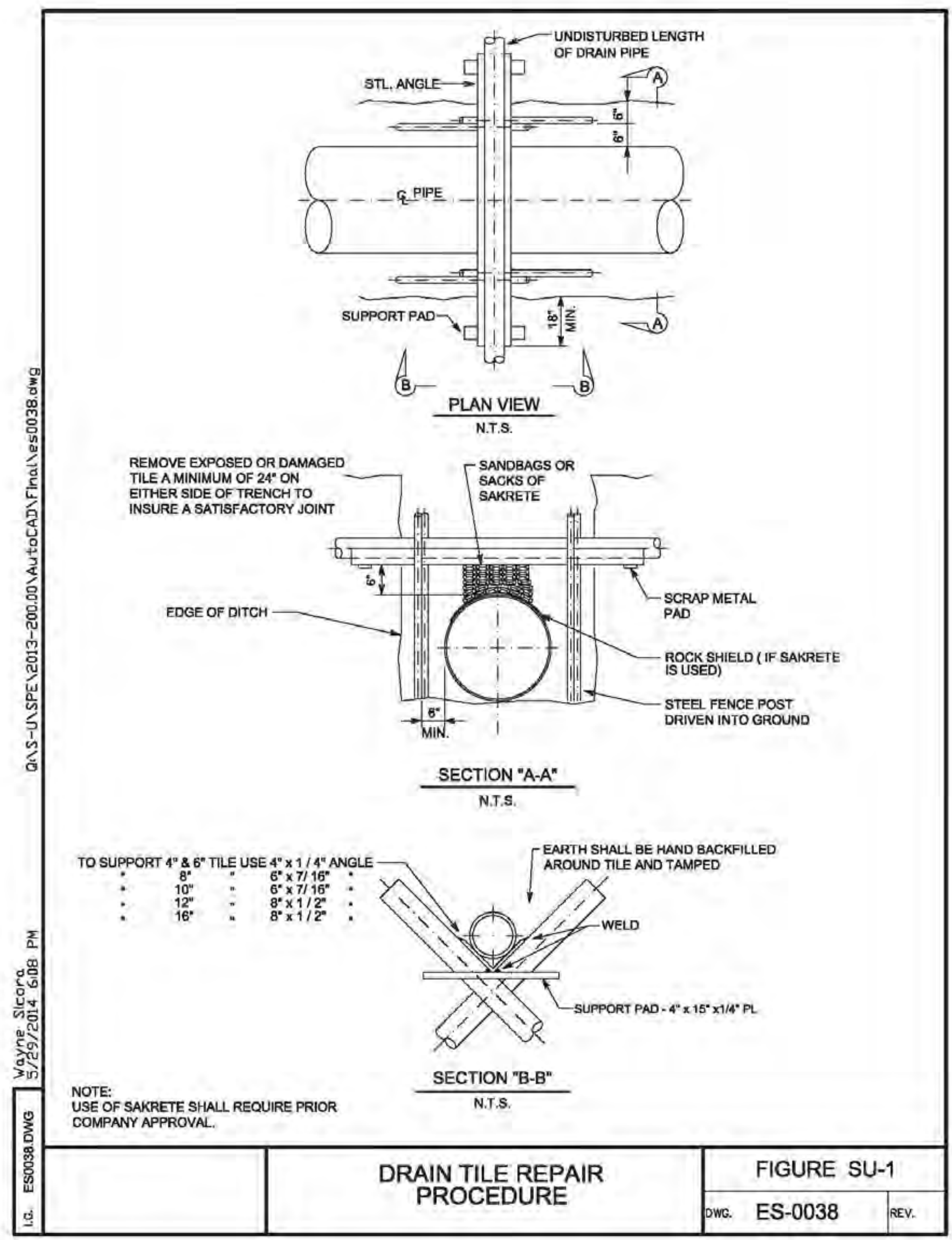
4. Who has done or is doing drain tile installation or maintenance/repair work on this tract?

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 1B5

Fugitive Dust Plan

NEXUS Gas Transmission, LLC

NEXUS Project

Docket No. CP16-__-000

FUGITIVE DUST PLAN

November 2015

Table of Contents

1.0 INTRODUCTION

NEXUS Gas Transmission, LLC ("NEXUS") is seeking a Certificate of Public Convenience and Necessity ("Certificate") from the Federal Energy Regulatory Commission ("FERC") pursuant to Section 7(c) of the Natural Gas Act ("NGA") authorizing the construction and operation of the NEXUS Gas Transmission Project ("NEXUS Project" or "Project"). NEXUS is owned by affiliates of Spectra Energy Partners, LP ("Spectra" or "Spectra Energy") and DTE Energy Company ("DTE" or "DTE Energy"). The NEXUS Project will utilize greenfield pipeline construction and capacity of third party pipelines to provide for the seamless transportation of 1.5 million dekatherms per day ("Dth/d") of Appalachian Basin shale gas, including Utica and Marcellus shale gas production, directly to consuming markets in northern Ohio and southeastern Michigan, and to the Dawn Hub in Ontario, Canada. Through interconnections with existing pipelines, supply from the NEXUS Project will also be able to reach the Chicago Hub in Illinois and other Midwestern markets. The United States portion of the NEXUS Project includes new greenfield pipeline in Ohio and Michigan.

The purpose of this Dust Control Plan ("Plan") is to inform the contractor and its subcontractors of required measures to be implemented during Project construction activity to reduce the potential impact of dust emissions on the nearby community (i.e., off-site receptors including residences, businesses) and on-site workers as a result of construction and soil handling activities that generate fugitive dust emissions. This Plan helps prevent the off-site spread of dust that may result from Project construction activity. The Plan requires monitoring, corrective actions to abate fugitive dust emissions, and documentation of control measures taken.

2.0 APPLICABILITY

The Plan is applicable to any fugitive dust emissions associated with construction vehicle movement, trenching, backfilling, and other earthmoving activities, including routine use of unpaved roads, soil excavation, and handling of any other materials that have the potential to result in fugitive dust emissions.

3.0 FUGITIVE DUST EMISSIONS MONITORING

Dust control is required to meet regulatory requirements and maintain good working relationships with landowners, tenants, regulatory authorities, and the general public. The Construction Contractor ("Contractor") will continually visually monitor the presence of airborne dust at the downwind boundary of the work site. If excessive airborne dust is detected at the boundary of the work site or if complaints are received, the Contractor will check for the presence of airborne dust on the upwind side of the construction area and implement dust control measures if construction activity is clearly the major contributing factor to increased dust emissions downwind. The Contractor will discontinue construction activities if generation of dust cannot be controlled to avoid soiling of structures or personal belongings on adjacent properties.

4.0 CONTROL MEASURES

The Contractor will take measures to reduce fugitive dust generation and employ industry best management practices to prevent excessive fugitive dust emissions (e.g., visible dust clouds). Abatement measures will be utilized as needed and appropriate. The following typical dust control measures to be used include but are not limited to:

- Load haul trucks such that the load is below the freeboard, ensure that haul truck cargo compartments are constructed and maintained to minimize spillage and loss of materials;
- Cover loads of sand, gravel, solid trash, or other loose materials during transport;
- Apply water or commercially available dust control agents consistent with local requirements when needed prior to disturbance and during disturbance to prevent dust generation;
- Maintain existing ground coverings (e.g., existing pavement) at aboveground facility locations until disturbance is required for construction and stabilize exposed soil with gravel or other stabilizing material, if dust generation is observed;
- Apply water one or more times per day, as needed, to affected unpaved roads, unpaved haul/access roads, and staging areas (when in use);
- Install temporary rock access pads at ROW entry and exit locations where necessary;
- Control and immediately remove any track-out of sediment that is spilled, dropped, washed or tracked onto roadways;
- Reduce vehicle speeds on unpaved roads, and unpaved haul and access roads as necessary;
- Route vehicles and equipment to covered surfaces (e.g., paved or graveled) when possible;
- Discontinue construction activities if generation of dust cannot be controlled to avoid soiling of structures or personal belongings on adjacent properties.

No dust control measures will be required during precipitation events. Dust control measures are required especially during warm dry weather and strong winds. The main source of dust control will be the use of water trucks at active worksites along the ROW and at facility sites. Water spray will be controlled to avoid or minimize over-spraying and pooling to the extent possible.

5.0 RESPONSIBILITY AND AUTHORITY

The Contractor Construction Superintendent, the Environmental Inspector(s), and the onsite NEXUS Chief Inspector will share the authority to determine if/when water needs to be reapplied for dust control and to determine if/when additional mitigation will be needed. The Contractor will furnish, operate and maintain equipment and employ methods to minimize the migration of dust beyond the boundaries of the work site. The Contractor also will provide a copy of the Dust Control Plan to applicable subcontractors. The Contractor Construction Superintendent will be responsible for implementing the Dust Control Plan. The Environmental Inspector has stop work authority for any non-compliance issues.

6.0 RECORDKEEPING AND MONITORING

The Contractor(s) and Environmental Inspector(s) will be responsible for making sure that dust control is effective and proper documentation is maintained. The field inspection and recording of the following information on a daily basis will be included in daily reports:

- Weather conditions (temperature, wind speed, and direction);
- Condition of Project soils at locations visited;
- Condition of Project access roads at locations visited;
- Cases where visible dust was observed requiring abatement measures to be implemented; and
- Overall status of dust control compliance.

APPENDIX 1B6

Winter Construction Plan

NEXUS Gas Transmission, LLC

NEXUS Project

FERC Docket No. CP16-__-000

WINTER CONSTRUCTION PLAN

November 2015

NEXUS Project Winter Construction Plan

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LIST OF ACRONYMS AND ABBREVIATIONS

ATWS	Additional Temporary Workspace
E&SCP	NEXUS Project Erosion & Sedimentation Control Plan
FERC	Federal Energy Regulatory Commission
NEXUS	NEXUS Gas Transmission L.L.C.
Plan	FERC Upland Erosion Control, Revegetation, and Maintenance Plan
Procedures	FERC Wetland and Waterbody Construction and Mitigation Procedures
Project	NEXUS Gas Transmission Project
USFWS	U.S. Fish and Wildlife Service
WCP	Winter Construction Plan

1 INTRODUCTION

NEXUS Gas Transmission, L.L.C. ("NEXUS") proposes to construct and operate approximately 256 miles of new, 36-inch diameter natural gas transmission mainline pipeline originating in Columbiana County, Ohio and extending through Ohio and Michigan and connecting with DTE Gas Company in Ypsilanti, Michigan; and approximately 0.9 mile of new 36-inch interconnecting pipeline to Tennessee Gas Pipeline Company L.L.C., with associated facilities in Ohio and Michigan. The NEXUS Gas Transmission Project (Project) is designed to transport 1.5 million dekatherms per day ('Dth/d") of Appalachian Basin shale gas, including Utica and Marcellus shale gas production, to Ohio, Michigan, and Chicago market centers in the United States and to the dawn Hub in Ontario, Canada. NEXUS is owned by affiliates of Spectra Energy Partners, LP and DTE Energy Company.

2 PURPOSE

The purpose of this Winter Construction Plan (WCP) is to identify best management practices for construction activities during the winter with focus on the procedures that will be used to cut trees along the Project construction right-of-way and within associated Additional Temporary Workspace (ATWS) and at aboveground facility locations, as necessary. Under frozen soil conditions, the measures in this plan will supplement measures in the NEXUS Project Erosion & Sedimentation Control Plan (E&SCP). The Project E&SCP, incorporates the Federal Energy Regulatory Commission's (FERC) Upland Erosion Control, Revegetation, and Maintenance Plan (Plan) and Wetland and Waterbody Construction and Mitigation Procedures (Procedures).

The 2016-2017 winter construction season is defined as the period beginning on November 1, 2016, and ending on March 31, 2017. Winter construction procedures account for frozen soil conditions or snow cover on construction work areas. As a result, the procedures identified in this WCP will be implemented for any Project construction activity that is authorized prior to March 31, 2017. The expected In-Service date of the Project is November 1, 2017. Therefore, winter construction procedures are not expected to be needed past this date.

3 WINTER CONSTRUCTION PROCEDURES

Cold and inclement weather conditions provide some unique construction challenges. Freezing temperatures and snow cover affect pipeline construction activities such as the ability to; clear land, grade and other excavating activities, install and maintain erosion control measures, and access the right-of-way. Although these climatological conditions, along with shortened daylight hours, result in changed working conditions, pipeline construction procedures do not fundamentally change. These winter construction methods provide the measures necessary to conduct the Project construction work planned for the 2016-2017 winter season while allowing the necessary flexibility to meet the construction schedule, agency requirements and mitigate environmental impacts.

3.1. Applicability of Winter Construction Procedures

These procedures specify the type of construction activity to be undertaken during the 2016-2017 winter season and are intended to facilitate the completion of tree cutting during the time period specified by the U.S. Fish and Wildlife Service (USFWS) while avoiding and minimizing potential environmental impact. In general, setup of Contractor's ware yards, the cutting of trees and associated stabilization of disturbed soil is the same regardless of the construction season.

The methods and procedures described herein are intended to supplement the applicable provisions of the Project E&SCP, which are incorporated by reference in the WCP. Apart from any specific exceptions noted in the WCP, the E&SCP will continue to be the primary document describing the detailed erosion and sediment control procedures for the Project.

3.2. Winter Construction Activities and Procedures

A detailed description of construction activities is provided in the E&SCP.

3.2.1. Right-of-Way Flagging and Clearing

Prior to any cutting of trees, the limits of the construction work area where removal of trees is required will be clearly marked with flagging.

Cutting of trees necessary to construct and operate the Project will be completed prior to March 31, 2017, to the extent allowed by the construction start date, weather conditions and property access. Cutting of trees will include the trimming of tree branches, where needed, along existing or constructed temporary access roads and tree felling on new access roads.

The cutting of trees will be completed by hand, using chainsaws and other hand tools, except in some limited situations where tree harvesting machinery may be required to ensure the trees are felled safely such as near power lines, residences, roads, etc. Trees will be cut so that they land within approved construction work areas to the maximum extent practicable. The felled trees will be left in place until subsequent pipeline construction activities begin after the winter construction season.

Minimal snow removal may be necessary along the construction right-of-way to facilitate flagging and felling the trees. The snow and frozen ground should minimize soil disturbance associated with this work.

If deep snow conditions are present, travel lanes may be established within the construction right-of-way near the intersection with existing access roads in order to access work areas.

Minimal ground disturbance should result from the snow removal process, leaving the existing herbaceous ground cover intact as much as practicable for temporary soil stabilization purposes and minimizing the amount of soil present in windrowed snow. Minimal ground disturbance should occur in association with the clearing of trees during the winter construction season. Care will be taken to minimize soil disturbance, leaving the existing herbaceous ground cover intact for soil stabilization purposes.

Stream and wetland crossings will be conducted in adherence to the permits and the Project E&SCP. Cutting of trees near waterbodies must be in accordance with the requirements of the Project E&SCP.

Any earth disturbance that occurs that could significantly alter the existing storm water runoff characteristics of the right-of-way will be repaired, and the associated exposed soils stabilized using temporary mulch applied at twice the rates specified in the Project E&SCP. In accordance with the E&SCP, hay may not be used as mulch for Project construction.

3.2.2. Grading, Removal and Disposal of Excess Rock

Grading, removal and disposal of excess rock along the construction right-of-way and within associated ATWS (with the exception of Contractor Staging Areas in use during winter clearing activities) will not occur until subsequent pipeline construction activities begin after the winter construction season.

Topsoil separation and grading at Contractors Staging Areas will be completed per the permits, Company specifications and the E&SCP with the additional winter construction measures listed below.

3.2.3. Additional Winter Construction Measures

Prior to any earth disturbance, the construction work area will be clearly marked with flagging.

If deep snow conditions are present, snow will either be removed or moved to the edge of construction work areas Minimal ground disturbance should result from the snow removal process, leaving the existing herbaceous ground cover intact as much as practicable for temporary soil stabilization purposes and minimizing the amount of soil present in windrowed snow.

Gaps will be left in snow windrows at natural drainage swales to allow for cross drainage.

Temporary sediment barriers will be installed around the down slope perimeter of exposed soils and spoil piles wherever ground conditions allow for proper staked and toed-in installation; otherwise, exposed soils and spoil piles where additional soil disturbance is not expected within 15 days will be stabilized with temporary mulch applied at twice the rates specified in the Project E&SCP.

Excess rock may be moved to site fill areas or stockpiled within the site until conditions improve. At that time, excess rock will be disposed of in accordance with the E&SCP.

3.3. Right-of-Way Access

During winter conditions, right-of-way access roads and travel lanes will be maintained as necessary to ensure construction, inspection, and emergency response access to active work areas. Mitigative measures designed to remove and/or control snow and ice as necessary to maintain adequate access are as follows:

- When removing snow from access roads and travel lanes, gaps will be left in windrowed snow at natural drainage swales to allow for cross drainage.
- Chemical deicers will not be used on the construction right-of-way or within 100 feet of wetlands or waterbodys along access roads.
- Mechanical methods to control ice may include use of a scarifier blade on a grader and/or tracked equipment to break-up ice along access roads.

4 WINTER MONITORING AND RESPONSE PLAN

An Environmental Inspector will conduct daily inspections of active work areas. The Environmental Inspector will perform monitoring of the pipeline right-of-way to ensure erosion, sedimentation, stormwater runoff and stabilization controls are in place where needed, properly functioning and maintained as necessary. An Environmental Inspector will conduct weekly inspections of inactive work areas with disturbed soils.

5 FINAL RESTORATION PROCEDURES

Final restoration of areas affected by winter construction will not occur until these areas are ready for final restoration following completion of construction later in the year. Temporary erosion and sedimentation controls to stabilize exposed soils will be installed, inspected and maintained as described above until subsequent construction activities commence after the winter construction season. Final restoration will then be completed in accordance with the Project E&SCP.

APPENDIX 1B7

Invasive Plant Species Management Plan

NEXUS GAS TRANSMISSION PROJECT

Invasive Plant Species Management Plan

November 2015

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1.0 INTRODUCTION

This Invasive Plant Species Management Plan ("Plan") was developed to mitigate the introduction or spread of invasive plant species as a result of construction of the proposed NEXUS Gas Transmission Project ("NEXUS Project" or "Project"). The Project includes construction of approximately 255 miles of new, 36-inch diameter natural gas transmission mainline pipeline originating in Columbiana County, Ohio and extending through Ohio and Michigan and connecting to the DTE Gas Company pipeline system in Ypsilanti, Michigan; including an approximately 0.9 mile new 36-inch diameter interconnecting pipeline to Tennessee Gas Pipeline Company L.L.C.'s existing pipeline system in Columbiana County, Ohio as shown in Figure 1.1-1 (*see* Figures section).

The Plan provides baseline information on the Project area and mitigation steps to be taken during construction to prevent the spread or introduction of invasive plant species. The Plan also includes a procedure for post-construction monitoring. Information collected during the monitoring effort will be utilized to determine and implement appropriate measures to mitigate the introduction or spread of invasive plant species as a result of construction of the Project, as described in Section 5 - Post-Construction Management. The template for the Plan has been approved by the FERC for the Ohio Pipeline Energy Network Project ("OPEN Project") (Docket No. CP14-68-000).

2.0 BASELINE CONDITIONS

2.1 Invasive Plant Species in Ohio

The Ohio Division of Natural Areas and Preserves ("ODNAP") and The Nature Conservancy ("TNC") have identified 13 invasive plant species as "Targeted Species" in Ohio (Appendix A). Targeted Species "have a state-wide distribution, are the most invasive in Ohio's natural areas, and are the most difficult to control" (ODNAP and TNC, 2000). These 13 species are inclusive of Ohio Department of Natural Resources' ("ODNR") "top ten" invasive non-native species list (ODNR, 2015). An additional 38 invasive plant species have been identified by the ODNAP and TNC as "Well-Established." These are species that "pose moderate to serious threats to natural areas in Ohio." Fourteen species of invasive plants have been identified as "Watch List" species, which are a potential threat in Ohio, but the current distribution of the species in the state may be limited (ODNAP and TNC, 2000).

On June 5, 2014, Ohio Governor John Kasich signed into law the Amended Substitute Senate Bill 192 which provides the director of the Ohio Department of Agriculture ("ODA") the authority to regulate invasive plant species in Ohio, "including the identification of invasive plant species and establishment of prohibited activities regarding them." NEXUS has consulted with the ODA regarding the Project and no specific issues were raised regarding invasive plant species.

2.2 Invasive Plant Species in Michigan

The Michigan Department of Natural Resources ("MDNR") Wildlife Division has identified lists of invasive plant priority species for each of Michigan's four major ecoregions (Southern Lower Peninsula, Northern Lower Peninsula, Eastern Upper Peninsula, and Western Upper Peninsula). Each ecoregion list is separated into the following action categories and are also listed in Appendix B:

- A list species ("Medium to high threat; mostly isolated occurrences, treat wherever found") (Appendix B);
- B list species ("Medium to high threat; mostly local—found in some areas but not others; designate areas for eradication, suppression or containment; may choose to control based on specific management goals and situations");
- C list species ("Medium to high threat; widespread; no action required; may choose to control based on specific management goals and situations"); and

* D list species ("More information required; may choose to control based on specific management goals and situations").

There are 10 prohibited and five restricted aquatic invasive plant species and two prohibited and one restricted terrestrial invasive plant species regulated in Michigan under the Natural Resources and Environmental Protection Act 451, Part 413 ("NREPA") and can be found in Appendix C.

This Plan will focus on the ODNAP and TNC list of Targeted Species as well as the MDNR Wildlife Division A list species and the prohibited plant species regulated under the NREPA. For this analysis, Ohio species listed as well-established or watch-list will not be considered for this effort unless significantly dense populations are found within the Project area. Michigan species listed as B list, C list, D list, or restricted will not be included in the analysis unless a large population is found within the Project area. In addition to the ODNAP and TNC list of Targeted Species, the Ohio Environmental Protection Agency ("OEPA") maintains a list of invasive/exotic plant species for the purposes of the Ohio Rapid Assessment Method for Wetlands V. 5.0 ("ORAM"). The ORAM list includes 10 species known to be invasive or exotic and have the potential to degrade wetlands; four of the ORAM-listed species overlap with the ODNAP and TNC list. A complete table of all state-listed invasive plant species in Ohio is included in Appendix D. A complete table of all Michigan state-listed invasive plant species per MDNR Wildlife Division is included in Appendix E. A complete table of all invasive plant species regulated per the NREPA is included in Appendix F.

2.3 Invasive Plant Species On and Near the Project

The NEXUS Project will be constructed across primarily agricultural land, with a small component of open and forested lands and parallels existing utility corridors to the extent practicable. Due to the history of disturbance and the numerous vectors for invasive plant species (farming, road crossings, streams, *etc.*), invasive plant species are widespread and well-established throughout the Project area. Due to their ubiquitous nature, the options for preventing the introduction of invasive plant species on the ROW are limited.

NEXUS conducted field surveys for the Project during the 2014 and 2015 growing seasons. These surveys included a 300-foot-wide survey corridor centered over the proposed pipeline and all properties where aboveground facilities are proposed. The survey corridor extended beyond the typically 100 foot wide pipeline construction ROW in order to evaluate potential low-impact opportunities for additional temporary workspace ("ATWS") and to avoid and minimize impacts on natural and manmade resources.

During these surveys, field biologists determined that the most prolific invasive plant species in the Project area are garlic mustard, non-native honeysuckle (*Lonicera* spp.), and multiflora rose. Garlic mustard is located in many of the forested areas throughout the Project area. Much of the regenerating farm land, stream borders, and cleared fields were found to have multiflora rose and honeysuckle species. Other invasive plant species observed during environmental surveys include Japanese knotweed, autumn olive, purple loosestrife, buckthorns, common reed, reed canary grass, and purple loosestrife, as well as the semi-aquatic narrow-leaved cattail (*Typha angustifolia*) and cattail hybrid (*Typha x glauca*). NEXUS also documented the presence of European milfoil in the survey area; however subsequent Project avoidance and minimization procedures have limited pond crossings to just two, including horizontally drilling below the Nimisila Reservoir with minimal impacts and crossing a manmade pond via open cut. Two other ponds are located within the Project area but are not crossed by the Project and therefore will not be impacted.

2.4 Priority Species and Focus of Management Efforts

The following lists present the NEXUS Project invasive plant species priorities and exclusions from the Plan.

- For the Project area in Ohio, this Plan will focus on the 13 species listed as "Targeted Species" by ODNAP and TNC (Appendix A), and the terrestrial species from the ORAM list (lesser celandine and two species of cattails). For the Project area within Michigan, this Plan will focus on the 12 species listed as prohibited under the NREPA and the 36 species in the A list per the MDNR Wildlife Division. Four of these A list species are also found on the NREPA list and thus the number of species focused on in Michigan is 44. There are eight species of invasive plants that are listed in both Ohio and Michigan, therefore 49 species will make up the **Project Priority Invasive Species** list ("PPIS list").
- Because there is limited in-water work needed to construct the Project, aquatic invasive plants (i.e., plants that live under or on the water's surface) are not being considered as part of this effort.
- Post-construction surveys will separate common cattail (*T. latifolia*) from the invasive varieties [narrow-leaved and hybrid (*T. angustifolia and T. x glauca*)]. However, due to the inherent difficulty in differentiating the species of cattails in the field, during construction all cattails will be considered as, and treated like, invasive species.
- During and after project implementation, contractors will use weed-free seed and straw (as necessary) to encourage quick establishment of native species and to help prevent invasive species from colonizing within impacted Project areas.
- Following construction, landowners will maintain farming rights over the pipeline ROW and NEXUS will have limited control over land use and maintenance (including invasive species control and management). While construction mitigation efforts (Section 4.1) will be implemented in these areas, active and fallow agricultural fields, maintained residential lawns, and industrial areas (*e.g.,* parking lots, storage yards and existing utility corridors and facilities) will not be monitored as part of this effort.

3.0 INVASIVE PLANT SPECIES MANAGEMENT

3.1 Construction Phase Invasive Plant Species Mitigation

One of the most practical and cost-effective solutions for managing invasive species is to employ a combination of prevention and control measures. Construction phase mitigation measures will be employed to prevent spreading existing populations, and restoration-phase efforts will be designed to leave the ROW in a condition that will inhibit rapid invasive species colonization. The PPIS list will form the basis of construction mitigation measures designed to prevent the spread and introduction of these species. The PPIS list will be included in Project contractor trainings and environmental inspector handbooks, in order to ensure that all Project participants are aware of the species identification, concerns, and mitigation.
The following mitigation measures will be implemented during construction:

1) Topsoil that is temporarily stockpiled will not be relocated or hauled off ROW, but rather will be stored at the edge of the trench, adjacent to the original position within the workspace where there is full ROW topsoil segregation, or along the ditch line where topsoil is segregated in wetlands. Despite the ubiquitous presence of invasive species throughout the project area, not moving the topsoil from its original location will prevent the spread of invasive species from one area to another.

2) The contractors are required to make certain that prefabricated equipment mats and all construction equipment that are brought to the Project are clean and free of excess dirt, mud or plant fragments prior to entering work areas.

3) Sediment/erosion control devices will be installed across the pipeline ROW on slopes leading into wetlands and along the edge of the construction ROW to prevent spoil from migrating into these

areas. This will also help to prevent the dispersion of seeds from invasive plant species into un-infested wetlands during construction.

4) The contractors and Environmental Inspectors ("EIs") will have a complete list of the Project priority invasive species, and will be expected to take precautions to prevent the spread of invasive species. Clearing will take place under the supervision of the EI who will provide assistance to the clearing and tree removal crews to minimize the potential that invasive species are not dragged or chipped into areas where they do not currently exist.

5) Following pipeline installation, the trench will be backfilled and the area re-contoured to its approximate original grade. Any segregated topsoil shall be replaced as the surficial layer and natural drainage patterns restored to facilitate natural re-establishment of native vegetation.

6) In wetlands, revegetation will be expedited by stripping the topsoil from over the trench, except in areas with standing water or heavily inundated soils, where no topsoil layer is evident, or where it exceeds the depth of the trench. Topsoil will then be stockpiled separately from subsoil to ensure preservation of the native seed bank.

7) In order to encourage quick establishment of native species and to help prevent invasive species which may colonize disturbed and poorly-vegetated sites, within six days of final re-grading (weather and soil conditions permitting):

   a. Restored upland areas will be seeded with a Project approved, weed-free upland seed mix of upland plant species.

   b. Restored wetland areas will be seeded with weed-free annual rye to establish ground cover and allow native wetland plants to revegetate from the existing seedbed.

8) All straw bales used on the site for erosion and sedimentation control will be noxious and invasive weed-free, including any mulches obtained off site. As required by the NEXUS Project Erosion and Sediment Control Plan (E&SCP), hay will not be used as mulch.

9) Mulch shall consist of weed-free straw, wood fiber hydromulch, erosion control fabric or some functional equivalent as approved by the EI and Chief Inspector.

3.2 Equipment Cleaning

Prior to demobilizing from the Project, the contractors will certify all construction-related equipment and vehicles are clean of noxious weeds as a means of preventing the spread of such materials to other pipeline projects, FERC-regulated or not. The following equipment cleaning will be performed:

- All construction-related equipment is required to arrive to the Project site clean, and will also be cleaned prior to exiting the Project.
- Equipment cleaning stations will be set up at the contractors' yards and/or final equipment storage areas.
- Equipment cleaning station set-up and cleaning procedures will be implemented under the supervision and to the satisfaction of the Environmental Inspector.
- Equipment cleaning stations will be constructed to accommodate equipment to enter via a "dirty end" and exit a "clean end" with rock pads, skid pads, or wash racks at both ends to prevent soil from being carried on tracks or tires as they exit the station. The equipment cleaning stations will be maintained as needed to ensure their effectiveness.
- Equipment cleaning stations will be constructed using a surrounding basin/depression and/or with a surrounding berm and fabric as necessary to contain waste and water (if/when used) to allow for ease of clean-up.

- Shovels or other hand tools and/or compressed air will be used to remove as much soil as practicable from equipment, with particular focus on tracks and blades.
- If water is used, any wash water will not be allowed to enter any waterbody or wetland. Wash water will be contained within the confines of the wash station and infiltrate into the ground or hydro-vacuumed and disposed in an appropriate location and/or per the Project SPCC Plan.
- Soil collected during the cleaning process will either be left within the confines of the station basin, covered with a layer of geotech material, followed by at least one-foot of clean fill to prevent any regeneration of invasive species, or stockpiled at a convenient location near the cleaning station and disposed of in an acceptable landfill.
- Non-industrial cleaning sites, if used, will be monitored per the post-construction measures of this plan.

3.3 Maintenance

- Rock construction entrance thickness shall be constantly maintained to the specified dimensions by adding rock. A stockpile of rock material shall be maintained on site for this purpose. Drain space under wash rack shall be kept open at all times. Damage to the wash rack shall be repaired prior to further use of the rack. Accumulated sediment deposited on roadways shall be removed and returned to the equipment cleaning station soil collection area immediately. Washing the roadway or sweeping the deposits into roadway ditches, sewers, culverts, or other drainage courses is not acceptable.

4.0 POST-CONSTRUCTION INVASIVE SPECIES MONITORING

During the second full growing season following final restoration, Project work areas will be inventoried for the presence of PPIS. For purposes of this Plan, the term "Project work areas" includes the pipeline construction ROW, temporary work space and above-ground facilities locations. To the extent that they can be surveyed visually from Project work areas, adjacent lands will also be inventoried in order to determine invasive plant occurrences and densities proximal to Project work areas.

Invasive plants tend to be opportunistic and will often be the first species to colonize disturbed areas. However, invasive plants are already present across much of the Project work areas and adjacent areas. Thus, in order to determine if the NEXUS Project construction has introduced new invasive species to an area or is allowing existing species to cover more area than they would have had the Project not been developed, NEXUS will compare Project work area invasive species data with that of adjacent land areas. Comparisons of invasive species data within Project work areas and adjacent areas will form the basis for decision making regarding remediation and management efforts to be conducted.

4.1 Methods

The Post-Construction Invasive Species Survey will be conducted from June through September during the second year after final restoration of Project work areas.

The NEXUS Project work areas will be surveyed for the presence of PPIS, excepting those areas noted as excluded in Section 2.3. The pipeline ROW will be divided into one-tenth mile long survey segments, and named based on Project mile posts (*e.g.*, survey segment "1.1 to 1.2", "1.2 to 1.3", etc.). Aboveground facility survey segments will use the facility name (*e.g.*, Hanoverton Compressor Station, Wadsworth Compressor Station, etc.). The approximate location, distribution and abundance of invasive species will be documented for each survey segment. Data will be collected on the PPIS occurrence within Project work areas and in the immediately adjacent area. Documentation of PPIS occurrence will include:

- Invasive species name
- Project Work Area Abundance Cover Class (within NEXUS pipeline tenth mile survey segment or within aboveground facility work area):
    - T (trace): ≤5%,
    - 1: >5% - ≤25%
    - 2: >25% - ≤50%
    - 3: >50%
- Adjacent Abundance Cover Class (adjacent to each tenth mile segment or adjacent to aboveground facility work area):
    - Same class ranges as for Project Work Area Abundance (percentages based on the area that can be visually assessed from within project work area).
- Project Work Area Distribution:
    - IO = infrequent occurrence – widely separated individuals >30 feet apart; no pattern to distribution.
    - ET = evenly throughout – individual plants occur at fairly regular intervals separated by 25 -150 feet; may be a pattern to the distribution.
    - LP = localized patches – isolated clump of a species, often at the initial site of introduction; may/may not be surrounded by another form of distribution, may be just one patch/several; typically widely spaced (usually no closer than 300 feet) compared to frequent.
    - FS = frequent stands – similar to localized patch but occurring with more frequency and in larger numbers; typically large clumps of plants close together (15-30 feet apart) but not touching; many stands usually in view at once within segment.
    - DT = densely throughout – many plants growing singly or in clumps close together or touching, a monoculture, small gaps acceptable, large ones not, cannot walk through without touching plant(s) at all times.
- Adjacent Distribution:
    - Same descriptors as for Project work Area Distribution.

4.2 Data Interpretation and Management Implementation

Products of the Post-Construction Invasive Species Survey will include documentation of the presence, abundance and distribution of the identified invasive species along NEXUS Project work areas and immediately adjacent areas (i.e. non-Project work areas). These data will be tabulated and compared along each project segment analyzed. Management options to control invasive plant species will be implemented in those locations disturbed by construction of the NEXUS Project where Abundance Cover Class by the invasive species exceeds Trace level abundance (*i.e.* >5%) in a given survey segment and the PPIS is at a higher abundance cover class in an on-ROW survey segment than in the adjacent, off-ROW area.

5.0 POST CONSTRUCTION MANAGEMENT

For segments with PPIS occurrences that meet the previously referenced (Section 4.2) criteria for management, NEXUS will implement a management plan to mitigate the species present and help prevent the spread of invasive species as a result of construction of the NEXUS Project. Invasive plant species will be treated with an appropriate herbicide (type and concentration to be determined by Ohio and Michigan--licensed commercial pesticide applicators). Depending on species and recommendations of the herbicide specialists, plant materials may later be cut and mulched in place or removed from the Project work area for disposal. Application of the herbicide will only be at the approval of the landowner and appropriate state agencies. If the landowner or state agencies deny permission for the use of herbicides, then the invasive species will be cut at ground level (i.e., snipped, sawed or mowed) prior to forming seed during the growing season following the post-construction monitoring effort (pending written approval of the United States

Fish and Wildlife Service ("USFWS") for mowing or clearing site-specific areas defined during the post-construction monitoring effort between April 15 and August 1[1]). Additionally, in order to further help control the reintroduction of invasive species in treated areas, at least seven days following any treatment all the treated areas will be re-seeded according to the Project's specifications for seeding in uplands and wetlands; in uplands, appropriate amounts of fertilizer and lime will be added to help increase the success of revegetation by non-invasive species.

5.1 Herbicide Schedule

The effectiveness of herbicide treatment is readily recognized visually (*e.g.* browned leaves) and will be evaluated prior to the end of the growing season at treatment locations. Herbicide will also be re-applied once in the growing season following initial treatment (as needed, based on site inspection of treated areas). Treated and re-treated areas will be seeded as described in Section 5.0, above, following each treatment.

Any potential subsequent occurrence of invasive species within Project work areas after the second growing season following the initial herbicide application would not be discernibly attributable to construction of the Project or would be an indication of a pre-existing population (thus not a situation worsened by the Project). Treatment activities for invasive species will be identified and documented as a corrective action and submitted to the Secretary as part of the quarterly activity reports.

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[1] Per the project E&SCP and FERC Plan & Procedures, routine vegetation mowing or clearing shall not occur between April 15 and August 1 of any year unless specifically approved in writing by the responsible land management agency of the U.S. Fish and Wildlife Service.

ODPS (Ohio Department of Public Safety). 2011. State of Ohio Standard Hazard Mitigation Plan. Available online at: http://ema.ohio.gov/Documents/OhioMitigationPlan/2011/Executive%20Summary.pdf. Accessed August 2015.

University of Georgia, Center for Invasive Species and Ecosystem Health. 2014. EDD Maps. Available online: http://www.eddmaps.org/. Accessed August 2015.

FIGURES

Proposed NEXUS Mainline Pipeline
Proposed Compressor Sites
Proposed M & R Station
Confirmed Market Connection
County Boundary
State Boundary

Figure 1.1-1

NEXUS Project Location Map

NEXUS GAS TRANSMISSION

11/6/2015

APPENDIX A

Targeted Species in Ohio

ODNAP and TNC "Targeted Invasive Species" and ORAM-listed "Invasive/Exotic Plant Species" in Ohio						
Species	**Common Name**	**Lifecycle and Form**	**Indicator Status for Eastern Mountains and Piedmont Region[3]**	**Indicator Status for Midwest Region[3]**	**Indicator Status for Northcentral and Northeast Region[3]**	**# of the 88 Ohio Counties in which this Species has been Observed[4]**
Alliaria petiolata	Garlic mustard	Biennial Flowering Herb	FACU	FAC	FACU	69
Elaeagnus umbellata	Autumn olive	Deciduous Shrub	NI	NI	NI	34
Fallopia japonica[1]	Japanese knotweed	Perennial Flowering Herb	FACU	FACU	FACU	39[5]
Frangula alnus[2]	Glossy buckthorn	Deciduous Shrub	FAC	FACW	FAC	30
Lonicera japonica	Japanese honeysuckle	Deciduous Woody Vine	FAC	FACU	FACU	66
Lonicera maackii	Amur honeysuckle	Deciduous Shrub	NI	NI	NI	47[6]
Lonicera morrowii	Morrow's honeysuckle	Deciduous Shrub	FACU	FACU	FACU	
Lonicera tatarica	Tatarian honeysuckle	Deciduous Shrub	FACU	FACU	FACU	
Lythrum salicaria[7]	Purple loosestrife	Perennial Flowering Herb	FACW	OBL	OBL	51
Phalaris arundinacea[7]	Reed canary grass	Herbaceous Perennial Grass	FACW	FACW	FACW	84[8]
Phragmites australis[7]	Common reed	Herbaceous Perennial Grass	FACW	FACW	FACW	43
Rhamnus cathartica[7]	Common buckthorn	Deciduous Shrub	FACU	FAC	FAC	30
Rosa multiflora	Multiflora rose	Deciduous Shrub	FACU	FACU	FACU	78
The following species are only included in the OEPA ORAM						
Myriophyllum spicatum	European milfoil	Submerged Perennial Herb	OBL	OBL	OBL	58[8]
Najas minor	Lesser naiad	Submerged Annual Herb	OBL	OBL	OBL	50[8]
Potamogeton crispus	Curly pondweed	Submerged Perennial Herb	OBL	OBL	OBL	35[8]
Ranunculus ficaria	Lesser celandine	Perennial Flowering Herb	NI	NI	NI	4
Typha angustifolia	Narrow-leaved cattail	Perennial Flowering Herb	OBL	OBL	OBL	38
Typha x glauca	Hybrid cattail	Perennial Flowering Herb	OBL	OBL	OBL	unknown

Source: ODNAP and TNC, 2000.
[1]Also known as *Polygonum cuspidatum* and *Reynoutria japonica*
[2]Also known as *Rhamnus frangula*
[3] Lichvar *et al.*, 2014
[4] OHDPS, 2014
[5] OIPC, 2010
[6] Shrubby honeysuckle distribution was assessed *en masse* for all three of these species
[7] Invasive/exotic plant species also identified in the OEPA ORAM
[8] University of Georgia – EDD Maps, 2014

APPENDIX B

MDNR Wildlife Division A List Species in Michigan

MDNR Wildlife Division A List Species in Michigan					
Species	**Common Name**	**Lifecycle and Form**	**Indicator Status for Midwest Region[3]**	**Indicator Status for Northcentral and Northeast Region[3]**	**# of the 83 Michigan Counties in which this Species has been Observed[5]**
Southern Lower Peninsula					
Acer platanoides	Norway maple	Deciduous Tree	UPL	UPL	21
Eichhornia crassipes	Water-hyacinth	Perennial Flowering Herb	OBL	OBL	NI
Glyceria maxima[2 6]	Reed mannagrass	Herbaceous Perennial Grass	OBL	OBL	50
Heracleum mantegazzianum[2]	Giant hogweed	Perennial Flowering Herb	FAC	FAC	3
Hydrilla verticillata[2]	*Hydrilla*	Submerged Perennial Herb	OBL	OBL	NI
Hydrocharis morsus-ranae[4]	European frog-bit	Submerged Perennial Herb	OBL	OBL	6
Microstegium vimineum	Japanese stilt grass	Herbaceous Annual Grass	FAC	FAC	NI
Phellodendron amurense	Amur cork-tree	Deciduous Tree	NI	NI	2
Polygonum sachalinense	Giant knotweed	Perennial Flowering Herb	NI	NI	6
Pueraria montana	Kudzu	Deciduous Woody Vine	UPL	UPL	1
Rhodotypos scandens	Black jetbead	Perennial Shrub	NI	NI	11
Vincetoxicum nigrum	Black swallowwort	Perennial Flowering Herb	NI	NI	13
Vincetoxicum rossicum	Pale swallowwort	Perennial Flowering Herb	NI	NI	4
Northern Lower Peninsula					
Acer platanoides	Norway maple	Deciduous Tree	UPL	UPL	21
Ailanthus altissima	Tree-of-heaven	Deciduous Tree	FACU	UPL	25
Alliaria petiolata	Garlic mustard	Biennial Flowering Herb	FAC	FACU	34
Berberis thunbergii	Japanese barberry	Perennial Shrub	FACU	FACU	43
Butomus umbellatus	Flowering rush	Perennial Flowering Herb	OBL	OBL	9
Celastrus orbiculatus	Oriental bittersweet	Deciduous Woody Vine	UPL	UPL	16
Cirsium palustre	Swamp thistle	Perennial Flowering Herb	FACW	FACW	19
Elaeagnus angustifolia	Russian olive	Deciduous Tree	FACU	FACU	11
Euphorbia esula	Leafy spurge	Perennial Flowering Herb	NI	NI	41
Glyceria maxima	Reed mannagrass	Herbaceous Perennial Grass	OBL	OBL	50
Heracleum mantegazzianum[2]	Giant hogweed	Perennial Flowering Herb	FAC	FAC	3
Hydrocharis morsus-ranae[4]	European frog-bit	Submerged Perennial Herb	OBL	OBL	6
Ligustrum obtusifolium	Privet	Perennial Shrub	NI	NI	8
Lonicera maackii	Amur honeysuckle	Deciduous Shrub	NI	NI	14
Microstegium vimineum	Japanese stilt grass	Herbaceous Annual Grass	FAC	FAC	NI
Pastinaca sativa	Wild parsnip	Perennial Flowering Herb	NI	NI	42
Phragmites australis	*Phragmites*	Herbaceous Perennial Grass	FACW	FACW	48
Polygonum cuspidatum[1 2]	Japanese knotweed	Perennial Flowering Herb	FACU	FACU	27
Polygonum sachalinense	Giant knotweed	Perennial Flowering Herb	NI	NI	6
Rhamnus cathartica	Common buckthorn	Deciduous Shrub	FAC	FAC	30
Rhodotypos scandens	Black jetbead	Perennial Shrub	NI	NI	11
Rosa multiflora	Multiflora rose	Deciduous Shrub	FACU	FACU	33
Vincetoxicum nigrum	Black swallowwort	Perennial Flowering Herb	NI	NI	13

MDNR Wildlife Division A List Species in Michigan					
Species	**Common Name**	**Lifecycle and Form**	**Indicator Status for Midwest Region[3]**	**Indicator Status for Northcentral and Northeast Region[3]**	**# of the 83 Michigan Counties in which this Species has been Observed[5]**
Vincetoxicum rossicum	Pale swallowwort	Perennial Flowering Herb	NI	NI	4
Eastern Upper Peninsula					
Acer platanoides	Norway maple	Deciduous Tree	UPL	UPL	21
Alliaria petiolata	Garlic mustard	Biennial Flowering Herb	FACU	FACU	34
Berberis thunbergii	Japanese barberry	Perennial Shrub	FACU	FACU	43
Euphorbia esula	Leafy spurge	Perennial Flowering Herb	NI	NI	41
Gypsophila paniculata	Baby's breath	Perennial Flowering Herb	NI	NI	23
Ligustrum obtusifolium	Privet	Perennial Shrub	NI	NI	8
Lythrum salicaria	Purple loosestrife	Perennial Flowering Herb	OBL	OBL	52
Pastinaca sativa	Wild parsnip	Perennial Flowering Herb	NI	NI	42
Phragmites australis	*Phragmites*	Herbaceous Perennial Grass	FACW	FACW	48
Polygonum cuspidatum[1 2]	Japanese knotweed	Perennial Flowering Herb	FACU	FACU	27
Polygonum sachalinense	Giant knotweed	Perennial Flowering Herb	NI	NI	6
Rhamnus cathartica	Common buckthorn	Deciduous Shrub	FAC	FAC	30
Rhamnus frangula[4]	Glossy buckthorn	Deciduous Shrub	FACW	FAC	34
Robinia pseudoacacia	Black locust	Deciduous Tree	FACU	FACU	45
Rosa multiflora	Multiflora rose	Deciduous Shrub	FACU	FACU	33
Western Upper Peninsula					
Acer platanoides	Norway maple	Deciduous Tree	UPL	UPL	21
Alliaria petiolata	Garlic mustard	Biennial Flowering Herb	FACU	FACU	34
Berberis thunbergii	Japanese barberry	Perennial Shrub	FACU	FACU	43
Butomus umbellatus	Flowering rush	Perennial Flowering Herb	OBL	OBL	9
Euphorbia esula	Leafy spurge	Perennial Flowering Herb	NI	NI	41
Gypsophila paniculata	Baby's breath	Perennial Flowering Herb	NI	NI	23
Heracleum mantegazzianum[2]	Giant hogweed	Perennial Flowering Herb	FAC	FAC	3
Lonicera maackii	Amur honeysuckle	Deciduous Shrub	NI	NI	14
Lonicera morrowii	Morrow's honeysuckle	Deciduous Shrub	FACU	FACU	32
Lonicera tatarica	Tatarian honeysuckle	Deciduous Shrub	FACU	FACU	36
Lythrum salicaria	Purple loosestrife	Perennial Flowering Herb	OBL	OBL	52
Phragmites australis	*Phragmites*	Herbaceous Perennial Grass	FACW	FACW	48
Pinus sylvestris	Scotch pine	Coniferous Tree	NI	NI	16
Polygonum cuspidatum[1 2]	Japanese knotweed	Perennial Flowering Herb	FACU	FACU	27
Polygonum sachalinense	Giant knotweed	Perennial Flowering Herb	NI	NI	6
Rhamnus cathartica	Common buckthorn	Deciduous Shrub	FAC	FAC	30
Rhamnus frangula[4]	Glossy buckthorn	Deciduous Shrub	FACW	FAC	34
Robinia pseudoacacia	Black locust	Deciduous Tree	FACU	FACU	45
Rosa multiflora	Multiflora rose	Deciduous Shrub	FACU	FACU	33
Valeriana officinalis	Common valerian	Perennial Flowering Herb	NI	NI	21

MDNR Wildlife Division A List Species in Michigan					
Species	Common Name	Lifecycle and Form	Indicator Status for Midwest Region[3]	Indicator Status for Northcentral and Northeast Region[3]	# of the 83 Michigan Counties in which this Species has been Observed[5]

Source: MDNR, 2009
[1] Also known as *Fallopia japonica* and *Reynoutria japonica*
[2] Species listed in both Appendix A and Appendix B
[3] Lichvar *et al.*, 2014
[4] Also known as *Frangula Alnus*
[5] The University of Michigan Herbarium, 2014
[6] Also known as *Glyceria grandis*

APPENDIX C

NREPA Prohibited Invasive Plant Species in Michigan

NREPA Prohibited Invasive Plant Species in Michigan					
Species	**Common Name**	**Lifecycle and Form**	**Indicator Status for Midwest Region[3]**	**Indicator Status for Northcentral and Northeast Region[3]**	**# of the 83 Michigan Counties in which this Species has been Observed[4]**
Cabomba caroliniana	Fanwort	Submerged Perennial Herb	OBL	OBL	3
Egeria densa	Brazilian elodea	Submerged Perennial Herb	OBL	OBL	NI
Heracleum mantegazzianum[2]	Giant hogweed	Perennial Flowering Herb	FAC	FAC	3
Hydrilla verticillata[2]	*Hydrilla*	Submerged Perennial Herb	OBL	OBL	NI
Hydrocharis morsus-ranae[4]	European frog-bit	Submerged Perennial Herb	OBL	OBL	6
Lagarosiphon major	African oxygen weed	Submerged Perennial Herb	NI	NI	NI
Myriophyllum aquaticum	Parrot's feather	Perennial Flowering Herb	OBL	OBL	1
Nitellopsis obtusa	Starry stonewort	Submerged Perennial Herb	NI	NI	NI
Nymphoides peltata	Yellow floating heart	Herbaceous Perennial Grass	OBL	OBL	NI
Polygonum cuspidatum[1 2]	Japanese knotweed	Perennial Flowering Herb	FACU	FACU	27
Salvinia molesta	Giant salvinia	Deciduous Shrub	NI	NI	NI
Trapa natans	Water chestnut	Submerged Perennial Herb	NI	OBL	NI

Source: Legislative Council, State of Michigan. 1994.
[1] Also known as *Fallopia japonica and Reynoutria japonica*
[2] Species listed in both Appendix A and Appendix B
[3] Lichvar *et a.l*, 2014
[4] The University of Michigan Herbarium, 2014

APPENDIX D

Ohio Invasive Plant Species and Ranks

Well-Established Species			
Scientific Name	**Common Name**	***Scientific Name***	**Common Name**
Agropyron repens	Quack grass	*Festuca pratensis*	Meadow fescue
Ailanthus altissima	Tree-of-heaven	*Hemerocallis fulva*	Day-lily
Berberis thunbergii	Japanese barberry	*Hesperis matronalis*	Dame's rocket
Bromus inermis	Smooth brome	*Iris pseudacorus*	Yellow flag
Butomus umbellatus	Flowering-rush	*Ligustrum vulgare*	Privet, common
Celastrus orbiculatus	Asian bittersweet	*Lysimachia nummularia*	Moneywort
Cirsium arvense	Canada thistle	*Melilotus alba*	Sweet-clover, white
Conium maculatum	Poison hemlock	*Melilotus officinalis*	Sweet-clover, yellow
Convolvulus arvensis	Field bindweed	*Myriophyllum spicatum*	Eurasian water-milfoil
Coronilla varia	Crown-vetch	*Najas minor*	Lesser naiad
Daucus carota	Queen Anne's lace	*Potamogeton crispus*	Curly pondweed
Dioscorea batatas	Air-potato	*Ranunculus ficaria*	Celandine, lesser
Dipsacus fullonum (sylvestris)	Teasel, common	*Rorippa nasturtium-aquaticum*	Water-cress
Dipsacus laciniatus	Teasel, cut-leaved	*Saponaria officinalis*	Bouncing bet
Elaeagnus angustifolia	Russian-olive	*Sorghum halepense*	Johnson grass
Epilobium hirsutum	Willow-herb, hairy	*Typha angustifolia*	Cattail, narrow-leaved
Epilobium parviflorum	Willow herb, small-flowered hairy	*Typha X glauca*	Cattail, hybrid
Euonymus alatus	Winged euonymus	*Viburnum opulus var. opulus*	European cranberry-bush
Euonymus fortunei	Wintercreeper	*Vinca minor*	Periwinkle or myrtle
Watch List Species			
Scientific Name	Common Name	*Scientific Name*	Common Name
Ampelopsis brevipedunculata	Porcelain-berry	*Miscanthus sinensis*	Chinese silvergrass
Carduus nutans	Nodding thistle	*Ornithogalum umbellatum*	Star-of-Bethlehem
Centaurea maculosa	Spotted knapweed	*Polygonum perfoliatum*	Mile-a-minute vine
Euphorbia esula	Leafy spurge	*Polygonum sachalinense*	Giant knotwood
Ligustrum obtusifolium	Privet, border	*Pueraria lobata*	Kudzu
Lonicera X bella	Honeysuckle, showy pink	*Rosa canina*	Dog rose
Microstegium vimineum	Nepalgrass	*Vincetoxicum nigrum*	Black swallow-wort
Source: ODNAP and TNC, 2000.			

APPENDIX E

Michigan Regional Invasive Plant Species Lists

Scientific Name	Common Name	Scientific Name	Common Name
Southern Lower Peninsula - A List Species			
Acer platanoides	Norway maple	*Rhodotypos scandens*	Black jetbead
Eichhornia crassipes	Water-hyacinth	*Vincetoxicum nigrum*	Black swallowwort
Glyceria maxima	Reed mannagrass	*Vincetoxicum rossicum*	Pale swallowwort
Heracleum mantegazzianum	Giant hogweed	*Acer platanoides*	Norway maple
Hydrilla verticillata	*Hydrilla*	*Eichhornia crassipes*	Water-hyacinth
Hydrocharis morsus-ranae	European frog-bit	*Glyceria maxima*	Reed mannagrass
Microstegium vimineum	Japanese stilt grass	*Heracleum mantegazzianum*	Giant hogweed
Phellodendron amurense	Amur cork-tree	*Hydrilla verticillata*	*Hydrilla*
Polygonum sachalinense	Giant knotweed	*Hydrocharis morsus-ranae*	European frog-bit
Pueraria montana	Kudzu		
Southern Lower Peninsula - B List Species			
Butomus umbellatus	Flowering rush	*Gypsophila paniculatus*	Baby's breath
Elaeagnus angustifolia	Russian olive	*Polygonum cuspidatum*	Japanese knotweed
Euphorbia esula	Leafy spurge	*Polygonum cuspidatum*	Japanese knotweed
Southern Lower Peninsula - C List Species			
Ailanthus altissima	Tree-of-heaven	*Lonicera xylosteum*	European fly honeysuckle
Alliaria petiolata	Garlic mustard	*Lythrum salicaria*	Purple loosestrife
Berberis thunbergii	Japanese barberry	*Myriophyllum heterophyllum*	Variable-leaf watermilfoil
Celastrus orbiculata	Oriental bittersweet	*Myriophyllum spicatum*	Eurasian watermilfoil
Centaurea maculosa	Spotted knapweed	*Phalaris arundinacea*	Reed canary grass
Cirsium arvense	Canada thistle	*Phragmites australis*	*Phragmites*
Elaeagnus umbellata	Autumn olive	*Pinus sylvestris*	Scotch pine
Lonicera japonica	Japanese honeysuckle	*Potomogeton crispus*	Curly pondweed
Lonicera maackii	Amur honeysuckle	*Rhamnus cathartica*	Common buckthorn
Lonicera morrowii	Morrow's honeysuckle	*Rhamnus frangula*	Glossy buckthorn
Lonicera tatarica	Tatarian honeysuckle	*Robinia pseudoacacia*	Black locust
Lonicera Xbella	Bell's honeysuckle	*Rosa multiflora*	Multiflora rose
Southern Lower Peninsula - D List Species			
Alnus glutinosa	Black alder	*Viburnum opulus*	European highbush cranberry
Najas minor	Lesser naiad		
Northern Lower Peninsula - A List Species			
Acer platanoides	Norway maple	*Ligustrum obtusifolium*	Privet
Ailanthus altissima	Tree-of-heaven	*Lonicera maackii*	Amur honeysuckle
Alliaria petiolata	Garlic mustard	*Microstegium vimineum*	Japanese stilt grass
Berberis thunbergii	Japanese barberry	*Pastinaca sativa*	Wild parsnip
Butomus umbellatus	Flowering rush	*Phragmites australis*	*Phragmites*
Celastrus orbiculata	Oriental bittersweet	*Polygonum cuspidatum*	Japanese knotweed
Cirsium palustre	Swamp thistle	*Polygonum sachalinense*	Giant knotweed
Elaeagnus angustifolia	Russian olive	*Rhamnus cathartica*	Common buckthorn
Euphorbia esula	Leafy spurge	*Rhodotypos scandens*	Black jetbead

Scientific Name	Common Name	Scientific Name	Common Name
Glyceria maxima	Reed mannagrass	*Rosa multiflora*	Multiflora rose
Heracleum mantegazzianum	Giant hogweed	*Vincetoxicum nigrum*	Black swallowwort
Hydrocharis morsus-ranae	European frog-bit	*Vincetoxicum rossicum*	Pale swallowwort
Northern Lower Peninsula - B List Species			
Cirsium arvense	Canada thistle	*Lonicera Xbella*	Bell's honeysuckle
Elaeagnus umbellata	Autumn olive	*Phragmites australis*	Reed grass
Gypsophila paniculatus	Baby's breath	*Pinus sylvestris*	Scotch pine
Lonicera morrowii	Morrow's honeysuckle	*Rhamnus frangula*	Glossy buckthorn
Lonicera tatarica	Tatarian honeysuckle	*Robinia pseudoacacia*	Black locust
Northern Lower Peninsula - C List Species			
Centaurea maculosa	Spotted knapweed	*Myriophyllum spicatum*	Eurasian watermilfoil
Hypericum perforatum	Common St. John's-wort	*Phalaris arundinacea*	Reed canary grass
Myriophyllum heterophyllum	Variable-leaf watermilfoil	*Potomogeton crispus*	Curly pondweed
Northern Lower Peninsula - D List Species			
Lysimachia nummularia	Money-wort	*Torilis japonica*	Japanese hedge-parsley
Lythrum salicaria	Purple loosestrife	*Viburnum opulus*	European highbush cranberry
Marsilea quadrifolia	European water-clover		
Eastern Upper Peninsula - A List Species			
Acer platanoides	Norway maple	*Phragmites australis*	*Phragmites*
Alliaria petiolata	Garlic mustard	*Polygonum cuspidatum*	Japanese knotweed
Berberis thunbergii	Japanese barberry	*Polygonum sachalinense*	Giant knotweed
Euphorbia esula	Leafy spurge	*Rhamnus cathartica*	Common buckthorn
Gypsophila paniculatus	Baby's breath	*Rhamnus frangula*	Glossy buckthorn
Ligustrum obtusifolium	Privet	*Robinia pseudoacacia*	Black locust
Lythrum salicaria	Purple loosestrife	*Rosa multiflora*	Multiflora rose
Pastinaca sativa	Wild parsnip		
Eastern Upper Peninsula - B List Species			
Cirsium palustre	Swamp thistle	*Lonicera tatarica*	Tatarian honeysuckle
Elaeagnus umbellata	Autumn olive	*Lonicera xylosteum*	European fly honeysuckle
Lonicera maackii	Amur honeysuckle	*Pinus sylvestris*	Scotch pine
Lonicera morrowii	Morrow's honeysuckle		
Eastern Upper Peninsula - C List Specie			
Centaurea maculosa	Spotted knapweed	*Myriophyllum spicatum*	Eurasian watermilfoil
Cirsium arvense	Canada thistle	*Phalaris arundinacea*	Reed canary grass
Hypericum perforatum	Common St. John's-wort	*Potomogeton crispus*	Curly pondweed
Myriophyllum heterophyllum	Variable-leaf watermilfoil		
Eastern Upper Peninsula - D List Species			
Lysimachia nummularia	Moneywort	*Viburnum opulus*	European highbush cranberry
Torillis japonica	Japanese hedge-parsley		

Scientific Name	Common Name	Scientific Name	Common Name
Western Upper Peninsula - A List Species			
Acer platanoides	Norway maple	*Lythrum salicaria*	Purple loosestrife
Alliaria petiolata	Garlic mustard	*Phragmites australis*	*Phragmites*
Berberis thunbergii	Japanese barberry	*Pinus sylvestris*	Scotch pine
Butomus umbellatus	Flowering rush	*Polygonum cuspidatum*	Japanese knotweed
Euphorbia esula	Leafy spurge	*Polygonum sachalinense*	Giant knotweed
Gypsophila paniculatus	Baby's breath	*Rhamnus cathartica*	Common buckthorn
Heracleum mantegazzianum	Giant hogweed	*Rhamnus frangula*	Glossy buckthorn
Lonicera maackii	Amur honeysuckle	*Robinia pseudoacacia*	Black locust
Lonicera morrowii	Morrow's honeysuckle	*Rosa multiflora*	Multiflora rose
Lonicera tatarica	Tatarian honeysuckle	*Valeriana officinalis*	Common valerian
Source: MDNR Wildlife Division, 2009.			

APPENDIX F

NREPA Prohibited and Restricted Plant Species

Restricted Species			
Scientific Name	**Common Name**	***Scientific Name***	**Common Name**
Cabomba caroliniana	Fanwort	*Polygonum cuspidatum*	Japanese knotweed
Cylindrospermopsis raciborskii	Cylindro	*Salvinia molesta*	Giant salvinia
Egeria densa	Brazilian elodea	*Trapa natans*	Water chestnut
Heracleum mantegazzianum	Giant hogweed	*Butomus umbellatus*	Flowering rush
Hydrilla verticillata	*Hydrilla*	*Elaeagnus umbellata*	Autumn olive
Hydrocharis morsus-ranae	European frog-bit	*Lythrum salicaria*	Purple loosestrife
Lagarosiphon major	African oxygen weed	*Myriophyllum spicatum*	Eurasian watermilfoil
Myriophyllum aquaticum	Parrot's feather	*Phragmites australis*	Phragmites or common reed
Nitellopsis obtusa	Starry stonewort	*Potamogeton crispus*	Curly leaf pondweed
Nymphoides peltata	Yellow floating heart		
Source: Legislative Council, State of Michigan, 1994.			

APPENDIX 1C

- **1C1 – Non-Landowner, Federal, State and Local Agency Contact List**
- **1C2 – Updated Agency Correspondence**
- **1C3 – NEXUS Public and Agency Participation Plan**
- **1C4 – Ohio Natural Gas Market Study**

APPENDIX 1C1

Non-Landowner, Federal, State and Local Agency Contact List

NEXUS Project Stakeholder List – Non-Landowners Federal, State, and Local Agency Contacts								
Agency	**Office**	**Contact Name**	**Contact Phone**	**Contact Email**	**Contact Address**	**Initial Contact Date**	**Date Sent**	**Response Date/Type**
FEDERAL								
FERC	Office of Energy Projects Division of Gas-Environment and Engineering Gas Branch 1	Joanne Wachholder, FERC Project Manager	TBD	Joanne.Wachholder@ferc.gov	FERC Office of Energy Projects Division of Gas- Environment and Engineering Gas Branch 1 888 First Street, NE Washington, D.C. 20426 office 6J-06	12/17/14 introductory meeting	Pre-filing Request Letter 12/30/14	Ongoing Communications
USACE	Pittsburgh District (Northern Pittsburgh District)	Matt Mason, Regulatory Branch	(412) 395-7129	Matthew.R.Mason@usace.army.mil	Pittsburgh District Corps of Engineers William S. Moorhead Federal Building 1000 Liberty Avenue Regulatory Branch, Suite 2200 Pittsburgh, PA 15222	10/31/14 via letter	10/31/14 via FedEx	12/30/14 via letter from Buffalo District
USACE	Pittsburgh District	Tyler Bintrim	(412) 395-7115	Tyler.j.bintrim@usace.army.mil	Pittsburgh District Corps of Engineers William S. Moorhead Federal Building 1000 Liberty Avenue Regulatory Branch, Suite 2200 Pittsburgh, PA 15222	1/14/15 introductory meeting		
USACE	Huntington District	Mark Taylor, Chief, Energy Resources	(304) 399-5610	MARK.A.TAYLOR@usace.army.mil	Huntington District Regulatory Division 502 8th Street Huntington, WV 25701	10/31/14 via letter	10/31/14 via FedEx	12/30/14 via letter from Buffalo District
USACE	Buffalo District	Mark Scalabrino Ohio Regulatory Chief	(716) 879-4327	mark.w.scalabrino@usace.army.mil	Buffalo District Office 1776 Niagara St. Buffalo, NY 14207	10/31/14 via letter	10/31/14 via FedEx	12/30/14 via letter
USACE	Buffalo District	Shawn Blohm Regulatory Project Manager	(330) 923-8214	Shawn.U.Blohm@usace.army.mil	Buffalo District-Stow Field Office 110 Graham Road Circle Stow, OH 44224	1/14/15 introductory meeting		

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NEXUS Project Stakeholder List – Non-Landowners Federal, State, and Local Agency Contacts								
Agency	**Office**	**Contact Name**	**Contact Phone**	**Contact Email**	**Contact Address**	**Initial Contact Date**	**Date Sent**	**Response Date/Type**
USACE	Detroit District	Stanley F. Cowton, Jr., Regulatory Project Manager	(313) 226-2219	stanley.f.cowton@usace.army.mil	USACE, Regulatory Office 477 Michigan Avenue, 6th Floor Detroit, Michigan 48226-2550	10/31/14 via letter	10/31/14 via FedEx	12/30/14 via letter from Buffalo District
USFWS	East Lansing Michigan Field Office	Chris Mensing, Fish and Wildlife Biologist	(517) 351-8316	chris_mensing@fws.gov	East Lansing Field Office 2651 Coolidge Road East Lansing, MI 48823	10/14/14 via phone	10/14/14 via email	10/14/14 via email
USFWS	East Lansing Michigan Field Office	Burr Fisher, Wildlife Biologist	(517) 351-8286	Burr_fisher@fws.com	East Lansing Field Office 2651 Coolidge Road East Lansing, MI 48823	09/22/14 via letter	09/22/14 via email	12/3/14 via letter
USFWS	East Lansing Michigan Field Office	Jack Dingledine	(517) 351-6320	Jack_dingledine@fws.com	East Lansing Field Office 2651 Coolidge Road East Lansing, MI 48823	10/20/15 Project update letter via email	10/20/15 via email	11/02/15 via email
USFWS	Ohio Field Office	Angela Boyer, Endangered Species Coordinator	(614) 416-8993 x22	angela_boyer@fws.gov	U.S. Fish and Wildlife Service Ohio Field Office 4625 Morse Rd, Suite 104 Columbus, OH 43230	09/18/14 via letter	09/18/14 via email	10/9/14 via letter
USFWS	Region 3	Jeff Gosse, Regional Energy Coordinator	(612) 713-5292	Jeff_gosse@fws.gov	U.S. Fish and Wildlife Service, Region 3 5600 American West Blvd. Bloomington, MN	5/21/15 via phone	5/21/15 via email	5/21/15 via email
NPS	National Park Service Midwest Region	Mark Weekly, Deputy Regional Director	(402) 661-1526	Mark_Weekley@nps.gov	National Park Service 601 Riverfront Drive Omaha, NE 68102-4226	10/31/14 via letter	10/31/14 via FedEx	
USEPA	NEPA Implementation Section	Kenneth A. Westlake, Chief	(312) 886-2910	westlake.kenneth@epa.gov	U.S. Environmental Protection Agency, Region 5 77 West Jackson Boulevard Chicago, Illinois 60604-3590	10/31/14 via letter	10/31/14 via FedEx	11/06/14 via phone

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ODA	Department of Agriculture	Dan Kenny and Matt Beal	(614) 728-6270 and (614) 728-6399	dkenny@agri.ohio.gov beal@agri.ohio.gov	Division of Plant Industry Ohio 8995 E. Main Street Reynoldsburg , Ohio 43068 United States	10/15/15 Project update via phone		10/15/15 via phone
OEPA	Central	Mike Mansour	(614) 644-3694	mike.mansour@epa.ohio.gov	Ohio EPA Central Office	12/09/14 meeting		
OEPA	Central	Dave Morehart	(614) 644-3601	dave.morehart@epa.ohio.gov	Ohio EPA Central Office	12/09/14 meeting		
OEPA	Northeast District	Ed Fasko	(330) 963-1161	ed.fasko@epa.ohio.gov	Ohio EPA Northeast District Office	12/10/14 meeting		
OEPA	Northeast District	Jana Gannon	(330) 963-1261	jana.gannon@epa.ohio.gov	Ohio EPA Northeast District Office	12/10/14 meeting		
OEPA	Northeast District	Kevin Fortune	(330) 963-1152	kevin.fortune@epa.ohio.gov	Ohio EPA Northeast District Office	12/10/14 meeting		
OEPA	Akron Regional Air Quality Management District	Sean Vadas	(330) 923-4891	svadas@schd.org	Akron Regional Air Quality Management District	12/10/14 meeting		
OEPA	Akron Regional Air Quality Management District	Kelly Kanoza	(330) 812-3954	kkanoza@schd.org	Akron Regional Air Quality Management District	12/10/14 meeting		
OEPA	Akron Regional Air Quality Management District	Duane LaClair	(330) 923-4891	dlaclair@schd.org	Akron Regional Air Quality Management District	12/10/14 meeting		
OEPA	Toledo Division of Environmental Services	Matt Stanfield	(419) 936-3938	matthew.stanfield@toledo.oh.gov	Toledo Division of Environmental Services	12/17/14 meeting		
OEPA	Central	Tiffani Kavalec, Assistant Chief	(614) 644-3538	Tiffany.Kavales@epa.ohio.gov	Ohio EPA Central Office	01/29/2015 via Letter	01/29/2015 letter via Fedex	
OEPA	Central	Harry Kallipolitis, OEPA Director	(614) 644-2146	harry.kallipolitis@epa.ohio.gov	Ohio EPA Central Office	09/25/15 Project update meeting		

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Agency	**Office**	**Contact Name**	**Contact Phone**	**Contact Email**	**Contact Address**	**Initial Contact Date**	**Date Sent**	**Response Date/Type**
OEPA	Northwest District	John Weaver and Archie Lunsey	(419) 352-8461	john.weaver@epa.ohio.gov archie.lunsey@epa.ohio.gov	Northwest District 347 N. Dunbridge Road Bowling Green, Ohio 43402	09/30/2015 via phone		09/30/2015 via phone
ODNR	Office of Real Estate	John Kessler, P.E. Assistant Chief	(614) 265-6621	john.kessler@dnr.state.oh.us	Ohio Department of Natural Resources, Office of Real Estate 2045 Morse Rd., Columbus, OH 43229-6605	09/18/14 via letter	09/18/14 via email	11/13/14 letter via email
ODNR	Division of Wildlife	Nathan Reardon, Compliance Coordinator	(614) 265-6741	Nathan.reardon@dnr.state.oh.us	ODNR - Division of Wildlife 2045 Morse Road, Bldg. G Columbus, OH 43229-6693	10/14/14 Introductory meeting		
ODNR	Ohio Coastal Management Program ODNR Office of Coastal Management	Steve Holland, MPA Federal Consistency Administrator	(419) 609-4104	steven.holland@dnr.state.oh.us	ODNR Office of Coastal Management 105 West Shoreline Drive Sandusky, Ohio 44870	11/25/15 via email	12/02/14 via email	12/02/14 via email and phone
ODNR	Division of Forestry and Maumee State Forest Manager	Gregg Maxfield and Don Schmenk	(419) 429-8310 and (419) 822-3052	Gregg.maxfield@dnr.state.oh.us and Donald.schmenk@dnr.state.oh.us	952 Lima Avenue, Box B Findlay, OH 45840	09/25/15 Project Update meeting		
ODNR	Division of Parks, Office of Real Estate, and Budget and Finance	Melissa Taylor Sarah Tebbe Ryan Frazee	(614) 265-6568, (614) 265-6397, and (614) 265 - 961	Melissa.taylor@dnr.state.oh.us, Sarah.tebbe@dnr.state.oh.us and Ryan.frazee@dnr.state.oh.us	Ohio Department of Natural Resources, Office of Real Estate 2045 Morse Rd., Columbus, OH 43229-6605	09/25/15 Project Update meeting		
SHPO	Ohio Office of Historic Preservation	Mark Epstein, Department Head, Resource Protection and Review	(614) 298-2000	mepstein@ohiohistory.org	Ohio Historic Preservation Office 800 E. 17th Avenue Columbus, Ohio 43211-2474	11/5/14 via letter	11/5/14 via US mail	
STATE - MICHIGAN								
MDNR	Wildlife Division	Lori Sargent	(517) 284-6216	sargentl@michigan.gov	Michigan Department of Natural Resources P.O. Box 30180 Lansing, MI 48909-7680	09/22/14 via letter	09/22/14 via email	09/23/14 via email

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MDNR	Wildlife Division	Daniel Kennedy, Endangered Species Coordinator	(517) 284-6194	kennedyd@michigan.gov	Michigan DNR, Wildlife Division P.O. Box 30444 525 W. Allegan Lansing, MI 48909-7944	11/14/14 via email	11/14/14 via email	11/14/14 via email
MDNR	Wildlife Division	Zach Cooley, Wildlife Biologist for Monroe and Wayne Counties	(734) 379-9692	cooleyz@michigan.gov		11/3/14 introductory meeting		
MDNR	Wildlife Division	Kristen Bissell, Wildlife Biologist for Lenawee and Washentaw Counties	(517) 522-4097	bissellk@michigan.gov		11/3/14 introductory meeting		
MDNR	Wildlife Division	Sue Tangora, Statewide Invasive Species Coordinator	(517) 284-6223	tangoras@michigan.gov		11/14/14 via email	11/14/14 via email	
MNFI	Natural Features Inventory	Michael A. Sanders, Rare Species Review Specialist	(517) 284-6200	sander75@msu.edu	Michigan State University Extension 3rd Floor Constitution Hall 525 W. Allegan St. Lansing, MI 48933	09/23/14 via letter	09/23/14 via email	10/09/14 letter via email
MDEQ	Water Resources Division, Jackson District Office	Ms. Katherine David, Water Resources Division	(517) 780-7021	DAVIDK@michigan.gov	301 E. Louis Glick Highway Jackson, Michigan 49201	12/18/14 via letter	12/18/14 via FedEx	05/6/15 via letter
MDEQ	Water Resource Division, Lansing Office	Brant Fisher, Water Wellhead Protection Engineer	(517) 284-6515	fisherb@michigan.gov	525 W. Allegan Street Constitution Hall, Fourth Floor-South Lansing, Michigan 48933	10/22/15 via phone		10/22/15 via phone
SHPO	Michigan Office of Historic Preservation	Brian D. Conway, State Historic Preservation Officer	(517) 373-1630	Conwayb1@michigan.gov	Michigan State Housing Development Authority 702 W. Kalamazoo St. P.O. Box 30740 Lansing, Michigan 48909-8240	12/04/14	12/04/14 via US mail	
TRIBES								

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NEXUS Project Stakeholder List – Non-Landowners Federal, State, and Local Agency Contacts								
Agency	**Office**	**Contact Name**	**Contact Phone**	**Contact Email**	**Contact Address**	**Initial Contact Date**	**Date Sent**	**Response Date/Type**
Tribe	Absentee-Shawnee Tribe of Indians of Oklahoma	Joseph Blanchard, Cultural Preservation Director Tribal Historic Preservation Officer	(405) 275-4030, ext 203	joseph.blanchard@astribe.com	Absentee-Shawnee Tribe of Indians of Oklahoma 2025 S. Gordon Cooper Drive Shawnee, OK 74801	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation	Michael Wiggins, Chairman	(715) 682-7111	hrmanager@badriver-nsn.gov	Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation P.O. Box 39 Odanah, WI 54861-0039	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation	Edith Leoso, Tribal Historic Preservation Officer	(715) 682-7111		Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation P.O. Box 39 Odanah, WI 54861-0039	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Bay Mills Indian Community	Levi Carrick, Sr., Chairman	(906) 248-3241		Bay Mills Indian Community 12140 W. Lakeshore Drive Brimley, MI 49715	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Bay Mills Indian Community	Paula Carrick, Tribal Historic Preservation Officer	(906) 248-8458	paulacarrick@baymills.org	Bay Mills Indian Community 12140 W. Lakeshore Drive Brimley, MI 49715	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Bois Forte Band (Nett Lake) of the Minnesota Chippewa Tribe	Kevin Leecy, Chairman	(218) 757-3261	kevin.leecy@boisforte-nsn.gov	Bois Forte Band (Nett Lake) of the Minnesota Chippewa Tribe P.O. Box 16 Nett Lake, MN 55772	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Bois Forte Band (Nett Lake) of the Minnesota Chippewa Tribe	Rosemary Berens, Tribal Historic Preservation Officer	(218) 757-3261	rozeberens@yahoo.com	Bois Forte Band (Nett Lake) of the Minnesota Chippewa Tribe P.O. Box 16 Nett Lake, MN 55772	12/11/14 via letter	12/11/14 via USPS certified mail	

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Tribe	Chippewa-Cree Indians of the Rocky Boy's Reservation	Bruce Sunchild, Chairman	(406) 395-4282	bsunchild@yahoo.com	Chippewa-Cree Indians of the Rocky Boy's Reservation 31 Agency Square Box Elder, MT 59521	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Chippewa-Cree Indians of the Rocky Boy's Reservation	Alvin Windy Boy, Tribal Historic Preservation Officer	(406) 352-3077	alvin@nei-yahw.com	Chippewa-Cree Indians of the Rocky Boy's Reservation P.O. Box 230 Box Elder, MT 59521	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Citizen Potawatomi Nation	John Barrett, Chairman	(405) 275-3121	rbarrett@potawatomi.org	Citizen Potawatomi Nation 1601 S. Gordon Cooper Drive Shawnee, OK 74801	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Citizen Potawatomi Nation	Kelli Mosteller, Tribal Historic Preservation Officer	(405) 878-5830	kelli.mosteller@potawatomi.org	Citizen Potawatomi Nation 1601 S. Gordon Cooper Drive Shawnee, OK 74801	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Delaware Nation	C.J. Watkins, Vice President	(405) 247-2448		Delaware Nation P.O. Box 825 Anadarko, OK 73005	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Delaware Nation	Tamara Francis-Fourkiller, Cultural Preservation Director	(405) 247-2448, ext 1180	tfrancis@delawarenation.com	Delaware Nation P.O. Box 825 Anadarko, OK 73005	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Delaware Tribe of Indians	Paula Pechonick, Chief	(918) 336-5272		Delaware Tribe of Indians 170 N Barbara Ave Bartlesville, OK 74003	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Delaware Tribe of Indians	Dr. Brice Obermeyer, Director, Tribal Historic Preservation Office	(620) 341-6699	bobermeyer@delawaretribe.org	Delaware Tribe of Indians Roosevelt Hall, Room 212 1200 Commercial Street Emporia, KS 66801	10/28/14 via letter	10/28/14 via USPS certified mail	11/17/14 via letter
Tribe	Eastern Shawnee Tribe of Oklahoma	Glenna J. Wallace, Chief	(918) 666-2435	gjwallace@estoo.net	Eastern Shawnee Tribe of Oklahoma P.O. Box 350 Seneca, MO 64865	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Eastern Shawnee Tribe of Oklahoma	Robin Dushane, Tribal Historic Preservation Officer	(918) 666-2435, ext 247	r.dushane@estoo.net	Eastern Shawnee Tribe of Oklahoma 12705 South 705 Road Wyandotte, OK 74370	10/28/14 via letter	10/28/14 via USPS certified mail	

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Tribe	Fond du Lac Band of the Minnesota Chippewa Tribe	Karen Driver, Chairwoman	(218) 878-2612	karendriver@fdlrez.com	Fond du Lac Band of the Minnesota Chippewa Tribe 1720 Big Lake Road Cloquet, MN 55720	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Fond du Lac Band of the Minnesota Chippewa Tribe	LeRoy Defoe, Tribal Historic Preservation Officer	(218) 878-7129	leroydefoe@fdlrez.com	Fond du Lac Band of the Minnesota Chippewa Tribe 1720 Big Lake Road Cloquet, MN 55720	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Forest County Potawatomi	Harold Frank, Chairman	(715) 478-7200		Forest County Potawatomi 5416 Everybody's Rd Crandon, WI 54520	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Forest County Potawatomi	Melissa Cook, Tribal Historic Preservation Officer	(800) 960-5479, ext 7248	melissa.cook@fcpotawatomi-nsn.gov	Forest County Potawatomi Cultural Center, Library & Museum 8130 Mishkoswen Drive PO Box 340 Crandon, WI 54520	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Grand Portage Band of the Minnesota Chippewa Tribe	Norman Deschampe, Chairman	(218) 475-2277	norman@grandportage.com	Grand Portage Band of the Minnesota Chippewa Tribe P.O. Box 428 Grand Portage, MN 55605	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Grand Portage Band of the Minnesota Chippewa Tribe	Mary Ann Gagnon, Tribal Historic Preservation Officer	(218) 475-0111	maryanng@grandportage.com	Grand Portage Band of the Minnesota Chippewa Tribe P.O. Box 428 Grand Portage, MN 55605	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Grand Traverse Band of Ottawa and Chippewa Indians	Derek J. Bailey, Chairperson	231-534-7750	derek.bailey@gtindians.com	Grand Traverse Band of Ottawa and Chippewa Indians 2605 North West Bayshore Drive Suttons Bay, MI 49682	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Hannahville Indian Community	Kenneth Meshigaud, Chairperson	(906) 466-2932		Hannahville Indian Community N14911 Hannahville B1 Rd Wilson, MI 49896	10/28/14 via letter	10/28/14 via USPS certified mail	

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Agency	**Office**	**Contact Name**	**Contact Phone**	**Contact Email**	**Contact Address**	**Initial Contact Date**	**Date Sent**	**Response Date/Type**
Tribe	Keweenaw Bay Indian Community	Donald Shalifoe, Sr. Ogimaa	(906) 353-6623	tcchris@kbic-nsn.gov	Keweenaw Bay Indian Community 16429 Beartown Road Baraga, MI 49908	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Keweenaw Bay Indian Community	Chris Chosa, Tribal Historic Preservation Officer	(906) 353-6272		Keweenaw Bay Indian Community 16429 Beartown Road Baraga, MI 49908	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin	Michael Isham, Jr. Chairman	(715) 634-8934	terrikay@cheqnet.net	Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin 13394 West Trapania Road, Building No. 1 Hayward, WI 54843	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin	Jerry Smith, Tribal Historic Preservation Officer	(715) 634-8934		Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin 13394 West Trapania Road, Building No. 1 Hayward, WI 54843	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin	Tom Maulson, President	(715) 588-3303		Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin P.O. Box 67 Lac du Flambeau, WI 54538	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin	Melinda Young, Tribal Historic Preservation Officer	(715) 588-2139		Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin P.O. Box 67 Lac du Flambeau, WI 54538	12/11/14 via letter	12/11/14 via USPS certified mail	

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Tribe	Lac Vieux Desert Band of Lake Superior Chippewa Indians	Alan Shively, Chairman	(906) 358-0137	jim.williams@lvdtribal.com	Lac Vieux Desert Band of Lake Superior Chippewa Indians P.O. Box 249 Watersmeet, MI 49969	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Lac Vieux Desert Band of Lake Superior Chippewa Indians	Giiwegiizhigookway Martin, Tribal Historic Preservation Officer	(906) 358-4577	gmartin@lvdtribal.com	Lac Vieux Desert Band of Lake Superior Chippewa Indians P.O. Box 249 Watersmeet, MI 49969	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Leech Lake Band of the Minnesota Chippewa Tribe	Carrie Jones, Chairwoman	(218) 335-8200		Leech Lake Band of the Minnesota Chippewa Tribe 115 6th Street NW Suite E Cass Lake, MN 56633	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Leech Lake Band of the Minnesota Chippewa Tribe	Gina Lemon, Tribal Historic Preservation Officer			Leech Lake Band of the Minnesota Chippewa Tribe 115 6th Street NW Suite E Cass Lake, MN 56633	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Match-e-be-nash-she-wish Band of Potawatomi Indians of Michigan	David Sprague, Chairman	(616) 681-8830	dsprague@mbpi.org	Match-e-be-nash-she-wish Band of Potawatomi Indians of Michigan P.O. Box 218 Dorr, MI 49323	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Miami Tribe of Oklahoma	George Strack, Tribal Historic Preservation Officer	(918) 542-1442	gstrack@miamination.com	Miami Tribe of Oklahoma P.O. Box 1326 Miami, OK 74355	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Mille Lacs Band of the Minnesota Chippewa Tribe	Melanie Benjamin, Chief Executive	(320) 532-4181		Mille Lacs Band of the Minnesota Chippewa Tribe 43408 Oodena Drive Onamia, MN 56359	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Mille Lacs Band of the Minnesota Chippewa Tribe	Natalie Weyaus, Tribal Historic Preservation Officer	(320) 532-7450		Mille Lacs Band of the Minnesota Chippewa Tribe 43408 Oodena Drive Onamia, MN 56359	12/11/14 via letter	12/11/14 via USPS certified mail	

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Tribe	Minnesota Chippewa Tribe	Norman Deschampe, President	(218) 335-8581		Minnesota Chippewa Tribe P.O. Box 217 Cass Lake, MN 56633	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Miami Tribe of Oklahoma	Douglas Lankford, Chief	(918) 542-1445	info@miamination.com	Miami Tribe of Oklahoma P.O. Box 1326 Miami, OK 74355	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Nottawaseppi Huron Band of the Potawatomi	Homer Mandoka, Chairman	(269) 729-5151	hmandoka@nhbpi.com	Nottawaseppi Huron Band of the Potawatomi 2221 1 1/2 Mile Road Fulton, MI 49052	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Nottawaseppi Huron Band of the Potawatomi	Jeff Chivis, Tribal Historic Preservation Officer	(269) 704-8416	jchivis@nhbpi.com	Nottawaseppi Huron Band of the Potawatomi 1485 Mno-Bmadzewen Way Fulton, MI 49052	12/16/14 via letter	12/16/14 via USPS certified mail	12/4/14 via email and letter
Tribe	Ottawa Tribe of Oklahoma	Ethel Cook, Chief	(918) 542-6162	adawetribe@sbcglobal.net	Ottawa Tribe of Oklahoma P.O. Box 110 Miami, OK 74354	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Ottawa Tribe of Oklahoma	Rhonda Dixon, Tribal Historic Preservation Officer	(918) 542-6162	dixon_rhonda@sbcglobal.net	Ottawa Tribe of Oklahoma P.O. Box 110 Miami, OK 74354	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Peoria Tribe of Indians of Oklahoma	John P. Froman, Chief	918-540-4155	jfroman@peoriatribe.com	Peoria Tribe of Indians of Oklahoma P.O. Box 1527 Miami, OK 74355	10/28/14 via letter	10/28/14 via USPS certified mail	11/7/14 via letter
Tribe	Pokagon Band of Potawatomi Indians	Matthew J. Wesaw, Chairman	(517) 719-5579	matthew.wesaw@pokagonband-nsn.gov	Pokagon Band of Potawatomi Indians P.O. Box 110 Dowagiac, MI	10/28/14 via letter	10/28/14 via USPS certified mail	11/26/14 Via email
Tribe	Pokagon Band of Potawatomi Indians	Mike Zimmerman, Tribal Historic Preservation Officer	(269) 782-9602	michael.zimmerman@pokagonband-nsn.gov	Pokagon Band of Potawatomi Indians P.O. Box 110 Dowagiac, MI	10/28/14 via letter	10/28/14 via USPS certified mail	11/26/14 Via email
Tribe	Prairie Band of Potawatomi Nation	Steve Ortiz, Chairman	(785) 966-4000		Prairie Band of Potawatomi Nation 16277 Q Road Mayetta, KS 66509	10/28/14 via letter	10/28/14 via USPS certified mail	

NEXUS Project Stakeholder List – Non-Landowners Federal, State, and Local Agency Contacts								
Agency	**Office**	**Contact Name**	**Contact Phone**	**Contact Email**	**Contact Address**	**Initial Contact Date**	**Date Sent**	**Response Date/Type**
Tribe	Quechan Tribe of the Fort Yuma Indian Reservation	Mike Jackson, President	(760) 572-0213		Quechan Tribe of the Fort Yuma Indian Reservation P.O. Box 1899 Yuma, AZ 85366	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin	Rose Gurnoe-Soulier, Chairperson	(715) 779-3700	webmaster@redcliff-nsn.gov	Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin 88385 Pike Road, Hwy 13 Bayfield, WI 54814	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin	Larry Balber, Tribal Historic Preservation Officer	(715) 779-3650		Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin 88385 Pike Road, Hwy 13 Bayfield, WI 54814	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Red Lake Band of Chippewa Indians	Floyd Jourdain, Chairperson	(218) 679-3341		Red Lake Band of Chippewa Indians P.O. Box 550 Redlake, MN 56671	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Saginaw Chippewa Indian Tribe of Michigan	Dennis V. Kequom, Chief	(989) 775-4000	dkequom@sagchip.org	Saginaw Chippewa Indian Tribe of Michigan 7070 East Broadway Road Mt. Pleasant, MI 48858	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Saginaw Chippewa Indian Tribe of Michigan	William Johnson, Curator	(989) 775-4730	wjohnson@sagchip.org	Ziibwing Center of Anishinabe Culture and Lifeways 6650 East Broadway Road Mt. Pleasant, MI 48858	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Sault Ste. Marie Tribe of Chippewa Indians of Michigan	Aaron Payment, Chairperson	(906) 635-6050	aaronpayment@saulttribe.net	Sault Ste. Marie Tribe of Chippewa Indians of Michigan 523 Ashmun Street Sault Ste. Marie, MI 49783	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Seneca-Cayuga Tribe of Oklahoma	LeRoy Howard, Chief	(918) 542-6609, ext 19		Seneca-Cayuga Tribe of Oklahoma 23701 South 655 Road Grove, OK 74344	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Seneca-Cayuga Tribe of Oklahoma	Paul Barton, Tribal Historic Preservation Officer	(918) 787-7979	pbarton@sctribe.com	Seneca-Cayuga Tribe of Oklahoma 23701 South 655 Road Grove, OK 74344	10/28/14 via letter	10/28/14 via USPS certified mail	

NEXUS Project Stakeholder List – Non-Landowners Federal, State, and Local Agency Contacts								
Agency	**Office**	**Contact Name**	**Contact Phone**	**Contact Email**	**Contact Address**	**Initial Contact Date**	**Date Sent**	**Response Date/Type**
Tribe	Seneca Nation of Indians	Beverly Cook, President			Seneca Nation of Indians 90 O:hi'yoh Way Salamanca, NY 14779	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Seneca Nation of Indians	Melissa Bach, Tribal Historic Preservation Officer	(716) 945-1790, ext 3580	melissa.bach@sni.org	Seneca Nation of Indians 90 O:hi'yoh Way Salamanca, NY 14779	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Shawnee Tribe	Ron Sparkman, Chairperson	(918) 542-2441	ronded@gmail.com	Shawnee Tribe P.O. Box 189 South Highway 69A, Miami, OK 74355	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Shawnee Tribe	Kim Jumpers, Tribal Historic Preservation Officer	(918) 542-2441	kim.jumper@shawnee-tribe.com	Shawnee Tribe P.O. Box 189 South Highway 69A, Miami, OK 74355	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Sokaogon Chippewa Community	Garland McGeshick, Chairman	(715) 478-7504	gaye.graham@scc-nsn.gov	Sokaogon Chippewa Community 3051 Sand Lake Road Crandon, WI 54520	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	St. Croix Chippewa Indians of Wisconsin	Stuart Bearheart, Chairman	(715) 349-2195	annb@stcroixtribalcenter.com	St. Croix Chippewa Indians of Wisconsin 24663 Angeline Avenue Webster, WI 54893	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Tonawanda Band of Seneca Indians of New York	Darwin Hill, Chief	(716) 542-4244	tonseneca@aol.com	Tonawanda Band of Seneca Indians of New York P.O. Box 795 7027 Meadville Road Basom, NY 14013	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Turtle Mountain Band of Chippewa Indians of North Dakota	Richard McCloud, Chairman	(701) 477-2600		Turtle Mountain Band of Chippewa Indians of North Dakota P.O. Box 900 Belcourt, ND 58316	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	White Earth Band of Minnesota Chippewa Tribe	Erma Vizenor, Chairman	(218) 983-3285	desiraes@whiteearth.com	White Earth Band of Minnesota Chippewa Tribe P.O. Box 418 White Earth, MN 56591	12/11/14 via letter	12/11/14 via USPS certified mail	

NEXUS Project Stakeholder List – Non-Landowners Federal, State, and Local Agency Contacts								
Agency	**Office**	**Contact Name**	**Contact Phone**	**Contact Email**	**Contact Address**	**Initial Contact Date**	**Date Sent**	**Response Date/Type**
Tribe	White Earth Band of Minnesota Chippewa Tribe	Renee Lampi, Tribal Historic Preservation Officer	(218) 983-3263		White Earth Band of Minnesota Chippewa Tribe P.O. Box 418 White Earth, MN 56591	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Wyandotte Nation	Billy Friend, Chief	(918) 678-2297		Wyandotte Nation 64700 E. Highway 60 Wyandotte, OK 74370	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Wyandotte Nation	Sherri Clemons, Tribal Historic Preservation Officer	(918) 678-2297, ext 244	sclemons@wyandotte.org	Wyandotte Nation 64700 E. Highway 60 Wyandotte, OK 74370	10/28/14 via letter	10/28/14 via USPS certified mail	

APPENDIX 1C2

Agency Correspondence

[PUBLIC – PROVIDED ON DVD]

APPENDIX 1C3

NEXUS Public and Agency Participation Plan

NEXUS Gas Transmission, LLC

NEXUS Gas Transmission Project
(NEXUS Project)

Public and Agency Participation Plan

November 2015

Table of Contents

APPENDICES

Note: Spectra Energy Partners, LP and DTE Energy are lead developers of the NEXUS Gas Transmission Project.

1. PLAN PURPOSE

The purpose of this Public and Agency Participation Plan is to identify stakeholders and potential issues related to the proposed NEXUS Gas Transmission Project ("NEXUS Project or Project") early in the development process; determine appropriate and effective methods of communication with stakeholders; identify responsible parties and adhere to communication protocols, and document the public consultation process.

NEXUS Gas Transmission, LLC ("NEXUS") is dedicated to seeking greater involvement from affected stakeholder groups early in the planning process so those who are interested may participate in the decision making process throughout development of the Project.

Our goal is to achieve consensus and agreements among the stakeholders reaching mutually acceptable project designs. We believe early and collaborative stakeholder involvement leads to project designs that minimize impacts to landowners, communities and the environment while enabling us to develop more comprehensive and complete applications submitted to regulatory agencies and the Federal Energy Regulatory Commission ("FERC or Commission").

1.1. Project Description

The NEXUS Project is a new interstate pipeline system designed to transport 1.5 million dekatherms per day ("Dth/d") of Appalachian Basin shale gas, including Utica and Marcellus shale gas production, directly to consuming markets in northern Ohio and southeastern Michigan, and to the Dawn Hub in Ontario, Canada ("Dawn Hub"). The target in-service date for service on the Project facilities is November 1, 2017.

The United States ("U.S.") portion of the NEXUS Project will traverse West Virginia, Pennsylvania, Ohio, and Michigan, terminating at the U.S./Canada international boundary between Michigan and Ontario. The Canadian portion of the Project will extend from the U.S./Canada international boundary to the Dawn Hub. By combining greenfield pipeline construction with the use of capacity on other pipeline systems, NEXUS will be able to minimize environmental disruption and optimize project efficiencies.

The greenfield portion of the NEXUS Project will be constructed, owned and operated by NEXUS and will extend from the Kensington Processing Plant located in Hanover Township, Ohio, to a new interconnection with the DTE Gas system west of Detroit in Ypsilanti Township, Michigan. The remainder of the NEXUS Project, which NEXUS will contract from third-party pipelines, will be comprised of the following: (1) expansion capacity on the Texas Eastern system in West Virginia, Pennsylvania, and Ohio; (2) existing and expansion capacity on the DTE Gas system in southeastern Michigan and extending to the U.S./Canada international boundary; and (3) existing capacity on the Vector U.S. system in southeastern Michigan and extending to the U.S./Canada international boundary. Use of this leased capacity will provide

NEXUS shippers with the ability to access additional points on a secondary basis, including Chicago through Vector U.S. Outside of the U.S., NEXUS will use existing capacity on the Vector Pipeline Limited Partnership in western Ontario to access the Dawn Hub.

The NEXUS Project is both a supply push and market pull pipeline project, meaning the Project targets transportation needs of both producers and end-use customers. The Project will provide critical access to emerging natural gas supplies from the Appalachian Basin, including the Marcellus and Utica shale gas producing areas, and will provide energy consumers in the region with affordable, cleaner-burning and domestically-abundant natural gas to help meet the growing environmental need for cleaner power generation, commercial and industrial demand, and home heating in the region. This encourages greater competition in fuel markets, creates economic incentives for power generators currently burning coal or oil to convert to natural gas; and improves national security by reducing U.S. dependence on foreign energy supplies. If this demand for natural gas associated with heating, lighting, and power generation is not met, other energy sources such as non-gas-fired fossil fuel generation would need to be permitted, constructed, and operated.

1.2. Values and Principles

Our core values guide our stakeholder outreach programs and activities as well as the work of our employees and contractors.

In conducting our business, we value our stakeholders by:

- ✓ ***Stewardship*** - Demonstrating a commitment to environmental responsibility and vibrant communities.
- ✓ ***Respect for the Individual*** - Embracing diversity and inclusion, enhanced by openness, sharing, trust, leadership, teamwork and involvement.
- ✓ ***Integrity*** - Ethically and honestly doing what we say we will do.
- ✓ ***Win-Win Relationships*** - Having relationships that focus on the creation of value for all parties.
- ✓ ***Initiative*** - Having the courage, creativity and discipline to lead change and shape the future.

While these values guide our stakeholder outreach approach, we tailor our activities for each project, ensuring that our dialogue with stakeholders is open, transparent and meaningful.

Our Stakeholder Engagement Principles**,** developed to guide our interactions, are as follows:

- We will be respectful of and considerate to all stakeholders.
- We will engage with those affected by our business.
- We will consider stakeholder-identified issues in our decision-making process.

- We will provide timely and accurate communications using accessible information and language.
- We will be transparent in our processes and communications.

Having established principles and knowing where, when and how to engage with external stakeholders is critical to our business success.

1.3. Management Commitment

Overview

Our stakeholder outreach activities are endorsed by our executive management team. We have communication plans that provide our employees the “who, what, where and when” protocols when conducting business.

To ensure effective dialogue with our stakeholders, we rely on one-on-one discussions, face-to-face meetings, open houses, websites, legal notices, media outreach and individual letters sent via mail.

Project Development Stakeholder Outreach

During project development, stakeholder consultation is critical because many people along the proposed and existing pipeline route may not be familiar with natural gas pipelines or our company.

The key criteria inherent in implementing a successful stakeholder consultation plan are the ability and knowledge to explain a project’s benefits and its potential impacts; to respond to questions, concerns and issues; and, whenever possible, to mitigate potential impacts. In order to sustain a successful program, we seek, involve, inform and respond to stakeholders by implementing the planning process early, with open and collaborative activities. We execute our plans by engaging in and sustaining understandable, accurate and timely dialogue with our stakeholders. This process guides us toward building and maintaining win-win relationships.

The NEXUS Project has evolved as market demands and our customers’ needs change and will require Federal, state, and local regulatory reviews and will be subject to government approvals.

Our mission is to work with Project stakeholders to define an acceptable project design. Our vision is to involve affected landowners, other interested citizens, public officials and government agencies early in the Project planning process to determine the proposed route. It is imperative to us that our employees and Project team understand the importance of public participation. The underpinnings of this plan are to inform, listen to, and record stakeholders’ ideas and knowledge of the area and environment. Our values and principles include a commitment to being honest and open and following through with stakeholders’ concerns and issues.

We manage all projects and operations in a manner that protects the environment and the health and safety of employees, customers, contractors and the public. Protection of human life is of highest priority, and actions undertaken to protect the environment or our assets must reflect this philosophy. We rely on each employee and contractor to support and actively participate in our environmental, health and safety program.

2. PROJECT DEVELOPMENT

The NEXUS Project team has been discussing the purpose and need for the Project with landowners, agencies, public officials and other stakeholders. We explain supply and demand, energy reliability, pipeline construction, operations and safety, and the need for the Project during opportunities such as voluntary landowner informational meetings, public open houses and other meetings that include all stakeholders (e.g., county commission meetings, home owner association meetings, etc.). In identifying issues important to landowners and other stakeholders, we seek assistance from federal and state agencies, commissions, the Energy Information Administration and regional and local entities. In addition to sharing information about the benefits of the NEXUS Project, we seek to understand stakeholder issues and concerns, such as, Project construction activity alignment with landowners', community and business activities, environmental needs, right-of-way requirements, etc.

As part of determining potential stakeholders for the NEXUS Project’s preliminary and proposed routes, we identified and are continually communicating with the following:

- Ohio and Michigan Governors; federal, state, county and local public officials
- Federal, state and local permitting agencies and groups
- Energy agencies
- FERC staff
- Landowners
- Federal and state land managers
- Non-governmental organizations
- Community and public interest groups

We continue to identify other stakeholders interested in the Project.

Proper documentation is made with regard to conversations, meetings, and phone/visitor logs so that tracking of calls, visits, emails and/or letters received as well as issue(s)/concern(s) raised from initial contacts are addressed and resolved. Our goal is to be responsive to all participating agencies, landowners and stakeholders.

2.1. NEXUS Project Team

The NEXUS Project Team includes representatives from engineering, right-of-way, legal, environmental, stakeholder outreach, public relations, government relations, operations, regulatory affairs, and business development.

2.2. Team Training

All facets of the NEXUS public outreach and consultation process are discussed with and supported by the NEXUS Project Team.

Our land agents and survey crews participate in Public Consultation Training. The training includes appropriate communication, participation and documentation practices with stakeholders.

All land agents are trained in project-appropriate research methods with regard to determining property ownership and legal descriptions. All have received training on negotiating skills that include effective listening. Effective listening skills are a vital part of the stakeholder/agent communication process. In addition, all land agents have extensive training in contracting and documentation, including fact checking and quality control.

2.3. Route/Corridor Planning

The proposed pipeline route/corridor is selected based upon engineering, construction, environmental and stakeholder considerations that include:

- Maximizing use of existing corridors
- Utilizing streets, industrial/commercial parking lots, edges of properties
- Minimizing residential and business impacts
- Minimizing interference with future development
- Minimizing disruptions during construction
- Avoiding environmental impacts where possible
- Minimizing unavoidable environmental impacts

The pipeline facilities will be installed is in accordance with U.S. Department of Transportation classifications and regulations.

2.4. Map

A Project Overview Map is included in Appendix A.

3. PUBLIC PARTICIPATION

We believe public participation strengthens our connection with people living and working near the pipeline and is critical to the successful completion of the Project.

During the early development stages of the Project we involve many landowners located within an initial 600-foot-wide “study corridor” comprising the preliminary and alternate routes. We mail landowners Project description letters and request survey permission; telephone landowners and follow up with face-to-face meetings. Prior to commencing the pre-filing process, NEXUS hosted a total of seven voluntary informational meetings for stakeholders in the vicinity of the proposed Project in Ohio in October 2014. Two additional voluntary informational meetings were held in the vicinity of the proposed Project in Michigan in November 2014. The voluntary informational meetings were set up similar to open house meetings, with subject matter experts available in the areas of surveying, construction, environmental impacts, regulatory affairs, state and federal relations, and right-of-way activities. Aerial imagery mapping identifying impacted tracts by landowner were available to allow for site specific discussion between the project team and interested stakeholders. After the commencement of the pre-filing process, NEXUS held ten open houses along the pipeline route in Ohio and Michigan during February of 2015.

We also contact and meet with local and state public officials.

During these meetings, we respond to stakeholders’ questions and for those questions that require research, we commit to responding in a timely fashion. We are taking care to respond in easy to understand terms and to provide stakeholders with comprehensive answers to their questions. We provide a toll free number and invite stakeholders to call at any time throughout the development process if new questions arise. We also invite them to visit both the Spectra Energy and NEXUS Project websites for the duration of the Project:

NEXUS Project website:
http://nexusgastransmission.com

Spectra Energy website:
http://www.spectraenergy.com/Operations/New-Projects-and-Our-Process/New-Projects-in-US/NEXUS-Gas-Transmission

3.1. Public Outreach

NEXUS will be implementing and coordinating public outreach activities during the FERC Pre-Filing Process as well as following the filing of the Certificate application. There are a number of separate components to our stakeholder outreach efforts, including the following:

- Developing our philosophy of outreach and stating our commitment

- Ensuring landowner, government and agency participation
- Training company representatives and land agents
- Providing a toll free number and website for easy access
- Developing and implementing a Public and Agency Participation Plan
- Collecting data and responding to stakeholders
- Having a plan for potential mitigation and compensation

3.1.1. Identification of Issues

Landowner

Throughout the development, construction and operation of the NEXUS Project, we emphasize the importance of landowner and community communications.

We sent letters to landowners providing them with information on the Project and requesting permission to survey. We also sent letters to stakeholders informing them of the FERC Pre-Filing Process, Open House Meetings, FERC Scoping Meetings and information on the Resource Reports, as well as the locations of libraries where the Resource Reports are available for viewing. This communication with affected stakeholders will continue once we submit our certificate application to FERC.

Further, we held 9 voluntary Landowner Informational Meetings in October and November 2014 in communities with proposed facilities. Subsequent to initiating the FERC Pre-filing Process, NEXUS hosted 10 open houses for all interested stakeholders. During these meetings, information was available regarding all aspects of the Project including pipeline design, construction, operations and safety. We mailed letters to landowners and public officials to announce the Landowner Informational Meetings and Open House Meetings.

Additionally, the Project has received coverage from local media outlets interested in the scope, schedule, permitting, potential stakeholder impacts and opportunities for engagement.

Sample letters are included in Appendix G.

See Appendix H for a list of voluntary landowner informational meetings and open house meetings. We will continue to provide updates to the meeting information as necessary.

Environmental

Pipeline projects and its operations typically involve working with the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, state departments of environmental protection, state departments of natural resources and the State Historic Preservation Offices. Knowing that developing the NEXUS Project may result in impacts to resources, we engaged these and other federal, state and regional agencies seeking guidance on specific issues early in the development process. Appendix C provides a list of Federal, state, and local agencies contacted on the NEXUS project to date.

3.1.2. Resolution of Issues

To date, stakeholder meetings and communications, which were designed to inform, communicate and listen to feedback, have resulted in several modifications to the proposed route.

Resolutions of issues are documented in our database and updated on an ongoing basis.

3.1.3. Response to Comments

Project Team representatives are documenting all comments and responding as appropriate.

3.1.4. Communication Protocol

Pre-Filing and post-certificate application activities are part of a coordinated plan involving many facets of the Project and team. Stakeholder communication is coordinated on a weekly basis, or more frequently, as needed.

3.2. Access to Land

Initial notifications to affected landowners were mailed in August 2014, and were followed by subsequent letters requesting survey permission.

Sample letters are included in Appendix G.

3.2.1. Land Agent Contacts

Contacts have been made with landowners living along the 600-foot wide study corridor, as well as landowners living within a half-mile radius of each compressor station. The preliminary route has consisted of more than 7,400 tracts. The total number of tracts impacted by the project is expected to be greatly reduced through the survey and route selection process.

3.3. Identification of Stakeholders

3.3.1. Landowners

See Appendix B for a list of landowners and Appendix G for sample letters.

3.3.2. Public Officials

Contacts have been made and/or briefings have been held with affected public officials beginning in August 2014.See Appendix E for a list of public officials.

3.3.3. Community and Public Interest Groups and Non-governmental Organizations

Contacts have been made and/or briefings have been held with community and public interest groups and non-governmental organizations.

See Appendix E for a list of community and public interest groups and non-governmental organizations.

3.3.4. Media

Information has been and will be provided to media outlets upon request.

3.3.5. Federal, State, and Local Agencies

Initial contacts and meetings with affected government officials and agencies were conducted beginning in the fall of 2014. A Project overview was provided at the meetings. Since that time, we have kept, and will remain in contact with, these officials and agencies throughout the development process.

See Appendix C for a list of federal, state and local agencies and Appendix G for sample letters.

3.4. Agency Permits/Approvals

A table listing the required permits and approvals and their estimated regulatory timeframes may be found in Appendix D.

4. DISSEMINATION OF INFORMATION

4.1. Website Development

A targeted Project page on the Spectra Energy website was launched in June 2013, and a standalone website for the NEXUS Project was launched in July 2013. The websites provide visitors with a toll free telephone number to obtain information and/or ask questions about the Project. This website was designed to be more interactive and to provide easy to understand and frequent updates.

Appendix F provides a sample of the NEXUS Project webpages.

4.1.1. Accessibility

The NEXUS Project websites provide stakeholders with information about the company, as well as facts about the Project, regulatory process, virtues of natural gas, pipeline operations, safety and maintenance, and Frequently Asked Questions. A toll free telephone contact number was established to assist stakeholders with their questions and comments.

In addition, we ensure information is disseminated, as requested by stakeholders, since not all stakeholders have access to the Internet.

4.1.2. Maintenance

The Project website is maintained by the website administrator as new information is made available.

4.1.3. Interactive Capabilities

The Project website includes an interactive project map that allows stakeholders to browse the proposed pipeline route.

4.2. Federal, State and Local Agency Communications

Consultation letters were mailed to the identified federal, state and local permitting agencies with jurisdiction over the Project. We maintain contact with the permitting agencies and respond to all requests for information we receive from them.

See Appendix C for a list of agencies and Appendix G for sample letters.

4.3. Stakeholder Notification of FERC Pre-Filing Participation

Stakeholders were notified by letter when the FERC approved the NEXUS Project for participation in the Pre-Filing process. These letters were signed by the NEXUS Project's team members accountable for specific stakeholder groups.

4.4. Voluntary Landowner Informational Meetings and Open House Meetings

In October and November 2014, NEXUS conducted 9 voluntary Landowner Informational Meetings in convenient locations for affected landowners. Subsequent to initiating the FERC Pre-filing Process, NEXUS hosted 10 open houses for all interested stakeholders. NEXUS subject matter experts hosted meetings in Ohio and Michigan.

At the voluntary landowner informational meetings and public open house meetings, information was available regarding all aspects of the Project, pipeline operations, safety and our company. Sign-in sheets documented the names and contact information for participants in order to allow for follow-up, as appropriate, with affected landowners.

See Appendix H for a list of voluntary Landowner Informational Meetings and Open House Meetings.

4.5. Landowner Invitations to Voluntary Landowner Informational Meetings

Letters inviting landowners to voluntary Landowner Informational Meetings were distributed prior to the meetings.

See Appendix G for sample letters to landowners.

4.6. Public Libraries for Filings

To ensure regulatory filings are accessible and convenient, NEXUS will submit draft environmental resource reports to public libraries in communities located along the Project route. Routine checks of the libraries will be conducted to ensure the information remains available. The final FERC Certificate Application including final resource reports will be filed in public libraries and will be available online via the FERC website at www.ferc.gov in addition to the NEXUS Project website.

4.7. Updates of Information

Updates will be approved by our Project Manager and disseminated to stakeholders in a timely manner. Methods of dissemination of information to stakeholders include U.S. mail, hand-delivery, email, Project website and/or telephone calls.

4.8. Filings with FERC

The NEXUS Certificate Application to be filed with the FERC in accordance with Section 7(c) of the federal Natural Gas Act will meet all FERC regulatory requirements.

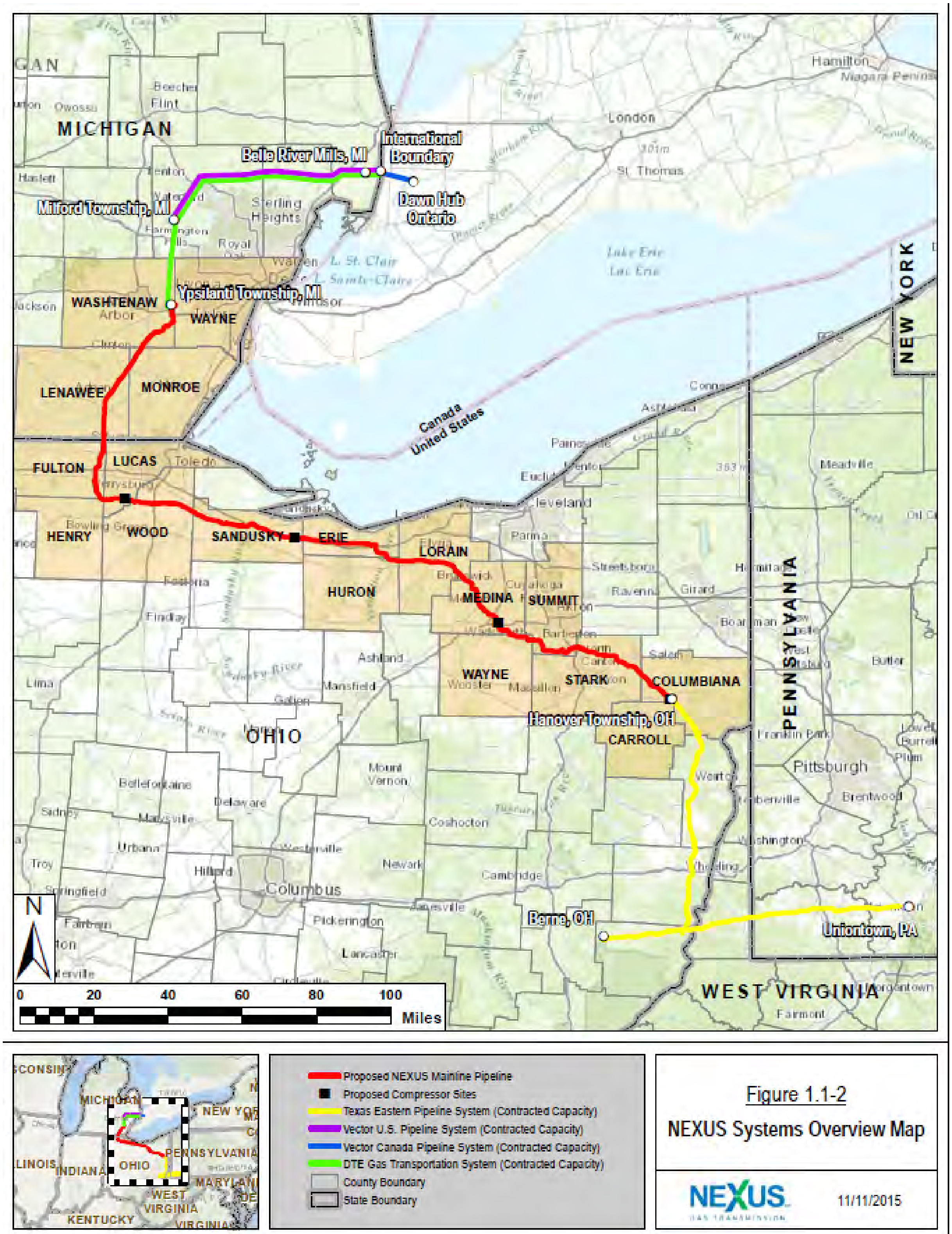
5. NEXUS Project Schedule

Conduct Landowner Informational Meetings	October - November 2014
Request Pre-Filing initiation	December 2014
Submit Draft Resource Reports 1 & 10 (Description & Alternatives)	January 2015
Conduct Open Houses / FERC Scoping Meetings	January - May 2015
Submit Draft Resource Reports	June 2015
File FERC Certificate Application	November 2015
Submit Federal and State Permit Applications	December 2015
FERC Issues Certificate	November 2016
Submit Implementation Plan	December 2016
Receive Final Agency Clearances	December 2016
Start Major Construction	January 2017
Place Project into Service	November 2017

6. Reporting

All FERC, federal, state and local government reporting will be timely and respectful of requirements. An official list of contacts within each stakeholder group has been developed to effectively and efficiently provide copies of reports and updates, as warranted.

Appendix A: Project Overview Map



Appendix C: Stakeholder List -- Non-Landowners Federal, State and Local Agencies

APPENDIX C- Stakeholder List – Non-Landowners, Federal, State, and Local Agency Contacts

Agency	Office	Contact Name	Contact Phone	Contact Email	Contact Address	Initial Contact Date	Date Sent	Response Date/Type
FEDERAL								
FERC	Office of Energy Projects Division of Gas-Environment and Engineering Gas Branch 1	Joanne Wachholder, FERC Project Manager	TBD	Joanne.Wachholder@ferc.gov	FERC Office of Energy Projects Division of Gas- Environment and Engineering Gas Branch 1 888 First Street, NE Washington, D.C. 20426 office 6J-06	12/17/14 introductory meeting	Pre-filing Request Letter 12/30/14	Ongoing Communications
USACE	Pittsburgh District (Northern Pittsburgh District)	Matt Mason, Regulatory Branch	(412) 395-7129	Matthew.R.Mason@usace.army.mil	Pittsburgh District Corps of Engineers William S. Moorhead Federal Building 1000 Liberty Avenue Regulatory Branch, Suite 2200 Pittsburgh, PA 15222	10/31/14 via letter	10/31/14 via FedEx	12/30/14 via letter from Buffalo District
USACE	Pittsburgh District	Tyler Bintrim	(412) 395-7115	Tyler.j.bintrim@usace.army.mil	Pittsburgh District Corps of Engineers William S. Moorhead Federal Building 1000 Liberty Avenue Regulatory Branch, Suite 2200 Pittsburgh, PA 15222	1/14/15 introductory meeting		
USACE	Huntington District	Mark Taylor, Chief, Energy Resources	(304) 399-5610	MARK.A.TAYLOR@usace.army.mil	Huntington District Regulatory Division 502 8th Street Huntington, WV 25701	10/31/14 via letter	10/31/14 via FedEx	12/30/14 via letter from Buffalo District
USACE	Buffalo District	Mark Scalabrino Ohio Regulatory Chief	(716) 879-4327	mark.w.scalabrino@usace.army.mil	Buffalo District Office 1776 Niagara St. Buffalo, NY 14207	10/31/14 via letter	10/31/14 via FedEx	12/30/14 via letter
USACE	Buffalo District	Shawn Blohm Regulatory Project Manager	(330) 923-8214	Shawn.U.Blohm@usace.army.mil	Buffalo District-Stow Field Office 110 Graham Road Circle Stow, OH 44224	1/14/15 introductory meeting		

APPENDIX C- Stakeholder List – Non-Landowners, Federal, State, and Local Agency Contacts

Agency	Office	Contact Name	Contact Phone	Contact Email	Contact Address	Initial Contact Date	Date Sent	Response Date/Type
USACE	Detroit District	Stanley F. Cowton, Jr., Regulatory Project Manager	(313) 226-2219	stanley.f.cowton@usace.army.mil	USACE, Regulatory Office 477 Michigan Avenue, 6th Floor Detroit, Michigan 48226-2550	10/31/14 via letter	10/31/14 via FedEx	12/30/14 via letter from Buffalo District
USFWS	East Lansing Michigan Field Office	Chris Mensing, Fish and Wildlife Biologist	(517) 351-8316	chris_mensing@fws.gov	East Lansing Field Office 2651 Coolidge Road East Lansing, MI 48823	10/14/14 via phone	10/14/14 via email	10/14/14 via email
USFWS	East Lansing Michigan Field Office	Burr Fisher, Wildlife Biologist	(517) 351-8286	Burr_fisher@fws.com	East Lansing Field Office 2651 Coolidge Road East Lansing, MI 48823	09/22/14 via letter	09/22/14 via email	12/3/14 via letter
USFWS	East Lansing Michigan Field Office	Jack Dingledine	(517) 351-6320	Jack_dingledine@fws.com	East Lansing Field Office 2651 Coolidge Road East Lansing, MI 48823	10/20/15 Project update letter via email	10/20/15 via email	11/02/15 via email
USFWS	Ohio Field Office	Angela Boyer, Endangered Species Coordinator	(614) 416-8993 x22	angela_boyer@fws.gov	U.S. Fish and Wildlife Service Ohio Field Office 4625 Morse Rd, Suite 104 Columbus, OH 43230	09/18/14 via letter	09/18/14 via email	10/9/14 via letter
USFWS	Region 3	Jeff Gosse, Regional Energy Coordinator	(612) 713-5292	Jeff_gosse@fws.gov	U.S. Fish and Wildlife Service, Region 3 5600 American West Blvd. Bloomington, MN	5/21/15 via phone	5/21/15 via email	5/21/15 via email
NPS	National Park Service Midwest Region	Mark Weekly, Deputy Regional Director	(402) 661-1526	Mark_Weekley@nps.gov	National Park Service 601 Riverfront Drive Omaha, NE 68102-4226	10/31/14 via letter	10/31/14 via FedEx	
USEPA	NEPA Implementation Section	Kenneth A. Westlake, Chief	(312) 886-2910	westlake.kenneth@epa.gov	U.S. Environmental Protection Agency, Region 5 77 West Jackson Boulevard Chicago, Illinois 60604-3590	10/31/14 via letter	10/31/14 via FedEx	11/06/14 via phone

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Agency	**Office**	**Contact Name**	**Contact Phone**	**Contact Email**	**Contact Address**	**Initial Contact Date**	**Date Sent**	**Response Date/Type**
ODA	Department of Agriculture	Dan Kenny and Matt Beal	(614) 728-6270 and (614) 728-6399	dkenny@agri.ohio.gov beal@agri.ohio.gov	Division of Plant Industry Ohio 8995 E. Main Street Reynoldsburg , Ohio 43068 United States	10/15/15 Project update via phone		10/15/15 via phone
OEPA	Central	Mike Mansour	(614) 644-3694	mike.mansour@epa.ohio.gov	Ohio EPA Central Office	12/09/14 meeting		
OEPA	Central	Dave Morehart	(614) 644-3601	dave.morehart@epa.ohio.gov	Ohio EPA Central Office	12/09/14 meeting		
OEPA	Northeast District	Ed Fasko	(330) 963-1161	ed.fasko@epa.ohio.gov	Ohio EPA Northeast District Office	12/10/14 meeting		
OEPA	Northeast District	Jana Gannon	(330) 963-1261	jana.gannon@epa.ohio.gov	Ohio EPA Northeast District Office	12/10/14 meeting		
OEPA	Northeast District	Kevin Fortune	(330) 963-1152	kevin.fortune@epa.ohio.gov	Ohio EPA Northeast District Office	12/10/14 meeting		
OEPA	Akron Regional Air Quality Management District	Sean Vadas	(330) 923-4891	svadas@schd.org	Akron Regional Air Quality Management District	12/10/14 meeting		
OEPA	Akron Regional Air Quality Management District	Kelly Kanoza	(330) 812-3954	kkanoza@schd.org	Akron Regional Air Quality Management District	12/10/14 meeting		
OEPA	Akron Regional Air Quality Management District	Duane LaClair	(330) 923-4891	dlaclair@schd.org	Akron Regional Air Quality Management District	12/10/14 meeting		
OEPA	Toledo Division of Environmental Services	Matt Stanfield	(419) 936-3938	matthew.stanfield@toledo.oh.gov	Toledo Division of Environmental Services	12/17/14 meeting		
OEPA	Central	Tiffani Kavalec, Assistant Chief	(614) 644-3538	Tiffany.Kavales@epa.ohio.gov	Ohio EPA Central Office	01/29/2015 via Letter	01/29/2015 letter via Fedex	
OEPA	Central	Harry Kallipolitis, OEPA Director	(614) 644-2146	harry.kallipolitis@epa.ohio.gov	Ohio EPA Central Office	09/25/15 Project update meeting		
OEPA	Northwest District	John Weaver and Archie Lunsey	(419) 352-8461	john.weaver@epa.ohio.gov archie.lunsey@epa.ohio.gov	Northwest District 347 N. Dunbridge Road Bowling Green, Ohio 43402	09/30/2015 via phone		09/30/2015 via phone

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Agency	**Office**	**Contact Name**	**Contact Phone**	**Contact Email**	**Contact Address**	**Initial Contact Date**	**Date Sent**	**Response Date/Type**
ODNR	Office of Real Estate	John Kessler, P.E. Assistant Chief	(614) 265-6621	john.kessler@dnr.state.oh.us	Ohio Department of Natural Resources, Office of Real Estate 2045 Morse Rd., Columbus, OH 43229-6605	09/18/14 via letter	09/18/14 via email	11/13/14 letter via email
ODNR	Division of Wildlife	Nathan Reardon, Compliance Coordinator	(614) 265-6741	Nathan.reardon@dnr.state.oh.us	ODNR - Division of Wildlife 2045 Morse Road, Bldg. G Columbus, OH 43229-6693	10/14/14 Introductory meeting		
ODNR	Ohio Coastal Management Program ODNR Office of Coastal Management	Steve Holland, MPA Federal Consistency Administrator	(419) 609-4104	steven.holland@dnr.state.oh.us	ODNR Office of Coastal Management 105 West Shoreline Drive Sandusky, Ohio 44870	11/25/15 via email	12/02/14 via email	12/02/14 via email and phone
ODNR	Division of Forestry and Maumee State Forest Manager	Gregg Maxfield and Don Schmenk	(419) 429-8310 and (419) 822-3052	Gregg.maxfield@dnr.state.oh.us and Donald.schmenk@dnr.state.oh.us	952 Lima Avenue, Box B Findlay, OH 45840	09/25/15 Project Update meeting		
ODNR	Division of Parks, Office of Real Estate, and Budget and Finance	Melissa Taylor Sarah Tebbe Ryan Frazee	(614) 265-6568, (614) 265-6397, and (614) 265 - 961	Melissa.taylor@dnr.state.oh.us, Sarah.tebbe@dnr.state.oh.us and Ryan.frazee@dnr.state.oh.us	Ohio Department of Natural Resources, Office of Real Estate 2045 Morse Rd., Columbus, OH 43229-6605	09/25/15 Project Update meeting		
SHPO	Ohio Office of Historic Preservation	Mark Epstein, Department Head, Resource Protection and Review	(614) 298-2000	mepstein@ohiohistory.org	Ohio Historic Preservation Office 800 E. 17th Avenue Columbus, Ohio 43211-2474	11/5/14 via letter	11/5/14 via US mail	
STATE - MICHIGAN								
MDNR	Wildlife Division	Lori Sargent	(517) 284-6216	sargentl@michigan.gov	Michigan Department of Natural Resources P.O. Box 30180 Lansing, MI 48909-7680	09/22/14 via letter	09/22/14 via email	09/23/14 via email
MDNR	Wildlife Division	Daniel Kennedy, Endangered Species Coordinator	(517) 284-6194	kennedyd@michigan.gov	Michigan DNR, Wildlife Division P.O. Box 30444 525 W. Allegan Lansing, MI 48909-7944	11/14/14 via email	11/14/14 via email	11/14/14 via email

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MDNR	Wildlife Division	Zach Cooley, Wildlife Biologist for Monroe and Wayne Counties	(734) 379-9692	cooleyz@michigan.gov		11/3/14 introductory meeting		
MDNR	Wildlife Division	Kristen Bissell, Wildlife Biologist for Lenawee and Washtenaw Counties	(517) 522-4097	bissellk@michigan.gov		11/3/14 introductory meeting		
MDNR	Wildlife Division	Sue Tangora, Statewide Invasive Species Coordinator	(517) 284-6223	tangoras@michigan.gov		11/14/14 via email	11/14/14 via email	
MNFI	Natural Features Inventory	Michael A. Sanders, Rare Species Review Specialist	(517) 284-6200	sander75@msu.edu	Michigan State University Extension 3rd Floor Constitution Hall 525 W. Allegan St. Lansing, MI 48933	09/23/14 via letter	09/23/14 via email	10/09/14 letter via email
MDEQ	Water Resources Division, Jackson District Office	Ms. Katherine David, Water Resources Division	(517) 780-7021	DAVIDK@michigan.gov	301 E. Louis Glick Highway Jackson, Michigan 49201	12/18/14 via letter	12/18/14 via FedEx	05/6/15 via letter
MDEQ	Water Resource Division, Lansing Office	Brant Fisher, Water Wellhead Protection Engineer	(517) 284-6515	fisherb@michigan.gov	525 W. Allegan Street Constitution Hall, Fourth Floor-South Lansing, Michigan 48933	10/22/15 via phone		10/22/15 via phone
SHPO	Michigan Office of Historic Preservation	Brian D. Conway, State Historic Preservation Officer	(517) 373-1630	Conwayb1@michigan.gov	Michigan State Housing Development Authority 702 W. Kalamazoo St. P.O. Box 30740 Lansing, Michigan 48909-8240	12/04/14	12/04/14 via US mail	
TRIBES								
Tribe	Absentee-Shawnee Tribe of Indians of Oklahoma	Joseph Blanchard, Cultural Preservation Director Tribal Historic Preservation Officer	(405) 275-4030, ext 203	joseph.blanchard@astribe.com	Absentee-Shawnee Tribe of Indians of Oklahoma 2025 S. Gordon Cooper Drive Shawnee, OK 74801	10/28/14 via letter	10/28/14 via USPS certified mail	

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Tribe	Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation	Michael Wiggins, Chairman	(715) 682-7111	hrmanager@badriver-nsn.gov	Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation P.O. Box 39 Odanah, WI 54861-0039	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation	Edith Leoso, Tribal Historic Preservation Officer	(715) 682-7111		Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation P.O. Box 39 Odanah, WI 54861-0039	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Bay Mills Indian Community	Levi Carrick, Sr., Chairman	(906) 248-3241		Bay Mills Indian Community 12140 W. Lakeshore Drive Brimley, MI 49715	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Bay Mills Indian Community	Paula Carrick, Tribal Historic Preservation Officer	(906) 248-8458	paulacarrick@baymills.org	Bay Mills Indian Community 12140 W. Lakeshore Drive Brimley, MI 49715	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Bois Forte Band (Nett Lake) of the Minnesota Chippewa Tribe	Kevin Leecy, Chairman	(218) 757-3261	kevin.leecy@boisforte-nsn.gov	Bois Forte Band (Nett Lake) of the Minnesota Chippewa Tribe P.O. Box 16 Nett Lake, MN 55772	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Bois Forte Band (Nett Lake) of the Minnesota Chippewa Tribe	Rosemary Berens, Tribal Historic Preservation Officer	(218) 757-3261	rozeberens@yahoo.com	Bois Forte Band (Nett Lake) of the Minnesota Chippewa Tribe P.O. Box 16 Nett Lake, MN 55772	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Chippewa-Cree Indians of the Rocky Boy's Reservation	Bruce Sunchild, Chairman	(406) 395-4282	bsunchild@yahoo.com	Chippewa-Cree Indians of the Rocky Boy's Reservation 31 Agency Square Box Elder, MT 59521	12/11/14 via letter	12/11/14 via USPS certified mail	

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Tribe	Chippewa-Cree Indians of the Rocky Boy's Reservation	Alvin Windy Boy, Tribal Historic Preservation Officer	(406) 352-3077	alvin@nei-yahw.com	Chippewa-Cree Indians of the Rocky Boy's Reservation P.O. Box 230 Box Elder, MT 59521	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Citizen Potawatomi Nation	John Barrett, Chairman	(405) 275-3121	rbarrett@potawatomi.org	Citizen Potawatomi Nation 1601 S. Gordon Cooper Drive Shawnee, OK 74801	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Citizen Potawatomi Nation	Kelli Mosteller, Tribal Historic Preservation Officer	(405) 878-5830	kelli.mosteller@potawatomi.org	Citizen Potawatomi Nation 1601 S. Gordon Cooper Drive Shawnee, OK 74801	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Delaware Nation	C.J. Watkins, Vice President	(405) 247-2448		Delaware Nation P.O. Box 825 Anadarko, OK 73005	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Delaware Nation	Tamara Francis-Fourkiller, Cultural Preservation Director	(405) 247-2448, ext 1180	tfrancis@delawarenation.com	Delaware Nation P.O. Box 825 Anadarko, OK 73005	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Delaware Tribe of Indians	Paula Pechonick, Chief	(918) 336-5272		Delaware Tribe of Indians 170 N Barbara Ave Bartlesville, OK 74003	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Delaware Tribe of Indians	Dr. Brice Obermeyer, Director, Tribal Historic Preservation Office	(620) 341-6699	bobermeyer@delawaretribe.org	Delaware Tribe of Indians Roosevelt Hall, Room 212 1200 Commercial Street Emporia, KS 66801	10/28/14 via letter	10/28/14 via USPS certified mail	11/17/14 via letter
Tribe	Eastern Shawnee Tribe of Oklahoma	Glenna J. Wallace, Chief	(918) 666-2435	gjwallace@estoo.net	Eastern Shawnee Tribe of Oklahoma P.O. Box 350 Seneca, MO 64865	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Eastern Shawnee Tribe of Oklahoma	Robin Dushane, Tribal Historic Preservation Officer	(918) 666-2435, ext 247	r.dushane@estoo.net	Eastern Shawnee Tribe of Oklahoma 12705 South 705 Road Wyandotte, OK 74370	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Fond du Lac Band of the Minnesota Chippewa Tribe	Karen Driver, Chairwoman	(218) 878-2612	karendriver@fdlrez.com	Fond du Lac Band of the Minnesota Chippewa Tribe 1720 Big Lake Road Cloquet, MN 55720	12/11/14 via letter	12/11/14 via USPS certified mail	

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Tribe	Fond du Lac Band of the Minnesota Chippewa Tribe	LeRoy Defoe, Tribal Historic Preservation Officer	(218) 878-7129	leroydefoe@fdlrez.com	Fond du Lac Band of the Minnesota Chippewa Tribe 1720 Big Lake Road Cloquet, MN 55720	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Forest County Potawatomi	Harold Frank, Chairman	(715) 478-7200		Forest County Potawatomi 5416 Everybody's Rd Crandon, WI 54520	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Forest County Potawatomi	Melissa Cook, Tribal Historic Preservation Officer	(800) 960-5479, ext 7248	melissa.cook@fcpotawatomi-nsn.gov	Forest County Potawatomi Cultural Center, Library & Museum 8130 Mishkoswen Drive PO Box 340 Crandon, WI 54520	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Grand Portage Band of the Minnesota Chippewa Tribe	Norman Deschampe, Chairman	(218) 475-2277	norman@grandportage.com	Grand Portage Band of the Minnesota Chippewa Tribe P.O. Box 428 Grand Portage, MN 55605	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Grand Portage Band of the Minnesota Chippewa Tribe	Mary Ann Gagnon, Tribal Historic Preservation Officer	(218) 475-0111	maryanng@grandportage.com	Grand Portage Band of the Minnesota Chippewa Tribe P.O. Box 428 Grand Portage, MN 55605	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Grand Traverse Band of Ottawa and Chippewa Indians	Derek J. Bailey, Chairperson	231-534-7750	derek.bailey@gtindians.com	Grand Traverse Band of Ottawa and Chippewa Indians 2605 North West Bayshore Drive Suttons Bay, MI 49682	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Hannahville Indian Community	Kenneth Meshigaud, Chairperson	(906) 466-2932		Hannahville Indian Community N14911 Hannahville B1 Rd Wilson, MI 49896	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Keweenaw Bay Indian Community	Donald Shalifoe, Sr. Ogimaa	(906) 353-6623	tcchris@kbic-nsn.gov	Keweenaw Bay Indian Community 16429 Beartown Road Baraga, MI 49908	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Keweenaw Bay Indian Community	Chris Chosa, Tribal Historic Preservation Officer	(906) 353-6272		Keweenaw Bay Indian Community 16429 Beartown Road Baraga, MI 49908	12/11/14 via letter	12/11/14 via USPS certified mail	

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Tribe	Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin	Michael Isham, Jr. Chairman	(715) 634-8934	terrikay@cheqnet.net	Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin 13394 West Trapania Road, Building No. 1 Hayward, WI 54843	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin	Jerry Smith, Tribal Historic Preservation Officer	(715) 634-8934		Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin 13394 West Trapania Road, Building No. 1 Hayward, WI 54843	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin	Tom Maulson, President	(715) 588-3303		Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin P.O. Box 67 Lac du Flambeau, WI 54538	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin	Melinda Young, Tribal Historic Preservation Officer	(715) 588-2139		Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin P.O. Box 67 Lac du Flambeau, WI 54538	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Lac Vieux Desert Band of Lake Superior Chippewa Indians	Alan Shively, Chairman	(906) 358-0137	jim.williams@lvdtribal.com	Lac Vieux Desert Band of Lake Superior Chippewa Indians P.O. Box 249 Watersmeet, MI 49969	12/11/14 via letter	12/11/14 via USPS certified mail	

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Tribe	Lac Vieux Desert Band of Lake Superior Chippewa Indians	Giiwegiizhigookway Martin, Tribal Historic Preservation Officer	(906) 358-4577	gmartin@lvdtribal.com	Lac Vieux Desert Band of Lake Superior Chippewa Indians P.O. Box 249 Watersmeet, MI 49969	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Leech Lake Band of the Minnesota Chippewa Tribe	Carrie Jones, Chairwoman	(218) 335-8200		Leech Lake Band of the Minnesota Chippewa Tribe 115 6th Street NW Suite E Cass Lake, MN 56633	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Leech Lake Band of the Minnesota Chippewa Tribe	Gina Lemon, Tribal Historic Preservation Officer			Leech Lake Band of the Minnesota Chippewa Tribe 115 6th Street NW Suite E Cass Lake, MN 56633	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Match-e-be-nash-she-wish Band of Potawatomi Indians of Michigan	David Sprague, Chairman	(616) 681-8830	dsprague@mbpi.org	Match-e-be-nash-she-wish Band of Potawatomi Indians of Michigan P.O. Box 218 Dorr, MI 49323	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Miami Tribe of Oklahoma	George Strack, Tribal Historic Preservation Officer	(918) 542-1442	gstrack@miamination.com	Miami Tribe of Oklahoma P.O. Box 1326 Miami, OK 74355	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Mille Lacs Band of the Minnesota Chippewa Tribe	Melanie Benjamin, Chief Executive	(320) 532-4181		Mille Lacs Band of the Minnesota Chippewa Tribe 43408 Oodena Drive Onamia, MN 56359	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Mille Lacs Band of the Minnesota Chippewa Tribe	Natalie Weyaus, Tribal Historic Preservation Officer	(320) 532-7450		Mille Lacs Band of the Minnesota Chippewa Tribe 43408 Oodena Drive Onamia, MN 56359	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Minnesota Chippewa Tribe	Norman Deschampe, President	(218) 335-8581		Minnesota Chippewa Tribe P.O. Box 217 Cass Lake, MN 56633	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Miami Tribe of Oklahoma	Douglas Lankford, Chief	(918) 542-1445	info@miamination.com	Miami Tribe of Oklahoma P.O. Box 1326 Miami, OK 74355	10/28/14 via letter	10/28/14 via USPS certified mail	

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Tribe	Nottawaseppi Huron Band of the Potawatomi	Homer Mandoka, Chairman	(269) 729-5151	hmandoka@nhbpi.com	Nottawaseppi Huron Band of the Potawatomi 2221 1 1/2 Mile Road Fulton, MI 49052	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Nottawaseppi Huron Band of the Potawatomi	Jeff Chivis, Tribal Historic Preservation Officer	(269) 704-8416	jchivis@nhbpi.com	Nottawaseppi Huron Band of the Potawatomi 1485 Mno-Bmadzewen Way Fulton, MI 49052	12/16/14 via letter	12/16/14 via USPS certified mail	12/4/14 via email and letter
Tribe	Ottawa Tribe of Oklahoma	Ethel Cook, Chief	(918) 542-6162	adawetribe@sbcglobal.net	Ottawa Tribe of Oklahoma P.O. Box 110 Miami, OK 74354	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Ottawa Tribe of Oklahoma	Rhonda Dixon, Tribal Historic Preservation Officer	(918) 542-6162	dixon_rhonda@sbcglobal.net	Ottawa Tribe of Oklahoma P.O. Box 110 Miami, OK 74354	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Peoria Tribe of Indians of Oklahoma	John P. Froman, Chief	918-540-4155	jfroman@peoriatribe.com	Peoria Tribe of Indians of Oklahoma P.O. Box 1527 Miami, OK 74355	10/28/14 via letter	10/28/14 via USPS certified mail	11/7/14 via letter
Tribe	Pokagon Band of Potawatomi Indians	Matthew J. Wesaw, Chairman	(517) 719-5579	matthew.wesaw@pokagonband-nsn.gov	Pokagon Band of Potawatomi Indians P.O. Box 110 Dowagiac, MI	10/28/14 via letter	10/28/14 via USPS certified mail	11/26/14 Via email
Tribe	Pokagon Band of Potawatomi Indians	Mike Zimmerman, Tribal Historic Preservation Officer	(269) 782-9602	michael.zimmerman@pokagonband-nsn.gov	Pokagon Band of Potawatomi Indians P.O. Box 110 Dowagiac, MI	10/28/14 via letter	10/28/14 via USPS certified mail	11/26/14 Via email
Tribe	Prairie Band of Potawatomi Nation	Steve Ortiz, Chairman	(785) 966-4000		Prairie Band of Potawatomi Nation 16277 Q Road Mayetta, KS 66509	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Quechan Tribe of the Fort Yuma Indian Reservation	Mike Jackson, President	(760) 572-0213		Quechan Tribe of the Fort Yuma Indian Reservation P.O. Box 1899 Yuma, AZ 85366	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin	Rose Gurnoe-Soulier, Chairperson	(715) 779-3700	webmaster@redcliff-nsn.gov	Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin 88385 Pike Road, Hwy 13 Bayfield, WI 54814	12/11/14 via letter	12/11/14 via USPS certified mail	

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Tribe	Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin	Larry Balber, Tribal Historic Preservation Officer	(715) 779-3650		Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin 88385 Pike Road, Hwy 13 Bayfield, WI 54814	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Red Lake Band of Chippewa Indians	Floyd Jourdain, Chairperson	(218) 679-3341		Red Lake Band of Chippewa Indians P.O. Box 550 Redlake, MN 56671	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Saginaw Chippewa Indian Tribe of Michigan	Dennis V. Kequom, Chief	(989) 775-4000	dkequom@sagchip.org	Saginaw Chippewa Indian Tribe of Michigan 7070 East Broadway Road Mt. Pleasant, MI 48858	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Saginaw Chippewa Indian Tribe of Michigan	William Johnson, Curator	(989) 775-4730	wjohnson@sagchip.org	Ziibwing Center of Anishinabe Culture and Lifeways 6650 East Broadway Road Mt. Pleasant, MI 48858	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Sault Ste. Marie Tribe of Chippewa Indians of Michigan	Aaron Payment, Chairperson	(906) 635-6050	aaronpayment@saulttribe.net	Sault Ste. Marie Tribe of Chippewa Indians of Michigan 523 Ashmun Street Sault Ste. Marie, MI 49783	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Seneca-Cayuga Tribe of Oklahoma	LeRoy Howard, Chief	(918) 542-6609, ext 19		Seneca-Cayuga Tribe of Oklahoma 23701 South 655 Road Grove, OK 74344	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Seneca-Cayuga Tribe of Oklahoma	Paul Barton, Tribal Historic Preservation Officer	(918) 787-7979	pbarton@sctribe.com	Seneca-Cayuga Tribe of Oklahoma 23701 South 655 Road Grove, OK 74344	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Seneca Nation of Indians	Beverly Cook, President			Seneca Nation of Indians 90 O:hi'yoh Way Salamanca, NY 14779	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Seneca Nation of Indians	Melissa Bach, Tribal Historic Preservation Officer	(716) 945-1790, ext 3580	melissa.bach@sni.org	Seneca Nation of Indians 90 O:hi'yoh Way Salamanca, NY 14779	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Shawnee Tribe	Ron Sparkman, Chairperson	(918) 542-2441	ronded@gmail.com	Shawnee Tribe P.O. Box 189 South Highway 69A, Miami, OK 74355	10/28/14 via letter	10/28/14 via USPS certified mail	

APPENDIX C- Stakeholder List – Non-Landowners, Federal, State, and Local Agency Contacts								
Agency	**Office**	**Contact Name**	**Contact Phone**	**Contact Email**	**Contact Address**	**Initial Contact Date**	**Date Sent**	**Response Date/Type**
Tribe	Shawnee Tribe	Kim Jumpers, Tribal Historic Preservation Officer	(918) 542-2441	kim.jumper@shawnee-tribe.com	Shawnee Tribe P.O. Box 189 South Highway 69A, Miami, OK 74355	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Sokaogon Chippewa Community	Garland McGeshick, Chairman	(715) 478-7504	gaye.graham@scc-nsn.gov	Sokaogon Chippewa Community 3051 Sand Lake Road Crandon, WI 54520	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	St. Croix Chippewa Indians of Wisconsin	Stuart Bearheart, Chairman	(715) 349-2195	annb@stcroixtribalcenter.com	St. Croix Chippewa Indians of Wisconsin 24663 Angeline Avenue Webster, WI 54893	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Tonawanda Band of Seneca Indians of New York	Darwin Hill, Chief	(716) 542-4244	tonseneca@aol.com	Tonawanda Band of Seneca Indians of New York P.O. Box 795 7027 Meadville Road Basom, NY 14013	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Turtle Mountain Band of Chippewa Indians of North Dakota	Richard McCloud, Chairman	(701) 477-2600		Turtle Mountain Band of Chippewa Indians of North Dakota P.O. Box 900 Belcourt, ND 58316	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	White Earth Band of Minnesota Chippewa Tribe	Erma Vizenor, Chairman	(218) 983-3285	desiraes@whiteearth.com	White Earth Band of Minnesota Chippewa Tribe P.O. Box 418 White Earth, MN 56591	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	White Earth Band of Minnesota Chippewa Tribe	Renee Lampi, Tribal Historic Preservation Officer	(218) 983-3263		White Earth Band of Minnesota Chippewa Tribe P.O. Box 418 White Earth, MN 56591	12/11/14 via letter	12/11/14 via USPS certified mail	
Tribe	Wyandotte Nation	Billy Friend, Chief	(918) 678-2297		Wyandotte Nation 64700 E. Highway 60 Wyandotte, OK 74370	10/28/14 via letter	10/28/14 via USPS certified mail	
Tribe	Wyandotte Nation	Sherri Clemons, Tribal Historic Preservation Officer	(918) 678-2297, ext 244	sclemons@wyandotte.org	Wyandotte Nation 64700 E. Highway 60 Wyandotte, OK 74370	10/28/14 via letter	10/28/14 via USPS certified mail	

Appendix D: Agency Permits and Approvals

APPENDIX D - NEXUS Project Agency Permits and Approvals

Agency	Permit/Approval/ Consultation	Contact	Consultation Initiated a/	Report/ Application Submitted	Anticipated Approval Date
FEDERAL					
Federal Energy Regulatory Commission	Certificate of Public Convenience and Necessity - Section 7(c) of the Natural Gas Act requires preparation of an ER (consisting of 12 Resource Reports) to be included with the Section 7(c) application. NEXUS used FERC's Pre-filing Process which involved conducting public open houses, preparation of responses to comments received on the Project during early scoping, and preparation of draft and final Resource Reports. Following submittal of the ER, support activities include responding to FERC staff data requests, reviewing FERC's EIS and preparing the Implementation Plan.	Joanne Wachholder, FERC Project Manager	17 Dec 14 introductory meeting	20 Nov 15 Certificate Application	
U.S. Army Corps of Engineers ("USACE"): Buffalo, Pittsburgh, Huntington, and Detroit Districts	Dredge and Fill Permit under Section 10 of the Rivers and Harbors Act of 1899 (33 USC § 403)	Shawn Blohm, Buffalo District NEXUS designated point of contact Tyler Bintrim, Pittsburgh District Regulatory Branch Mark Taylor, Huntington District Chief, Energy Resources Stanley F. Cowton, Jr., Detroit District Regulatory Project Manager	31 Oct 14 introductory letter 14 Jan 15 introductory meeting update meeting Buffalo District 13 Aug 15	Planned Dec 2015	
	Dredge and Fill Permit under Section 404 of the Clean Water Act (33 USC § 1344)			Planned Dec 2015	
United States Department of the Interior, U.S. Fish and Wildlife Service, Midwest Region 3 (Columbus, OH and East Lansing, MI Field offices)	Consultation under Section 7 of the Endangered Species Act	Chris Mensing, Fish and Wildlife Biologist Burr Fisher, Wildlife Biologist Angela Boyer, Endangered Species Coordinator	18 Sept 14 introductory letter 07 Oct 15 Columbus Ohio Field Office introductory meeting 12 Nov 14 East Lansing Field Office	20 Nov 15	
	Coordination per the Migratory Bird Treaty Act; and the Fish and Wildlife Coordination Act (16 USC §§ 661 et seq.)				

APPENDIX D - NEXUS Project Agency Permits and Approvals

Agency	Permit/Approval/ Consultation	Contact	Consultation Initiated a/	Report/ Application Submitted	Anticipated Approval Date
			introductory meeting		
U.S. Department of the Interior, National Park Service	Wild and Scenic Rivers Act Section 7(a) Determination	Mark Weekly, Deputy Regional Director	31 Oct 14 introductory letter	20 Nov 15	
U. S. Environmental Protection Agency ("EPA"), Region 3	Spill Prevention, Control and Countermeasures Plan (33 USC § 1321(j) and 40 CFR § 112)	Kenneth A. Westlake, Chief	31 Oct 14 introductory letter	20 Nov 15	
	Section 404 of the CWA (USEPA review of wetland permits issued by the USACE)				
	Determination of General Conformity Applicability				
National Marine Fisheries Service ("NMFS")	Federal Endangered Species Act	Donna Wieting, Director, Office of Protected Resources	31 Oct 14 introductory letter	20 Nov 15	
	Magnuson-Stevens Fishery Conservation and Management Act				
U.S. Department of Agriculture Natural Resources Conservation Service ("NRCS")	Restoration Consultation and potential Agricultural Impact Mitigation Agreement, Invasive Plant Species	Dan Kenny, Assistant Chief of Plant Health		20 Nov 15	
Advisory Council on Historic Preservation and Consultation with Native American Tribes	Section 106 Consultation, National Historic Preservation Act ("NHPA") - Section 106 Consultation	Mark Epstein, Department Head, Resource Protection and Review	5 Nov 14 Ohio SHPO introductory letter	20 Nov 15	
		Brian D. Conway, State Historic Preservation Officer ("SHPO")	4 Dec 14 Michigan SHPO introductory letter	20 Nov 15	
STATE					
Ohio					
Ohio Environmental Protection Agency ("OEPA")	Section 401 Water Quality Certification	Mike Mansour, Central Harry Kallipolitis, Central	9, 10 and 17 Dec 14 introductory meetings Update meeting 25 Sept 15	Planned for Dec. 2015	
	Clean Air Act, Air Permit-to-Install-and-Operate	Dave Morehart, Central		14 July 15 compressor stations	
				10 Sept 15 M&R 1, 2,	

APPENDIX D - NEXUS Project Agency Permits and Approvals					
Agency	**Permit/Approval/ Consultation**	**Contact**	**Consultation Initiated a/**	**Report/ Application Submitted**	**Anticipated Approval Date**
				and 3	
	NPDES Hydrostatic Test	Jana Gannon, Northeast		Planned for 2016	
		Kevin Fortune, Northeast Sean Vadas, Akron Regional Kelly Kanoza,Akron Regional Duane LaClair, Akron Regional Matt Stanfield, Toledo			
Ohio Department of Natural Resources (“ODNR”)	Consultation on Threatened and Endangered Species	John Kessler, P.E. Assistant Chief	18 Sep 14 introductory letter	20 Nov 15	
	Water Withdrawal Facility Registration (>100,000 gallons per day) Coastal Management Zone Determination	Steve Holland, MPA Federal Consistency Administrator	2 Dec 14 introductory email and phone call Update meeting 25 Sept 15	Planned for 2016 Planned for Dec. 2015	
Ohio Historic Preservation Office	Section 106 NHPA Consultation	Mark Epstein, Department Head, Resource Protection and Review	5 Nov 14 Ohio SHPO introductory letter	20 Nov 15	
Michigan					
Michigan Department of Natural Resources (“MDNR”), Wildlife Division	State listed species consultation	Lori Sargent, Wildlife Division	22 Sep 14 introductory letter	20 Nov 15	
	Public Lands consultation, Permit to Use State Lands				
Michigan Department of Environmental Quality (“MDEQ”), Water Resources Division	MDEQ/USACE Joint Permit for impacts to wetlands, inland lakes, streams and floodplains NPDES Permit for Storm Water Discharge from Construction Activities Water Withdrawal Authorization	Katherine David, Jackson District Office	18 Dec 14 introductory letter	Planned Dec. 2015	
	Possible permit to install for facility meter station air emissions				
Michigan Natural Resources Inventory (“MNRI”)	State-listed threatened and endangered species consultations	Michael A. Sanders, Rare Species Review Specialist	23 Sep 14 introductory letter	20 Nov 15	
Michigan State Housing and Development Authority (“MSHDA”) – Michigan Office of Historic Preservation	Section 106 NHPA Consultation	Brian D. Conway, SHPO	4 Dec 14 Michigan SHPO introductory letter	20 Nov 15	

Appendix E: Stakeholder List -- Non-Landowners - Public Officials, Community and Public Interest Groups and Non-Governmental Organizations

Public Officials – Michigan

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip Code
David	Stimpson	Lenawee	County Commissioner		301 North Main Street	Adrian	MI	49221
John	Lapham	Lenawee	County Commissioner		301 North Main Street	Adrian	MI	49221
Jim	Driskill	Lenawee	County Commissioner		301 North Main Street	Adrian	MI	49221
Cletus	Smith	Lenawee	County Commissioner		301 North Main Street	Adrian	MI	49221
Karol	Bolton	Lenawee	County Commissioner		301 North Main Street	Adrian	MI	49221
Terry	Collins	Lenawee	County Commissioner		301 North Main Street	Adrian	MI	49221
Bob	Knoblauch	Lenawee	County Commissioner		301 North Main Street	Adrian	MI	49221
Ralph	Tillotson	Lenawee	County Commissioner		301 North Main Street	Adrian	MI	49221
Martin	Marshall	Lenawee	County Administrator		301 North Main Street	Adrian	MI	49221
Dale	Zorn	Lenawee	State Senator		P.O. Box 30036	Lansing	MI	48909
Brett	Roberts	Lenawee	State Representative		P.O. Box 30014	Lansing	MI	48909
Nancy	Jenkins	Lenawee	State Representative		P.O. Box 30014	Lansing	MI	48909
Richard	Marks	Lenawee	Town Supervisor	Ogden Township	10526 Pence Hwy	Blissfield	MI	49228
Eric	Martis	Lenawee	Trustee	Ogden Township	8612 E. Mulberry Rd. Blissfield, MI 49228	Blissfield	MI	49228
Mark	Vandenbusc he	Lenawee	Trustee	Ogden Township	6672 E. Weston Rd.	Blissfield	MI	49228
Jim	Isley	Lenawee	Town Supervisor	Palmyra Township	2683 Grosvenor Highway	Palmyra	MI	49268
Steve	Papenhagen	Lenawee	Trustee	Palmyra Township	5765 Palmyra Road	Palmyra	MI	49268
Perry	Pooley	Lenawee	Trustee	Palmyra Township	4594 Ogden Highway	Adrian	MI	49221
Bruce	Carter	Lenawee	Town Supervisor	Blissfield Township	120 S. Lane Street P.O.Box 58	Blissfield	MI	49228
Reed	Mapstone	Lenawee	Trustee	Blissfield Township	120 S. Lane Street P.O. Box 58	Blissfield	MI	49228

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip Code
OPEN	OPEN	Lenawee	Trustee	Blissfield Township	120 S. Lane Street P.O. Box 58	Blissfield	MI	49228
Ron	Cousino	Lenawee	Town Supervisor	Deerfield Township	392 East River Street	Deerfield	MI	49238
Joseph	Fowler	Lenawee	Trustee	Deerfield Township	P.O. Box 176	Deerfield	MI	49238
Daniel	Witt	Lenawee	Trustee	Deerfield Township	2352 Stearns Road	Deerfield	MI	49238
Lee	Wagner	Lenawee	Town Supervisor	Macon Township	9620 Smith Road	Tecumseh	MI	49286
David	Wielfaert	Lenawee	Trustee	Macon Township	12922 Milwaukee Road	Britton	MI	49229
Ed	Clark	Lenawee	Trustee	Macon Township	11852 Tecumseh-Macon Road	Clinton	MI	49236
Robert	Downing	Lenawee	Town Supervisor	Ridgeway Township	6666 North County Line Highway	Britton	MI	49229
Marc	Brown	Lenawee	Trustee	Ridgeway Township	7583 Hendershot Highway	Tecumseh	MI	49286
Daniel	Prielipp	Lenawee	Trustee	Ridgeway Township	4651 Downing Road	Britton	MI	49229
Jennifer	Escott	Lenawee	Drain Commissioner	Lenawee County			MI	
David	Hoffman	Monroe	County Commissioner		125 East Second Street	Monroe	MI	48161
Mark	Brant	Monroe	County Commissioner		4929 Blue Bush	Monroe	MI	48162
Al	Potratz	Monroe	County Commissioner		4848 S. Huron River	Flat Rock	MI	48134
Dan	Donahue	Monroe	County Commissioner		733 E. Hurd Road	Monroe	MI	48161
Jason	Turner	Monroe	County Commissioner		125 East Second Street	Monroe	MI	48161
Jerry	Oley	Monroe	County Commissioner		125 East Second Street	Monroe	MI	48161
Gary	Wilmoth	Monroe	County Commissioner		3635 Luna Pier Road	Erie	MI	48133
Mark	Ellsworth	Monroe	County Commissioner		1421 Winding Way	Temperance	MI	48182
Michael	Bosanac	Monroe	County Administrator		125 East Second Street	Monroe	MI	48161
J. Henry	Lievens	Monroe	County Commissioner		125 East Second Street	Monroe	MI	48161
Dale	Zorn	Monroe	State Senator		P.O. Box 30036	Lansing	MI	48909
Phil	Heath	Monroe	Town Supervisor	Milan Township	16444 Cone Road	Milan	MI	48160
Olga	Mancik	Monroe	Trustee	Milan Township	16444 Cone Road	Milan	MI	48160
Bob	Dopkowski	Monroe	Trustee	Milan Township	1644 Cone Road	Milan	MI	48160
Jade	Smith	Monroe	Administrator	City of Milan	147 Wabash	Milan	MI	48160
David	Thompson	Monroe	Drain Commissioner	Monroe County				
Dan	Minton	Monroe	Road Commissioner	Monroe County	840 S Telegraph Road	Monroe	MI	48161

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip Code
Warren	Evans	Wayne	County Executive	Wayne County	Office of the Wayne County Executive 500 Griswold, 31st Floor	Detroit	MI	48226
Al	Haidous	Wayne	County Commissioner	Wayne County	500 Griswold St. 7th Floor	Detroit	MI	48226
Patrick	Colbeck	Wayne	State Senator		P.O. Box 30036	Lansing	MI	48909-7536
Kristy	Pagan	Wayne	State Representative		P.O. Box 30014	Lansing	MI	48909-7514
Hoon	Young-Hopgood	Wayne	State Senator		P.O. Box 30036	Lansing	MI	48909-7536
Linda	Combs	Van Buren Township	Supervisor			Van Buren Township	MI	48111
Kent	Martinez-Kratz	Washtenaw	County Commissioner		6980 Old Forge Court	Chelsea	MI	48118
Dan	Smith	Washtenaw	County Commissioner		328 N. Pointe Drive	Whitmore Lake	MI	48189
Alicia	Ping	Washtenaw	County Commissioner		307 N Harris	Saline	MI	48104
Felicia	Brabec	Washtenaw	County Commissioner		220 North Main Street	Ann Arbor	MI	48104
Ruth Ann	Jamnick	Washtenaw	County Commissioner		7776 Lake Crest Drive	Ypsilanti	MI	48197
Ronnie	Peterson	Washtenaw	County Commissioner		1146 Rue Willette Blvd	Ypsilanti	MI	48198
Andy	LaBarre	Washtenaw	County Commissioner		2411 Meadowridge Crt	Ann Arbor	MI	48105
Yousef	Rabhi	Washtenaw	County Commissioner		1255 Kensington Drive	Ann Arbor	MI	48104
Conan	Smith	Washtenaw	County Commissioner		234 Eighth	Ann Arbor	MI	48103
Verna	McDaniel	Washtenaw	County Administrator		220 North Main Street	Ann Arbor	MI	48104
Adam	Zemke	Washtenaw	State Representative		P.O. Box 30014	Lansing	MI	48909
David	Rutledge	Washtenaw	State Representative		P.O. Box 30014	Lansing	MI	48909
Rebekah	Warren	Washtenaw	State Senator		P.O. Box 30036	Lansing	MI	48909
Jeff	Irwin	Washtenaw	State Representative		P.O.Box 30014	Lansing	MI	48909
John	Stanowski	Washtenaw	Town Supervisor	York Township	11560 Stony Creek Road	Milan	MI	48160
Jill	Hargrove	Washtenaw	Trustee	York Township	11560 Stony Creek Road	Milan	MI	48160
Brian	Iott	Washtenaw	Trustee	York Township	11560 Stony Creek Road	Milan	MI	48160
Jane	Kartje	Washtenaw	Trustee	York Township	11560 Stony Creek Road	Milan	MI	48160
Dan	Pichla	Washtenaw	Trustee	York Township	11560 Stony Creek Road	Milan	MI	48160

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip Code
Pete	Hafler	Washtenaw	Supervisor	Augusta Township	P.O. Box 100	Whittaker	MI	48190
Cath	Howard	Washtenaw	Trustee	Augusta Township	P.O. Box 100	Whittaker	MI	48190
Joe	Keefe	Washtenaw	Trustee	Augusta Township	P.O. Box 100	Whittaker	MI	48190
Judy	Thornton	Washtenaw	Trustee	Augusta Township	P.O. Box 100	Whittaker	MI	48190
Ira	Todd	Washtenaw	Trustee	Augusta Township	P.O. Box 100	Whittaker	MI	48190
Larry	Doe	Washtenaw	Treasurer	Ypsilanti Township	7200 South Huron River Drive	Ypsilanti	MI	48197
Brenda	Stumbo	Washtenaw	Trustee	Ypsilanti Township	7200 South Huron River Drive	Ypsilanti	MI	48197
Jean	Hall Currie	Washtenaw	Trustee	Ypsilanti Township	7200 South Huron River Drive	Ypsilanti	MI	48197
Mike	Martin	Washtenaw	Trustee	Ypsilanti Township	7200 South Huron River Drive	Ypsilanti	MI	48197
Scott	Martin	Washtenaw	Trustee	Ypsilanti Township	7200 South Huron River Drive	Ypsilanti	MI	48197
Stan	Eldridge	Washtenaw	Trustee	Ypsilanti Township	7200 South Huron River Drive	Ypsilanti	MI	48197
Jeff	Allen	Washtenaw	Residential Services Manager	Ypsilanti Township	7200 S. Huron River Dr.	Ypsilanti	MI	48197
Eric	Copeland	Washtenaw	Fire Chief	Ypsilanti Township	7200 S. Huron River Dr.	Ypsilanti	MI	48197
Scott	Miller	Washtenaw	Drain Commissioner	Washtenaw County	705 N. Zeeb Rd. P.O. Box 8645	Ann Arbor	MI	48107
Tim	Walberg	Lenawee, Monroe, Washtenaw	US Representative		110 First Street, Suite 2	Jackson	MI	49201
Debbie	Dingell	Washtenaw Wayne	US Representative		19855 West Outer Drive, Suite 103-E	Dearborn	MI	48124
Debbie	Stabenow		US Senator		221 West Lansing Road, Suite 100	East Lansing	MI	48823
Gary	Peters		US Senator		Patrick V. McNamara Federal Building 477 Michigan Avenue Suite 1860	Detroit	MI	48826
Rick	Snyder		Governor		P. O. Box 30013	Lansing	MI	48909

Public Officials – Ohio

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
Jeffrey	Ohler	Carroll County	County Commissioner	879 Courtview Dr		Carrollton	OH	44615
Thomas	Wheaton	Carroll County	County Commissioner	4082 Perth Rd SE		Carrollton	OH	44615
Robert	Wirkner	Carroll County	County Commissioner	2072 Brenner Rd NE		Carrollton	OH	44615
Curtis	Frase	Carroll County	East Township Trustee	8156 Mark Rd NE		Kensington	OH	44427
Richard	Miller	Carroll County	East Township Trustee	5210 Meadow Rd NE		Kensington	OH	44427
Russell	Shipley	Carroll County	East Township Trustee	9099 Apollo Rd NE		Kensington	OH	44427
Michael	Halleck	Columbiana County	County Commissioner	2096 Country Side Dr		Salem	OH	44460
James	Hoppel	Columbiana County	County Commissioner	50499 Calcutta Smith Ferry Rd		E Liverpool	OH	43920
Timothy	Weigle	Columbiana County	County Commissioner	49498 England Dr		E Palestine	OH	44413
Bert	Dawson	Columbiana County	County Engineer	50487 Fisher Ave		E Liverpool	OH	43920
Robert	Manfull	Columbiana County	Hanover Township Trustee	29209 Manfull Lake Rd		Kensington	OH	44427
Mancil	Ridgeway	Columbiana County	Hanover Township Trustee	10554 Mechanicstown Rd		Hanoverton	OH	44423
John	Zehentbauer	Columbiana County	Hanover Township Trustee	P.O. Box 304	10786 Lindesmith Rd	Hanoverton	OH	44423
Gregory	Carver	Columbiana County	Knox Township Trustee	4038 Homeworth Rd		Homeworth	OH	44634
Sara	Crawford	Columbiana County	Knox Township Trustee	26026 Hartley Rd		Beloit	OH	44609
Benjamin	Pidgeon	Columbiana County	Knox Township Trustee	27625 SR 62		Beloit	OH	44609
Dale	Lowmiller	Columbiana County	West Township Trustee	23980 SR 172		Minerva	OH	44657

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
Richard	Mcclellan	Columbiana County	West Township Trustee	22502 Mc Daniel Rd		Minerva	OH	44657
Glenn	Whiteleather	Columbiana County	West Township Trustee	8008 Essick Rd		Minerva	OH	44657
Rick	Jeffrey	Erie County	Auditor	247 Columbus Ave.	Rm. 210	Sandusky	OH	44870
Mathew	Old	Erie County	Berlin Township Trustee	12101 St. Rt. 61		Berlin Heights	OH	44814
Tadd	Smith	Erie County	Berlin Township Trustee	12101 St. Rt. 61		Berlin Heights	OH	44814
John	Zarvis	Erie County	Berlin Township Trustee	12101 St. Rt. 61		Berlin Heights	OH	44814
Thomas	Ferrell, Jr.	Erie County	Commissioner	2900 Columbus Ave		Sandusky	OH	44870
Bill	Monaghan	Erie County	Commissioner	2900 Columbus Ave		Sandusky	OH	44870
Patrick	Shenigo	Erie County	Commissioner	2900 Columbus Ave		Sandusky	OH	44870
John	Farschman	Erie County	Engineer	2700 Columbus Ave		Sandusky	OH	44870
John	Krumweide	Erie County	Florence Township Trustee	11011 Chapel St		Wakeman	OH	44889
Orville	Sayler	Erie County	Florence Township Trustee	11011 Chapel St		Wakeman	OH	44889
Raymond	Skip Halliwell	Erie County	Florence Township Trustee	11011 Chapel St		Wakeman	OH	44889
Ron	Brown	Erie County	Groton Township Trustee	1820 Bogart Rd.		Huron	OH	44839
Roger	Rowland	Erie County	Groton Township Trustee	1820 Bogart Rd.		Huron	OH	44839
Roger	Russell	Erie County	Groton Township Trustee	1820 Bogart Rd.		Huron	OH	44839
Daniel	Frederick	Erie County	Milan Township Trustee	1518 St. Rt 113		Milan	OH	44846
Frank	Lytle	Erie County	Milan Township Trustee	1518 St. Rt 113		Milan	OH	44846
Jim	Verbridge	Erie County	Milan Township Trustee	1518 St. Rt 113		Milan	OH	44846
Sparky	Weilnau	Erie County	Milan Township Trustee	1518 St. Rt. 113		Milan	OH	44846
Scott	Leber	Erie County	Oxford Township Trustee	11104 Ransom Rd		Monroeville	OH	44847

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
Michael	Parker	Erie County	Oxford Township Trustee	11104 Ransom Rd		Monroeville	OH	44847
James	Stewart	Erie County	Oxford Township Trustee	11104 Ransom Rd		Monroeville	OH	44847
Barbara	Sessler	Erie County	Recorder	247 Columbus Ave.	Suite 225	Sandusky	OH	44870
Vond	Hall	Fulton County	Administrator	152 S. Fulton St. #270		Wauseon	OH	43567
Thomas	Herr, Jr.	Fulton County	Amboy Township Trustee	2650 Co. Rd. S		Metamora	OH	43540
Richard	Raab	Fulton County	Amboy Township Trustee	2650 Co. Rd. S		Metamora	OH	43540
Jeff	Simon	Fulton County	Amboy Township Trustee	2650 Co. Rd. S		Metamora	OH	43540
Brett	Kolb	Fulton County	Auditor	152 S. Fulton St.	Suite 165	Wauseon	OH	43567
Paul	Barnaby	Fulton County	Commissioner	152 S. Fulton St.	Suite 270	Wauseon	OH	43567
Bill	Rufenacht	Fulton County	Commissioner	152 S. Fulton St.	Suite 270	Wauseon	OH	43567
Perry (Jeffrey)	Rupp	Fulton County	Commissioner	152 S. Fulton St.	Suite 270	Wauseon	OH	43567
Cheryl	Geer	Fulton County	Council	P.O. Box 299		Metamora	OH	43540
John	Hudik	Fulton County	Council	P.O. Box 299		Metamora	OH	43540
Karon	Lane	Fulton County	Council	P.O. Box 299		Metamora	OH	43540
Ned	Monroe	Fulton County	Council	P.O. Box 299		Metamora	OH	43540
Suzie	Stough	Fulton County	Council	P.O. Box 299		Metamora	OH	43540
Ken	Wysong	Fulton County	Council	P.O. Box 299		Metamora	OH	43540
Frank	Onweller	Fulton County	Engineer	9120 Co. Rd. 14		Wauseon	OH	43567
Scott	Gillen	Fulton County	Fulton Township Trustee	1613 County Rd. N		Swanton	OH	43558
Joe	Gombash	Fulton County	Fulton Township Trustee	9241 County Rd. 1		Swanton	OH	43558
Bernard Francis	Wanner	Fulton County	Fulton Township Trustee	9750 County Rd. 5-2		Delta	OH	43515
Gary	Loar	Fulton County	Mayor	P.O. Box 299		Metamora	OH	43540
Sandra	Barber	Fulton County	Recorder	152 S. Fulton St.	Suite 175	Wauseon	OH	43567
Roy	Miller	Fulton County	Sheriff	129 Courthouse Plaza		Wauseon	OH	43567
Ron	Holdeman	Fulton County	Swancreek Township Trustee	5565 Co. Rd. D		Delta	OH	43515
Rick	Kazmierczak	Fulton County	Swancreek Township Trustee	5565 Co. Rd. D		Delta	OH	43515

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
Pamela	Moore	Fulton County	Swancreek Township Trustee	5565 Co. Rd. D		Delta	OH	43515
Charlene	Lee	Fulton County	Treasurer	152 S. Fulton St.	Suite 155	Wauseon	OH	43567
Paul	Dzyak	Fulton County	Village of Swanton	219 Chestnut Street		Swanton	OH	43558
Tamara	Haselman	Fulton County	Village of Swanton	219 Chestnut Street		Swanton	OH	43558
Gary	Moore	Fulton County	Village of Swanton	219 Chestnut Street		Swanton	OH	43558
Jim	Piotrowski	Fulton County	Village of Swanton	219 Chestnut Street		Swanton	OH	43558
Michael	Rochelle	Fulton County	Village of Swanton	219 Chestnut Street		Swanton	OH	43558
Craig	Rose	Fulton County	Village of Swanton	219 Chestnut Street		Swanton	OH	43558
Ann	Roth	Fulton County	Village of Swanton	219 Chestnut Street		Swanton	OH	43558
Kevin	Garringer	Henry County	Auditor	632 Briarhearth		Napoleon	OH	43545
Bob	Hastedt	Henry County	Commissioner	10906 County Rd. H		Hamler	OH	43524
Glenn	Miller	Henry County	Commissioner	513 W. Washington St.		Napoleon	OH	43545
Thomas	Von Deylen	Henry County	Commissioner	T752 SR 108		Napoleon	OH	43545
Timothy	Schumm	Henry County	Engineer	12421 County Rd. P3		Napoleon	OH	43545
Mike	Bodenbender	Henry County	Sheriff	Q214 County Rd. 8		Napoleon	OH	43545
Terry	Miller	Henry County	Washington Township Trustee	6665 County Rd. T		Liberty Center	OH	43532
John	Patrick	Henry County	Washington Township Trustee	4321 County Rd. V		Liberty Center	OH	43532
Julian	Westhoven	Henry County	Washington Township Trustee	S051 Sounty Rd. 3B		Liberty Center	OH	43532
Roland	Tkach	Huron County	Auditor	4655 SR 60 N.		Wakeman	OH	44889
Gary	Bouer	Huron County	Commissioner	677 W. South Norwalk Rd.		Norwalk	OH	44857
Tom	Dunlap	Huron County	Commissioner	11 Rosedale Dr.		Norwalk	OH	44857
Joe	Hintz	Huron County	Commissioner	10 E. Quail Hollow Dr.		Norwalk	OH	44857
Joseph	Kovach	Huron County	Engineer	158 Fairway Circle		Norwalk	OH	44857
Dane	Howard	Huron County	Sheriff	123 First St.		New London	OH	44851
Carroll	Butler	Huron County	Wakeman Township Trustee	24 Townsend St		Wakeman	OH	44889
Byron	Dalton, III	Huron County	Wakeman Township Trustee	3333 SR 60 N		Wakeman	OH	44889
Kenneth	Tkach	Huron County	Wakeman Township Trustee	16 River St.		Wakeman	OH	44889
Jim	Cordes	Lorain County	Administrator	226 Middle Ave		Elyria	OH	44035

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
Eric	Norenerg	Lorain County	City Manager	85 S. Main Street		Oberlin	OH	44074
Ted	Kalo	Lorain County	Commissioner	226 Middle Avenue	Fourth Floor	Elyria	OH	44035
Lori	Kokoski	Lorain County	Commissioner	226 Middle Avenue	Fourth Floor	Elyria	OH	44035
Matt	Lundy	Lorain County	Commissioner	226 Middle Avenue	Fourth Floor	Elyria	OH	44035
Scott	Broadwell	Lorain County	Council	85 South Main Street		Oberlin	OH	44074
Bryan	Burgess	Lorain County	Council	85 South Main Street		Oberlin	OH	44074
Sharon	Fairchild-Soucy	Lorain County	Council	85 South Main Street		Oberlin	OH	44074
Elizabeth	Meadows	Lorain County	Council	85 South Main Street		Oberlin	OH	44074
Sharon	Pearson	Lorain County	Council	85 South Main Street		Oberlin	OH	44074
Kristin	Peterson	Lorain County	Council	85 South Main Street		Oberlin	OH	44074
Ron	Rimbert	Lorain County	Council	85 South Main Street		Oberlin	OH	44074
Ken	Carney	Lorain County	Engineer	247 Hadaway Street		Elyria	OH	44035
Jean	Haight	Lorain County	Grafton Township Trustee	P.O. Box 100	17109 Avon Belden Road	Grafton	OH	44044
Dan	Miller	Lorain County	Grafton Township Trustee	P.O. Box 100	17109 Avon Belden Road	Grafton	OH	44044
Carl	Wesemeyer	Lorain County	Grafton Township Trustee	P.O. Box 100	17109 Avon Belden Road	Grafton	OH	44044
Ronald	Baumann	Lorain County	Henrietta Township Trustee	10413 Vermilion Road		Oberlin	OH	44074
Howard	Born, III	Lorain County	Henrietta Township Trustee	10413 Vermilion Road		Oberlin	OH	44074
Joseph	Knoble	Lorain County	Henrietta Township Trustee	10413 Vermilion Road		Oberlin	OH	44074
Gary	Burnett	Lorain County	LaGrange Township Trustee	42251 Route 303		LaGrange	OH	44044
Douglas	Gardner	Lorain County	LaGrange Township Trustee	16433 Indian Hollow Road		Grafton	OH	44044
Rita	Tompkins Canfield	Lorain County	LaGrange Township Trustee	15815 Diagonal Road		LaGrange	OH	44044
Patti	Brubaker	Lorain County	New Russia Township Trustee	46300 Butternut Ridge Road		Oberlin	OH	44074
Jack	Hoyt	Lorain County	New Russia Township Trustee	46300 Butternut Ridge Road		Oberlin	OH	44074
John	Piwinski	Lorain County	New Russia Township Trustee	46300 Butternut Ridge Road		Oberlin	OH	44074

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
Mark	Diedrick	Lorain County	Pittsfield Township Trustee	46118 State Rt. 303		Oberlin	OH	44090
Mark	McConnell	Lorain County	Pittsfield Township Trustee	46118 State Rt. 303		Oberlin	OH	44090
Forrest	Mohrman	Lorain County	Pittsfield Township Trustee	46118 State Rt. 303		Oberlin	OH	44090
Paul	Stammitti	Lorain County	Sheriff	9896 Murray Ridge Rd		Elyria	OH	44035
Laura	Lloyd-Jenkins	Lucas County	Administrator	One Government Center	Suite 800	Toledo	OH	43617
Anita	Lopez	Lucas County	Auditor	One Government Center	Suite 600	Toledo	OH	43604
Carol	Contrada	Lucas County	Commissioner	One Government Center	Suite 800	Toledo	OH	43604
Pete	Gerken	Lucas County	Commissioner	One Government Center	Suite 800	Toledo	OH	43604
Tina	Skeldon Wozniak	Lucas County	Commissioner	One Government Center	Suite 800	Toledo	OH	43604
Barb	Bruno	Lucas County	Council	25 North Second St.		Waterville	OH	43566
Micheline	Krise	Lucas County	Council	25 North Second St.		Waterville	OH	43566
Charles	Larkins	Lucas County	Council	25 North Second St.		Waterville	OH	43566
Tim	Pedro	Lucas County	Council	25 North Second St.		Waterville	OH	43566
John	Rozic	Lucas County	Council	25 North Second St.		Waterville	OH	43566
Jim	Valtin	Lucas County	Council	25 North Second St.		Waterville	OH	43566
Keith	Earley	Lucas County	Engineer	1049 S. McCord Road		Holland	OH	43528
Lori	Brodie	Lucas County	Mayor	25 North Second St.		Waterville	OH	43566
Lee	Bialecki	Lucas County	Providence Township	13257 Perry Road		Grand Rapids	OH	43522
Steve	Kendall	Lucas County	Providence Township	13257 Perry Road		Grand Rapids	OH	43522
Cody	Mastin	Lucas County	Providence Township	13257 Perry Road		Grand Rapids	OH	43522
Phil	Copeland	Lucas County	Recorder	One Government Center	Suite 700	Toledo	OH	43604
John	Tharp	Lucas County	Sheriff	1622 Spielbusch Ave		Toledo	OH	43604
Wade	Kapszukiewicz	Lucas County	Treasurer	One Government Center	Suite 500	Toledo	OH	43604
Les	Disher	Lucas County	Waterville Township Trustee	621 Farnsworth Road		Waterville	OH	43566

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
Kyle	Hertzfeld	Lucas County	Waterville Township Trustee	621 Farnsworth Road		Waterville	OH	43566
Karen	Schneider	Lucas County	Waterville Township Trustee	621 Farnsworth Road		Waterville	OH	43566
Adam	Friedrick	Medina County	Commissioner	144 North Broadway St., #201		Medina	OH	44256
Patricia	Geissman	Medina County	Commissioner	144 North Broadway St., #201		Medina	OH	44256
Tim	Smith	Medina County	Commissioner	144 North Broadway St., #201		Medina	OH	44256
Mike	Salay	Medina County	Engineer	791 West Smith Road,		Medina	OH	44256
Steve	Fulton	Medina County	Guilford Township Trustee	8701 Hubbard Valley Rd		Seville	OH	44273
Robert	Rohrer	Medina County	Guilford Township Trustee	8612 Yoder Rd		Wadsworth	OH	44281
Glenn	Sheller	Medina County	Guilford Township Trustee	9027 Skypark Drive		Wadsworth	OH	44281
Lynda	Bowers	Medina County	Lafayette Township Trustee	6776 Wedgewood Road		Medina	OH	44256
Michael	Costello	Medina County	Lafayette Township Trustee	6776 Wedgewood Road		Medina	OH	44256
Bryon	Macron	Medina County	Lafayette Township Trustee	6776 Wedgewood Road		Medina	OH	44256
Dennis	Horvath	Medina County	Litchfield Township Trustee	9256 Norwalk Road		Litchfield	OH	44253
Michael	Pope	Medina County	Litchfield Township Trustee	9256 Norwalk Road		Litchfield	OH	44253
Nancy	Wargo	Medina County	Litchfield Township Trustee	9256 Norwalk Road		Litchfield	OH	44253
Sally	Albrecht	Medina County	Montville Township Trustee	3077 Blue Heron Trace		Medina	OH	44256
Ronald	Bischof	Medina County	Montville Township Trustee	3227 Rustic Valley Dr		Medina	OH	44256
Jeff	Brandon	Medina County	Montville Township Trustee	5184 Glenmore Way		Medina	OH	44256
Robert	Engler	Medina County	Wadsworth Township Trustee	263 Wall Road		Doylestown	OH	44230

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
James	Gardner	Medina County	Wadsworth Township Trustee	8069 Hartman Road		Wadsworth	OH	44281
Kevin	Keiper	Medina County	Wadsworth Township Trustee	9450 Mennonite Road		Wadsworth	OH	44281
Colene	Conley	Medina County	York Township Trustee	6609 Norwalk Road		Mallet Creek	OH	44256
Richard	Monroe	Medina County	York Township Trustee	6609 Norwalk Road		Mallet Creek	OH	44256
William	Pavlick	Medina County	York Township Trustee	6609 Norwalk Road		Mallet Creek	OH	44256
Warren	Brown	Sandusky County	Administrator	622 Croghan Street		Fremont	OH	43420
Jerri	Miller	Sandusky County	Auditor	100 N. Park Ave.	Suite 228	Fremont	OH	43420
Dan	Polter	Sandusky County	Commissioner	622 Croghan St.		Fremont	OH	43420
Charles	Schwochow	Sandusky County	Commissioner	622 Croghan St.		Fremont	OH	43420
Terry	Thatcher	Sandusky County	Commissioner	622 Croghan St.		Fremont	OH	43420
James	Moyer	Sandusky County	Engineer	2500 West State St.		Fremont	OH	43420
Colleen	Carmack	Sandusky County	Recorder	100 N. Park Ave.	Suite 217	Fremont	OH	43420
John	Antesberger	Sandusky County	Riley Township Trustee	1062 N. CR 220		Fremont	OH	43420
Gary	Overmyer	Sandusky County	Riley Township Trustee	3420 CR 231		Fremont	OH	43420
David	Sachs	Sandusky County	Riley Township Trustee	997 N. CR 198		Fremont	OH	43420
Paul	Lotycz	Sandusky County	Sandusky Township Trustee	710 N. Stone St		Fremont	OH	43420
Gilbert	Overmyer	Sandusky County	Sandusky Township Trustee	1749 CR 142		Fremont	OH	43420
Michael	Willis	Sandusky County	Sandusky Township Trustee	351 W. CR 73		Fremont	OH	43420
Kyle	Overmyer	Sandusky County	Sheriff	2323 Countryside Dr.		Fremont	OH	43420
Jean	Leber	Sandusky County	Townsend Township Trustee	1736 N. County Rd. 294		Vickery	OH	43464
Bruce	Meggitt	Sandusky County	Townsend Township Trustee	1736 N. County Rd. 294		Vickery	OH	43464
Paul	Warner	Sandusky County	Townsend Township Trustee	1736 N. County Rd. 294		Vickery	OH	43464
Irma	Celestino	Sandusky County	Treasurer	100 N. Park Ave.	Suite 227	Fremont	OH	43420

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
Glenn	Baker	Sandusky County	Washington Township Trustee	211 Lynn St		Lindsey	OH	43442
Harold	Overmyer	Sandusky County	Washington Township Trustee	1612 W. CR 109		Fremont	OH	43420
Robert	Reed	Sandusky County	Washington Township Trustee	2721 CR 92		Lindsey	OH	43442
Kenneth	Green	Sandusky County	Woodville Township Trustee	4680 CR 44		Woodville	OH	43469
William	Hammer	Sandusky County	Woodville Township Trustee	505 Water St.		Woodville	OH	43469
Paul	Heineman	Sandusky County	Woodville Township Trustee	731 Fort Findlay Rd.		Woodville	OH	43469
Brant	Luther	Stark County	Administrator	110 Central Plaza S #240		Canton	OH	44702
Thomas	M. Bernabei	Stark County	County Commissioner	2745 Dunkeith Dr., NW		Canton	OH	44708
Richard	Regula	Stark County	County Commissioner	8020 Erie Ave Sw		Navarre	OH	44662
Janet	Weir Creighton	Stark County	County Commissioner	7711 Bucknell Cir., NW		North Canton	OH	44720
Keith	Bennett	Stark County	County Engineer	266 Creekside Cir NE		North Canton	OH	44720
John	Arnold	Stark County	Lake Township Trustee	2725 Aylesbury St Nw		North Canton	OH	44720
Ellis	Erb	Stark County	Lake Township Trustee	1477 Lake O Pines St NE		Hartville	OH	44632
Galen	Lee Stoll	Stark County	Lake Township Trustee	2690 Rita St NE		Hartville	OH	44632
Kenneth	Eddleman	Stark County	Marlboro Township Trustee	10351 Marlboro Ave NE		Louisville	OH	44641
John	Hagan	Stark County	Marlboro Township Trustee	11301 Marlboro Ave NE		Alliance	OH	44601
Wayne	Schillig	Stark County	Marlboro Township Trustee	10750 Marlboro Ave NE		Alliance	OH	44601
Lou	Johnson	Stark County	Nimishillen Township Trustee	9821 Louisville St NE		Louisville	OH	44641
Mike	Lynch	Stark County	Nimishillen Township Trustee	P.O. Box 181		Louisville	OH	44641

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
Lisa	Shafer	Stark County	Nimishillen Township Trustee	6590 Winter St NE		Louisville	OH	44641
Mort	Dehoff	Stark County	Washington Township Trustee	5789 Beechwood Ave		Alliance	OH	44601
Paul	Delpuppo	Stark County	Washington Township Trustee	8701 Byrd Ave NE		Alliance	OH	44601
Randy	Rodgers	Stark County	Washington Township Trustee	15874 Bowman St. NE		Homeworth	OH	44634
Christopher	Humphrey	Summit County	City Of Green Council-At-Large	P.O. Box 278	Green Administration Building	Green	OH	44232
Gerard	Neugebauer	Summit County	City Of Green Council-At-Large	P.O. Box 278	Green Administration Building	Green	OH	44232
Joel	Reed	Summit County	City Of Green Council-At-Large	P.O. Box 278	Green Administration Building	Green	OH	44232
Harold	Gehm	Summit County	City Of New Franklin Council-At-Large	5611 Manchester Rd.		Akron	OH	44319
Judy	Jones	Summit County	City Of New Franklin Council-At-Large	5611 Manchester Rd.		Akron	OH	44319
Andrea	Norris	Summit County	City Of New Franklin Council-At-Large	5611 Manchester Rd.		Akron	OH	44319
Tim	Crawford	Summit County	County Council	175 South Main Street		Akron	OH	44308
Paula	Prentice	Summit County	County Council	175 South Main Street		Akron	OH	44308
Alan	Brubaker	Summit County	County Engineer	538 E South St		Akron	OH	44311
Russell	Pry	Summit County	County Executive	175 S. Main St.	7th Floor	Akron	OH	44308
Dick	Norton	Summit County	Mayor City of Green	P.O. Box 278	Central Administration Building	Green	OH	44232
Al	Bollas	Summit County	Mayor City of New Franklin	5611 Manchester Rd.		Akron	OH	44319
John	Donofrio	Summit County	Summit County Council-At-Large	175 S Main St	7th Floor	Akron	OH	44308

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
Sandra	Kurt	Summit County	Summit County Council-At-Large	175 S Main St	7th Floor	Akron	OH	44308
Ilene	Shapiro	Summit County	Summit County Council-At-Large	175 S Main St	7th Floor	Akron	OH	44308
Lenny	Broome	Wayne County	Chippewa Township Trustee	12714 Mark Path		Doylestown	OH	44230
Roberta	Gleason	Wayne County	Chippewa Township Trustee	14228 Galehouse Rd		Doylestown	OH	44230
Robert	Macgregor	Wayne County	Chippewa Township Trustee	11980 Whitman Rd.		Doylestown	OH	44230
Patrick	Herron	Wayne County	County Administrator	428 West Liberty St		Wooster	OH	44691
Jim	Carmichael	Wayne County	County Commissioner	1429 Moore Rd.		Wooster	OH	44691
Ann	Obrecht	Wayne County	County Commissioner	7849 Columbus Rd.		Shreve	OH	44676
Scott	Wiggam	Wayne County	County Commissioner	316 E. Beverly Rd.		Wooster	OH	44691
Roger	Terrill	Wayne County	County Engineer	3151 West Old Lincoln Way		Wooster	OH	44691
Terry	Lindeman	Wayne County	Mayor City of Doylestown	24 S. Portage St		Doylestown	OH	44230
Michael	Sibbersen	Wood County	Auditor	One Courthouse Square	5th Floor	Bowling Green	OH	43402
Lisa	Heft	Wood County	Clerk	P.O. Box 182	100 N Church St.	Haskins	OH	43525
Doris	Herringshaw	Wood County	Commissioner	One Courthouse Square	5th Floor	Bowling Green	OH	43402
Joel	Kuhlman	Wood County	Commissioner	One Courthouse Square	5th Floor	Bowling Green	OH	43402
Craig	LaHote	Wood County	Commissioner	One Courthouse Square	5th Floor	Bowling Green	OH	43402
Helen	Bonnough	Wood County	Council	P.O. Box 182	100 N Church St.	Haskins	OH	43525
Ashley	Pearl Brooks	Wood County	Council	P.O. Box 182	100 N Church St.	Haskins	OH	43525
Nancy	Perry	Wood County	Council	P.O. Box 182	100 N Church St.	Haskins	OH	43525
Julienne	Snyder	Wood County	Council	P.O. Box 182	100 N Church St.	Haskins	OH	43525
Phillip	Tipton	Wood County	Council	P.O. Box 182	100 N Church St.	Haskins	OH	43525
Ray	Huber	Wood County	Engineer	One Courthouse Square		Bowling Green	OH	43402

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
Raymond	Huber	Wood County	Engineer	One Courthouse Square	5th Floor	Bowling Green	OH	43402
Paul	Gies	Wood County	Mayor	P.O. Box 182	100 N Church St.	Haskins	OH	43525
Jim	Bostdorff	Wood County	Middleton Township Trustee	P.O. Box 206		Haskins	OH	43525
Penny	Getz	Wood County	Middleton Township Trustee	P.O. Box 206		Haskins	OH	43525
Fred	Vetter	Wood County	Middleton Township Trustee	P.O. Box 206		Haskins	OH	43525
Julie	Baumgardner	Wood County	Recorder	One Courthouse Square	5th Floor	Bowling Green	OH	43402
Mark	Wasylyshyn	Wood County	Sheriff	One Courthouse Square	5th Floor	Bowling Green	OH	43402
Jill	Engle	Wood County	Treasurer	One Courthouse Square	5th Floor	Bowling Green	OH	43402
Matt	Brinker	Wood County	Troy Township Trustee	P.O. Box 128	311 Krotzer Ave.	Luckey	OH	43443
Stephen	Levorchick	Wood County	Troy Township Trustee	P.O. Box 128	311 Krotzer Ave.	Luckey	OH	43443
Ken	Skip Recker	Wood County	Troy Township Trustee	P.O. Box 128	311 Krotzer Ave.	Luckey	OH	43443
Isaac	Bailey	Wood County	Webster Township Trustee	8138 Middleton Pike		Bowling Green	OH	43402
Mark	Bushman	Wood County	Webster Township Trustee	8138 Middleton Pike		Bowling Green	OH	43402
Jim	Cajka	Wood County	Webster Township Trustee	8138 Middleton Pike		Bowling Green	OH	43402
John	Kasich		Governor	77 South High Street		Columbus	OH	43215
Ron	Amstutz		State Representative	77 South High Street		Columbus	OH	43215
Steven	Arndt		State Representative	77 South High Street		Columbus	OH	43215
Terry	Boose		State Representative	77 South High Street		Columbus	OH	43215
Tim	Brown		State Representative	77 South High Street		Columbus	OH	43215
Tony	DeVitis		State Representative	77 South High Street		Columbus	OH	43215
Tim	Ginter		State	77 South High Street		Columbus	OH	43215

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
			Representative					
Christina	Hagan		State Representative	77 South High Street		Columbus	OH	43215
Dave	Hall		State Representative	77 South High Street		Columbus	OH	43215
Stephen	Hambley		State Representative	77 South High Street		Columbus	OH	43215
Rob	McColley		State Representative	77 South High Street		Columbus	OH	43215
Dan	Ramos		State Representative	77 South High Street		Columbus	OH	43215
Bill	Reineke		State Representative	77 South High Street		Columbus	OH	43215
Barbara	Sears		State Representative	77 South High Street		Columbus	OH	43215
Marilyn	Slaby		State Representative	77 South High Street		Columbus	OH	43215
Andy	Thompson		State Representative	77 South High Street		Columbus	OH	43215
Dave	Burke		State Senator	1 Captiol Square		Columbus	OH	43215
Randy	Gardner		State Senator	1 Captiol Square		Columbus	OH	43215
Cliff	Hite		State Senator	1 Captiol Square		Columbus	OH	43215
Frank	LaRose		State Senator	1 Captiol Square		Columbus	OH	43215
Gayle	Manning		State Senator	1 Captiol Square		Columbus	OH	43215
Larry	Obhof		State Senator	1 Captiol Square		Columbus	OH	43215
Scott	Oelslager		State Senator	1 Captiol Square		Columbus	OH	43215
Tom	Sawyer		State Senator	1 Captiol Square		Columbus	OH	43215
Joe	Schiavoni		State Senator	1 Captiol Square		Columbus	OH	43215
John	Boehner		U.S. Representative	1011 Longworth House Office Building		Washington	DC	20515
Bob	Gibbs		U.S. Representative	329 Cannon House Office Building		Washington	DC	20515
Bill	Johnson		U.S. Representative	317 Cannon House Office Building		Washington	DC	20515
Jim	Jordan		U.S. Representative	1524 Longworth House Office Building		Washington	DC	20515
Bob	Latta		U.S. Representative	2448 Rayburn House Office Building		Washington	DC	20515

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
Jim	Renacci		U.S. Representative	130 Cannon House Office Building		Washington	DC	20515
Tim	Ryan		U.S. Representative	1421 Longworth House Office Building		Washington	DC	20515
Sherrod	Brown		U.S. Senator	713 Hart Senate Office Building		Washington	DC	20515
Rob	Portman		U.S. Senator	448 Russell Senate Office Building		Washington	DC	20515

Public Officials – Compressor Stations

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
Michael	Halleck	Columbiana County	County Commissioner	2096 Country Side Dr		Salem	OH	44460
James	Hoppel	Columbiana County	County Commissioner	50499 Calcutta Smith Ferry Rd		E Liverpool	OH	43920
Timothy	Weigle	Columbiana County	County Commissioner	49498 England Dr		E Palestine	OH	44413
Bert	Dawson	Columbiana County	County Engineer	50487 Fisher Ave		E Liverpool	OH	43920
Robert	Manfull	Columbiana County	Hanover Township Trustee	29209 Manfull Lake Rd		Kensington	OH	44427
Mancil	Ridgeway	Columbiana County	Hanover Township Trustee	10554 Mechanicstown Rd		Hanoverton	OH	44423
John	Zehentbauer	Columbiana County	Hanover Township Trustee	P.O. Box 304	10786 Lindesmith Rd	Hanoverton	OH	44423
Laura	Lloyd-Jenkins	Lucas County	Administrator	One Government Center	Suite 800	Toledo	OH	43617
Anita	Lopez	Lucas County	Auditor	One Government Center	Suite 600	Toledo	OH	43604
Carol	Contrada	Lucas County	Commissioner	One Government Center	Suite 800	Toledo	OH	43604
Pete	Gerken	Lucas County	Commissioner	One Government Center	Suite 800	Toledo	OH	43604
Tina	Skeldon Wozniak	Lucas County	Commissioner	One Government Center	Suite 800	Toledo	OH	43604
Les	Disher	Lucas County	Waterville Township Trustee	621 Farnsworth Road		Waterville	OH	43566
Kyle	Hertzfeld	Lucas County	Waterville Township Trustee	621 Farnsworth Road		Waterville	OH	43566
Karen	Schneider	Lucas County	Waterville Township Trustee	621 Farnsworth Road		Waterville	OH	43566
Adam	Friedrick	Medina County	Commissioner	144 North Broadway St., #201		Medina	OH	44256
Patricia	Geissman	Medina County	Commissioner	144 North Broadway St., #201		Medina	OH	44256
Tim	Smith	Medina County	Commissioner	144 North Broadway St., #201		Medina	OH	44256

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
Mike	Salay	Medina County	Engineer	791 West Smith Road,		Medina	OH	44256
Steve	Fulton	Medina County	Guilford Township Trustee	8701 Hubbard Valley Rd		Seville	OH	44273
Robert	Rohrer	Medina County	Guilford Township Trustee	8612 Yoder Rd		Wadsworth	OH	44281
Glenn	Sheller	Medina County	Guilford Township Trustee	9027 Skypark Drive		Wadsworth	OH	44281
Warren	Brown	Sandusky County	Administrator	622 Croghan Street		Fremont	OH	43420
Jerri	Miller	Sandusky County	Auditor	100 N. Park Ave.	Suite 228	Fremont	OH	43420
Dan	Polter	Sandusky County	Commissioner	622 Croghan St.		Fremont	OH	43420
Charles	Schwochow	Sandusky County	Commissioner	622 Croghan St.		Fremont	OH	43420
Terry	Thatcher	Sandusky County	Commissioner	622 Croghan St.		Fremont	OH	43420
James	Moyer	Sandusky County	Engineer	2500 West State St.		Fremont	OH	43420
Colleen	Carmack	Sandusky County	Recorder	100 N. Park Ave.	Suite 217	Fremont	OH	43420
Kyle	Overmyer	Sandusky County	Sheriff	2323 Countryside Dr.		Fremont	OH	43420
Jean	Leber	Sandusky County	Townsend Township Trustee	1736 N. County Rd. 294		Vickery	OH	43464
Bruce	Meggitt	Sandusky County	Townsend Township Trustee	1736 N. County Rd. 294		Vickery	OH	43464
Paul	Warner	Sandusky County	Townsend Township Trustee	1736 N. County Rd. 294		Vickery	OH	43464
Irma	Celestino	Sandusky County	Treasurer	100 N. Park Ave.	Suite 227	Fremont	OH	43420
Tim	Ginter		State Representative	77 South High Street		Columbus	OH	43215
Stephen	Hambley		State Representative	77 South High Street		Columbus	OH	43215
Bill	Reineke		State Representative	77 South High Street		Columbus	OH	43215

First Name	Last Name	County	Position	Address 1	Address 2	City	State	Zip
Barbara	Sears		State Representative	77 South High Street		Columbus	OH	43215
Dave	Burke		State Senator	1 Captiol Square		Columbus	OH	43215
Randy	Gardner		State Senator	1 Captiol Square		Columbus	OH	43215
Larry	Obhof		State Senator	1 Captiol Square		Columbus	OH	43215
Joe	Schiavoni		State Senator	1 Captiol Square		Columbus	OH	43215
Bill	Johnson		U.S. Representative	317 Cannon House Office Building		Washington	DC	20515
Jim	Jordan		U.S. Representative	1524 Longworth House Office Building		Washington	DC	20515
Bob	Latta		U.S. Representative	2448 Rayburn House Office Building		Washington	DC	20515
Jim	Renacci		U.S. Representative	130 Cannon House Office Building		Washington	DC	20515
Sherrod	Brown		U.S. Senator	713 Hart Senate Office Building		Washington	DC	20515
Rob	Portman		U.S. Senator	448 Russell Senate Office Building		Washington	DC	20515

Community and Public Interest Groups and Non-Governmental Organizations

Ohio

Organization	Contact First Name	Contact Last Name	Address 1	Address 2	City	State	Zip
Appalachian Partnership for Economic Growth	Dorinda	Byers	35 Public Square	PO Box 456	Nelsonville	OH	45764
Black Swamp Conservancy	Rob	Krain	132 W 2nd St.		Perrysburg	OH	43551
Bowling Green Chamber of Commerce	Earlene	Kilpatrick	PO Box 31		Bowling Green	OH	43402
Canton Regional Chamber of Commerce	Dennis	Saunier	222 Market Ave N		Canton	OH	44702
Clear Water, Inc	Cindy	Drill					
Cleveland Building and Construction Trades Council	Terry	Joyce	3250 Euclid Avenue	Suite 280	Cleveland	OH	44115
Conservation Action Project	Bill	Rohrs			Napoleon	OH	43545
Damage Prevention Council of Northwest Ohio	Stella	Ellerbrock	6099 Angola Rd		Holland	OH	43528
Development Finance Authority of Summit County – Port Authority	Chris	Burnham	47 N. Main Street	Suite 407	Akron	OH	44308
Eastern Gateway Community College	Mark	Ciccarelli	4000 Sunset Blvd		Steubenville	OH	43952
Erie County Economic Development Corp	Peter	Zaehringer	247 Columbus Ave.		Sandusky	OH	44870
Firelands Land Conservancy Project	Kate	Pilacky					
Fremont Rotary Club	Angie	Morelock	2340 E. State St		Fremont	OH	43420
Fulton County Economic Development	Matt	Gilroy	123 Courthouse Plaza	Suite 2	Wauseon	OH	43567
Great Lakes Innovation and Development Institute	Tracy	Green	151 Innovation Drive	Suite 210	Elyria	OH	44035

Organization	Contact First Name	Contact Last Name	Address 1	Address 2	City	State	Zip
Greater Akron Chamber of Commerce	Daniel	Colantone	1 Cascade Plz, # 17		Akron	OH	44308
Greater Medina Chamber	Jaclyn	Ringstmeir	145 N Court St		Medina	OH	44256
International Union of Operating Engineers Local 18			3515 Prospect Ave.		Cleveland	OH	44115
JobsOhio	David	Mustine	41 S High Street, #1500		Columbus	OH	43215
Knight Foundation	Kyle	Kutuchief	277 East Mill Street		Akron	OH	44308
Lorain County Community College	Lisa	Delp	1005 Abbe Rd. N.		Elyria	OH	44035
Lucas County Economic Development Corp.	Ford	Weber	2 Maritime Plaza		Toledo	OH	43604
Lucas County Soil and Water Conservation District			130-A West Dudley		Maumee	OH	43537
MAGNET	Linda	Barita	1768 East 25th Street		Cleveland	OH	44114
Maumee River Advisory Council	Marcus	Ricci	1435 West Twp Rd. 38		Tiffin	OH	44883
Maumee River Basin Partnership of Local Governments	Robert	Vargo	115 West Washington Street		Indianapolis	IN	46204
Maumee Valley Heritage Corridor	Lori	Gates	5100 W Central Ave		Toledo	OH	43615
Medina County Economic Development Corp	Bethany	Dentler	144 N. Broadway St.		Medina	OH	44256
Northeast Ohio Trade and Economic Development Consortium	Ron	DeBarr	PO Box 5190		Kent	OH	44242
Northwest State Community College	Thomas	Stucky	22600 Ohio 34		Archbold	OH	43502
Ohio AFL-CIO	Tim	Burga	395 East Broad Street		Columbus	OH	43215
Ohio Association of Community Colleges	Jack	Hershey	175 S. 3rd St., #560		Columbus	OH	43215

Organization	Contact First Name	Contact Last Name	Address 1	Address 2	City	State	Zip
Ohio Chamber of Commerce	Beau	Euton	230 E Town St.		Columbus	OH	43215
Ohio Chemistry Council	Jen	Kline	88 E. Broad Street	Suite 1490	Columbus	OH	43215
Ohio Farm Bureau	Dale	Arnold	280 North High St.	6th Floor	Columbus	OH	43215
Ohio Farm Bureau	Dale	Arnold	280 North High St	6th Floor	Columbus	OH	43215
Ohio Gas Association	Jimmy	Stewart	6100 Emerald Pkwy		Dublin	OH	43016
Ohio Manufactures Association	Ryan	Augsburger	33 N High St	Suite 600	Columbus	OH	43215
Ohio Nature Conservancy	Josh	Knights	6375 Riverside Dr	Suite 100	Dublin	OH	43017
Ohio State Grange	Lisa	Tharpe	16303 Township Rd 608		Fredericktown	OH	43019
Ohio Township Association	Matt	DeTemple	6500 Taylor Road		Blacklick	OH	43004
Owens Community College	Brian	Paskvan	3200 Bright Rd.		Findlay	OH	45840
Pro Football Hall Fame	Pete	Frierle	2121 George Halas Dr. NW		Canton	OH	44708
Regional Growth Partnership	Dean	Monske	300 Madison Ave.		Toledo	OH	43604
Sandusky County Chamber of Commerce	Angie	Morelock	101 S Front St.		Fremont	OH	43420
Sandusky County Economic Development Corp.	Kay	Reiter	2511 Countryside Drive	Suite C	Fremont	OH	43420
Sandusky River Advisory Council	Robert	Vargo	1435 West Twp Rd. 38		Tiffin	OH	44883
Sandusky River Watershed Coalition	Cindy	Brookes	219 South Front Street	PO Box 590	Fremont	OH	43420
Sandusky State Scenic River	Robert	Vargo			Tiffin	OH	44883

Organization	Contact First Name	Contact Last Name	Address 1	Address 2	City	State	Zip
Stark Development Board	Steve	Paquette	116 Cleveland Ave. NW		Canton	OH	44702
Stark State Community College	Irene	Motts	6200 Frank Ave. NW		North Canton	OH	44720
Team Lorain County	Steve	Morey	226 Middle Ave.		Elyria	OH	44035
TeamNEO	Paul	Boulier	737 Bolivar Rd.		Cleveland	OH	44115
Terra Community College	Jerome	Webster	2830 Napoleon Rd.		Fremont	OH	43420
Toledo Regional Chamber of Commerce	Wendy	Gramza	300 Madison Ave.		Toledo	OH	43604
Waterville Chamber of Commerce	Corrina	Phleger	122 Farnsworth Rd		Waterville	OH	43017
Wayne County Economic Development Council	Rodney	Crider	542 E. Liberty St.		Wooster	OH	44691
Western Lake Erie Water Keeper	Sandy	Bihn	3900 N. Summit Bldg. 2		Toledo	OH	43611
Western Reserve Land Conservancy	Kendrick	Chittock	3850 Chagrin River Rd.		Moreland Hills	OH	44022
Wood County Economic Development Commission	Wade	Gottschalk	639 S Dunbridge Rd.		Bowling Green	OH	43402
Work in Northeast Ohio Council	Al	Catani	445 W Liberty St.	Suite 225	Medina	OH	44256

Michigan

Organization	Contact First Name	Contact Last Name	Address	Address	City	State	Zip
Michigan Chamber of Commerce	Jason	Geer		600 S Walnut St.	Lansing	MI	48933
Michigan Manufacturers	Mike	Johnston		620 S Capitol Ave	Lansing	MI	48933

Organization	Contact First Name	Contact Last Name	Address	Address	City	State	Zip
Association							
Michigan Farm Bureau	Matt	Smego		7373 W. Saginaw Hwy.	Lansing	MI	48917
Lenawee Now	Jim	Van Doren		5285 W. US 223	Adrian	MI	49221
Lenawee Now	Tim	Robinson		5285 W. US 223	Adrian	MI	49221
Monroe County Chiefs of Police	Tony	Cuevas				MI	
Michigan United Conservation Clubs	Daniel	Eichinger		2101 Wood St.	Lansing	MI	48912
Heart of the Lakes Land Conservancy	Julie	Stoneman		P.O. Box 1128	Bay City	MI	48706
Southeast Michigan Land Conservancy	Jill	Lewis		8383 Vreeland Rd, Ypsilanti	Ypsilanti	MI	481982
Legacy Land Conservancy	Susan	Lackey		1100 N Main St #203.	Ann Arbor	MI	48104
Monroe County Community College	Parmeshwar	Coomar		1555 S Raisinville Rd.	Monore	MI	48161
Monroe County Community College	Kojo	Quartay		1555 S Raisinville Rd.	Monore	MI	48161
Michigan Building & Construction Trades Council	Zane	Walker		1640 Porter St.	Detroit	MI	48216
Michigan LECET	Richard	Turner		780 Toll Street Monroe	Monroe	MI	48162
Michigan Operating Engineers	Doug	Stockwell		500 Hulet Dr.	Bloomfield Hills	MI	48302
RACER Trust	Bruce	Rasher		500 Woodward Ave., Ste . 2650	Detroit	MI	48226
Michigan Economic Development Corporation	Steve	Arwood		300 N. Washington Sq.	Lansing	MI	48933
API Michigan	John	Griffin		124 W. Allegan	Lansing	MI	48933
Lincoln Schools / Washtenaw ISD	Scott	Menzel		1819 S Wagner Rd.	Ann Arbor	MI	48103
Adrian Area Chamber of Commerce	John	Bartoszewicz		137 N. Main St.	Adrian	MI	49221
Monroe County Business Development Corp	Tracy	Oberleiter		102 E. Front St.	Monroe	MI	48161
Ducks Unlimited	Tracy	Oberlieter		P.O. Box 2432	Monroe	MI	48161

Organization	Contact First Name	Contact Last Name	Address	Address	City	State	Zip
Monroe County Business Development Corp	Tim	Lake		102 E. Front St.	Monroe	MI	48161
Monroe County Chamber of Commerce	Michelle	Dugan		P.O. Box 626	Monroe	MI	48161

Community and Public Interest Groups and Non-Governmental Organizations

NEXUS Gas Transmission, LLC has identified numerous non-governmental organizations along the proposed pipeline route. We have engaged with these groups as appropriate and will continue to supplement the list as contact is made. These groups may be associated with businesses, environmental resources or community groups and NEXUS engagement efforts will be coordinated with the Project subject matter experts.

These groups include:

- State and local chambers of commerce
- Community members
- Labor associations
- Economic development authorities
- Educational and industrial-vocation training institutions
- Natures preservation organizations
- Local/regional environmental organizations
- River groups and partnerships
- Agricultural interests

Appendix F: Examples of Home Pages for Websites

www.nexusgastransmission.com

www.spectraenergy.com/Operations/New-Projects-and-Our-Process/New-Projects-in-US/NEXUS-Gas-Transmission

Appendix G: Sample Letters

200 Corporate Center Drive, Suite 350
Coraopolis, PA 15108

NEXUS
GAS TRANSMISSION
«Tract_Number»

August 11, 2014

«Salutation» «First_Name» «Last_Name»
«CorporationTrust»
«Address_»
«City», «State» «Zip»

Re: Proposed NEXUS Gas Transmission (NEXUS) Project
Property located in: «Property_County» County, «Property_State»

Dear Landowner:

With the growing demand for reliable energy sources with fewer emissions, DTE Energy Co. ("DTE Energy") and Spectra Energy Corp ("Spectra Energy"), the lead developers of the NEXUS Gas Transmission Project ("NEXUS"), recently began evaluating an interstate natural gas pipeline expansion project that will increase energy supply diversity, security and reliability in the U.S. Midwest and Ontario, Canada. DTE Energy and Spectra Energy are two of the leading energy service and infrastructure companies in North America with more than a century of combined experience in developing infrastructure projects to meet the energy needs of North America in a safe, reliable and responsible manner.

NEXUS's efforts to develop a new natural gas transportation system will benefit the U.S. Midwest Region and the Dawn natural gas trading hub in Southwestern Ontario, Canada. Ultimately, this Project will help to meet the growing environmental need for cleaner and more affordable fuels for regional power generation and for industrial and commercial customers, as well as home heating and domestic use as early as the fourth quarter of 2017.

The purpose of this letter is to introduce the proposed NEXUS Project to you. We have enclosed a Frequently Asked Questions document that provides more detail about this proposal.

To help us refine our proposed pipeline route, Project representatives have begun collecting and evaluating existing information necessary to determine the pipeline path with the least overall impact while balancing constructability concerns. The proposed geographic area under evaluation includes a newly-constructed pipeline that will extend from eastern Ohio to an interconnection with the existing natural gas pipeline grid in southeastern Michigan. The new construction in Michigan will be limited to the segment between the Ohio/Michigan border and the existing DTE Gas system near Willow Run, Michigan. From Willow Run, the NEXUS Project will utilize both existing and expansion capacity on the DTE Gas transportation system and the Vector Pipeline System to directly access Michigan markets, Chicago and the Dawn, Ontario Hub. A map is included that provides you with the general study corridor under consideration.

Page 2

You are receiving this letter because your property may be within or very near the routing study corridor being considered for the Project and for that reason we will soon send an additional letter to you related to our survey needs and practices. These civil, environmental and cultural resources survey activities are required to thoroughly evaluate a pipeline route in balancing environmental, engineering and landowner concerns. The surveys will be coordinated with the appropriate municipal officials and performed in a minimal amount of time with the goal of little to no inconvenience to landowners.

We have begun meeting with your community leaders and elected officials about the NEXUS Project while continuing to evaluate and refine the proposed route. In addition, we soon will be meeting with landowners, agencies and other stakeholders to discuss the Project and to seek input on the proposed routing for this expansion.

Please be assured that we are early in the proposed process and everyone will have multiple opportunities to interact and engage with the project team, as well as participate in the appropriate regulatory processes. Different companies take different approaches with engagement and communications with the affected public. DTE Energy and Spectra Energy take a collaborative approach. We communicate early and often about our project activities to build positive relationships and long-lasting partnerships with all stakeholders.

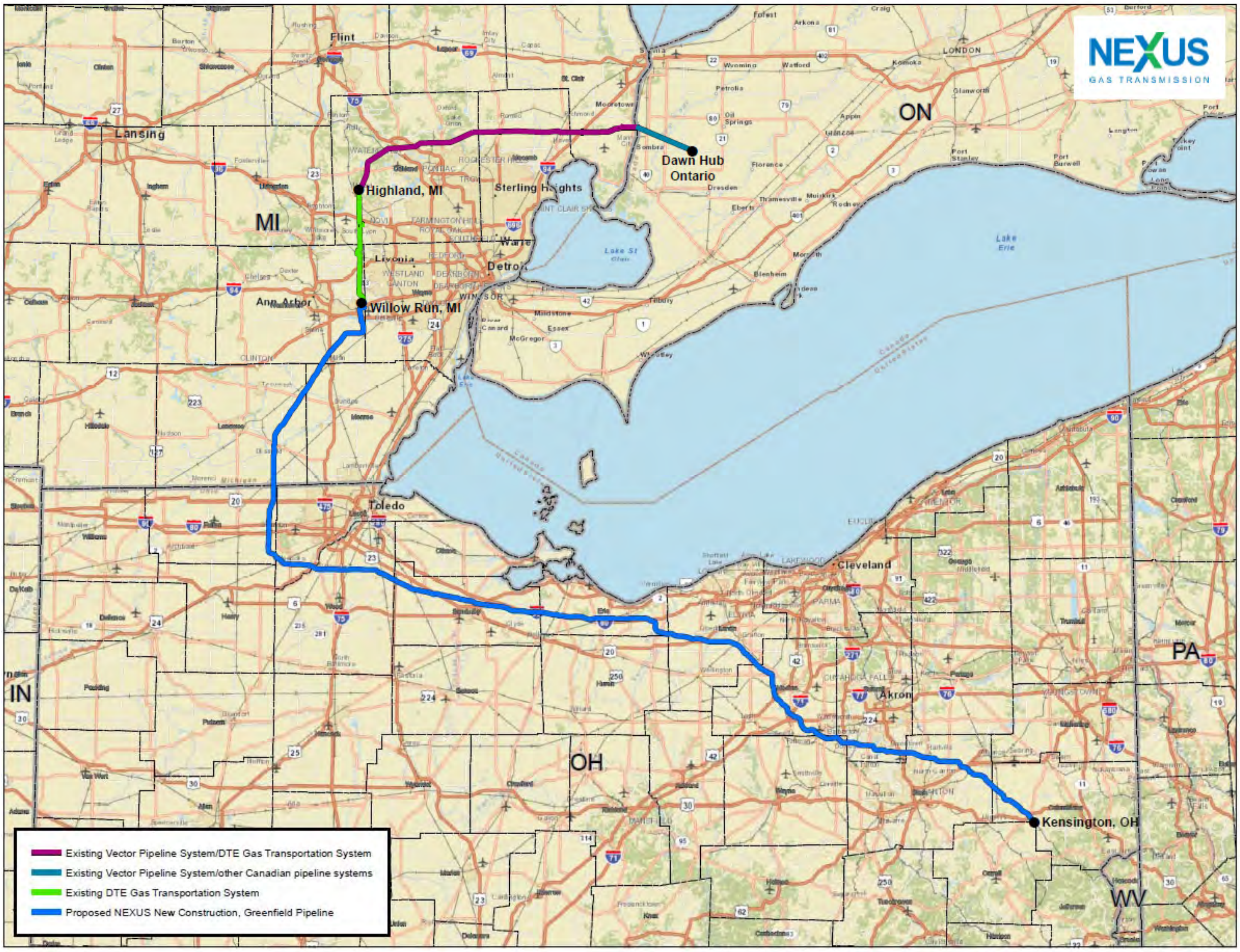
If you have questions or would like additional information concerning our proposed NEXUS Project, please call our toll free number 1-844-589-3655. We would be pleased to address any or all aspects of the project with you. For more information, please visit our website http://nexusgastransmission.com/.

Sincerely,

Peter Cassan

Peter Cassan
Right-of-Way Project Manager
Spectra Energy Corp

Enclosure:
NEXUS Project proposed study corridor map
NEXUS Project frequently asked questions


NEXUS GAS TRANSMISSION
Dawn Hub Ontario
Highland, MI
Willow Run, MI
Kensington, OH
MI
ON
OH
IN
PA
WV
Lansing
Flint
Ann Arbor
Toledo
Cleveland
Akron
Sterling Heights
Livonia
Lake Erie
Existing Vector Pipeline System/DTE Gas Transportation System
Existing Vector Pipeline System/other Canadian pipeline systems
Existing DTE Gas Transportation System
Proposed NEXUS New Construction, Greenfield Pipeline

NEXUS Gas Transmission: Frequently Asked Questions

1. What is the proposed NEXUS Gas Transmission project?

The NEXUS Gas Transmission Project (NEXUS) is a natural gas pipeline system proposed to provide additional pipeline transportation infrastructure in the upper U.S. Midwest and eastern Canadian regions to support growing demand for clean-burning natural gas.

The new pipeline will be capable of transporting at least two billion cubic feet per day (Bcf/d) of new, critically-needed supplies of natural gas to serve local distribution companies, industrial end users and natural gas-fired power generators in the Ohio, Michigan, Chicago and Dawn Ontario markets.

2. Why is this project necessary?

Natural gas is an integral part of North America's energy mix, and the NEXUS project will serve increasing demand across multiple customer segments – largely being driven by its affordable cost, its ability to complement renewables, its environmental value as a low-carbon fossil fuel and its significant availability into the foreseeable future.

3. What project scope are you proposing?

The transportation path will utilize existing pipeline capacity and infrastructure, as well as a newly-constructed pipeline. The project likely will involve 36-inch to 42-inch diameter pipe, which would extend from an originating point in eastern Ohio to interconnects with the existing pipeline grid in southeastern Michigan. As proposed, the path will utilize both existing and expansion capacity on the DTE Gas transportation system and the Vector Pipeline (Vector) System to access Chicago and the Dawn Hub.

The initial project will include interconnects with Texas Eastern Transmission, LP, and Tennessee Gas Pipeline Company, L.L.C. in the Appalachian Basin, with DTE Gas and Consumers Energy in Michigan, and with the Enbridge Tecumseh storage facility and the Union Gas Limited Dawn Hub in Ontario. Other facilities associated with the project may include compression located along the greenfield portion of the pipeline. The location and size of these other facilities has not yet been determined and could change based on the final project scope.

4. Where will the majority of new pipeline construction occur?

The majority of new pipeline build will occur in the State of Ohio as the system extends from the Utica production region to interconnections in Michigan.

5. What's the estimated cost of the project?

The project is in the early development stage, but preliminary estimates are approximately $1.5 billion; however, this could change, depending on final market commitments and project scope.

6. What is the expected in-service date of the project?

The project's target in-service date is as early as the fourth quarter of 2017, subject to market demand and receipt of the necessary regulatory approvals.

7. What is the "study corridor" that has been referred to in project-related material?

Generally, study corridors are established along the proposed primary and alternate routes to determine possible locations for the pipeline facilities and potential workspace areas. The study corridors are typically 600 feet wide. However, once our field evaluations are complete, the pipeline corridor will be reduced to a much narrower width that would be necessary to construct the pipeline. Typically, this is approximately 100 feet with the permanent rights-of-way typically being 50 feet wide.

8. Will the route for the new pipeline have any impacts on Lake Erie?

The new pipeline route will not cross or affect Lake Erie.

9. Will there be long-term benefits to stakeholders once the project is in service?

Yes. The project will provide critical access to new emerging supplies from the Utica shale gas producing region and provide local communities with affordable, clean-burning and domestically-abundant natural gas to help meet the growing environmental need for cleaner power generation.

The increased investment in energy infrastructure will deliver additional local and regional benefits in Ohio, Michigan and Ontario by creating significant jobs during the construction phase and then increased tax revenues post construction.

10. What sort of local or regional benefits can we expect to see from a project of this size?

In Ohio and Michigan, the project will create significant jobs during construction and add capital investment and tax base to both states. Long term, new natural gas infrastructure will strengthen both Ohio and Michigan as Midwest Hubs and spur additional activity and asset development such as pipelines and storage.

In all areas, the proposed pipeline project will provide consumers and businesses with critical access to an affordable, new natural gas supply source that will invigorate economies, spur growth and ensure regional economic competitiveness.

11. What impact will the project have on landowners?

The project team will begin communicating with stakeholders early on in the development process and will maintain open lines of communication throughout the project's development. Landowners and other stakeholders will have multiple opportunities to provide input during the permitting process.

The new pipeline will follow existing utility corridors for the majority of its route, which will greatly minimize impacts to the environment and surrounding areas

12. How will you communicate with local communities, landowners and other affected parties?

The experienced project development team will engage with stakeholders through informational meetings, open houses, mailings and cooperative outreach efforts with local communities. These activities will be an integral part of the project and will occur through all phases of permitting, construction and in-service operations.

13. How are the final facilities and locations determined?

The Federal Energy Regulatory Commission (FERC) exclusively authorizes the construction and operation of new facilities. FERC is also the lead federal agency responsible for conducting environmental reviews of interstate pipeline projects in compliance with the National Environmental Policy Act.

FERC will review the proposed routes and alternatives to determine which will have the least environmental and stakeholder impact while still meeting the intent of the project and needs of the market. In its review process, FERC will address all concerns raised by stakeholders throughout its proceeding.

14. Can we get a map of the pipeline?

The preliminary study corridor and potential pipeline route will be available during the public outreach phase of the project, well before any final route decisions are made by FERC. During public outreach and open houses NEXUS will seek feedback on the proposed route from landowners and make adjustments to the route when possible.

15. How will you ensure the environment will not be harmed?

The NEXUS project is committed to protecting the environment. Wherever possible the new pipeline will follow existing rights-of-way to substantially limit environmental impacts and effects to landowners. Another important feature of this pipeline system will also be its ability to utilize both existing and expansion capacity on the DTE Gas transportation system and the Vector Pipeline System to access Michigan, Chicago and the Dawn Hub in Ontario, significantly reducing overall impacts for construction and operation.

These development efforts are closely monitored by federal and state environmental agencies, requiring a number of permits. We closely adhere to all applicable environmental standards to ensure we minimize our footprint.

Environmental aspects of the construction project are regulated by FERC, which will review all plans and conduct its own environmental study of the project. Because the pipeline is an interstate line, its design and operations will be regulated by the U.S. Department of Transportation's (DOT) Office of Pipeline Safety. DOT's technical specifications and requirements that apply to construction, installation and operation of pipelines will be met or exceeded.

16. What about safety issues and measures?

Safety is the number one priority for both DTE Energy and Spectra Energy. The project partners are dedicated to the safe, reliable operation of facilities and to the protection of employees, the public and the environment. Natural gas pipelines monitor and control safety in many ways and use many different tools. Collectively, these tools make natural gas one of the safest forms of energy transportation. Our safety programs are designed to prevent pipeline failures, detect anomalies and perform repairs, often exceeding regulatory requirements. The new pipeline will operate in strict accordance with all federal, state and provincial safety requirements.

For Further Information

Please visit http://nexusgastransmission.com/.

200 Corporate Center Drive, Suite 350
Coraopolis, PA 15108

August 16, 2014

«Salutation» «First_Name» «Last_Name»
«CorporationTrust»
«Address_Line_1»
«Mailing__City», «Mailing__State» «Mailing_Zip»

Re: Proposed NEXUS Gas Transmission (NEXUS) Project
Tax Parcel #(s): «Tax_ID»
Property located in: «Property_County», County «Property_State»

Dear Landowner:

Recently you were mailed a letter announcing that DTE Energy Co. ("DTE Energy") and Spectra Energy Corp ("Spectra Energy"), the lead developers of the NEXUS Gas Transmission Project ("NEXUS"), are evaluating a proposed natural gas pipeline expansion project in your area. DTE Energy and Spectra Energy are two of the leading energy service and infrastructure companies in North America with more than a century of combined experience in developing infrastructure projects to meet the energy needs of North America in a safe, reliable and responsible manner.

To help us analyze the proposed NEXUS study corridor, our representatives are in the early stages of collecting and evaluating information necessary to determine the pipeline path with the least overall landowner, community and environmental impact, while balancing constructability concerns. You are receiving this follow-up letter because your property is within the initial study corridor being considered. We are requesting your authorization to access your property for the purpose of performing the necessary survey activities in connection with the NEXUS Project.

Our earlier letter shared news of our initial Project outreach efforts with landowners, community leaders and elected officials. This is all part of our coordinated plan to inform stakeholders about various aspects of the proposed Project, such as surveys. These civil, environmental and cultural resource survey activities are required to thoroughly evaluate a pipeline route. The surveys will be performed in a minimal amount of time with the goal of little to no inconvenience to you and other landowners.

The survey activities planned along a portion of your property within the study area, and any minimal impacts that may result, are more fully described in the enclosure entitled "Description of Survey Activities." While NEXUS certainly does not anticipate any damages to result from these surveys, please be assured that you will be compensated if any damages to your property or crops occur as a direct result of these activities. Please also note that granting us authorization to access your property for the purpose of conducting these surveys does *not* grant any other rights to NEXUS. Your consent to survey and your cooperation with NEXUS's Project representatives would be sincerely appreciated.

Survey work is scheduled to begin in September 2014. In those areas where NEXUS is proposing to construct the new pipeline system, it will be necessary to determine a location for the proposed line, availability of temporary construction work areas and potential construction access roads.

Your NEXUS representative will soon reach out to you to begin the dialogue that leads to a better understanding of your property and minimizing any impacts to your land. Our goal is for you to be as informed as possible throughout the process.

A survey permission form is enclosed for your consideration, along with a self-addressed stamped envelope. We ask that you sign this survey permit and return it to us in the enclosed envelope.

NEXUS's efforts to develop a new natural gas transportation system will benefit the U.S. Midwest Region and the Dawn natural gas trading hub in Southwestern Ontario, Canada. Ultimately, this Project will help to meet the growing environmental need for cleaner and more affordable fuels for regional power generation and for industrial and commercial customers, as well as home heating and domestic use as early as the fourth quarter of 2017.

Due to the nature of siting interstate pipelines, other pipeline companies may be evaluating proposed projects and their representatives may contact you or other landowners in your area. This is because other pipeline companies may be evaluating routing using similar criteria to NEXUS's. We understand it may be confusing if other pipeline companies contact you regarding potentially competing projects. We will certainly keep you informed of the progress of the NEXUS Project. Please don't hesitate to contact us at the number below if you have any questions.

Again, we are early in the proposed Project process and everyone will have multiple opportunities to interact and engage with the Project team, as well as participate in the appropriate regulatory processes. Different companies take different approaches to engagement and communications with the public. DTE Energy and Spectra Energy take a collaborative approach. We communicate early and often about our project activities to build positive relationships and long-lasting partnerships with all stakeholders.

If you have questions or would like additional information concerning our proposed NEXUS Project, please call our toll free number 1-844-589-3655. We would be happy to address any or all aspects of the Project with you. For more information, please visit our website http://nexusgastransmission.com/.

Sincerely,

Peter Cassan

Peter Cassan
Right-of-Way Project Manager
NEXUS Gas Transmission

Enclosure:

Survey Permission form
Description of Survey Activities
Self-addressed stamped envelope

Tract No(s): «Tract_Number»

200 Corporate Center Drive, Suite 350
Coraopolis, PA 15108

NEXUS GAS TRANSMISSION

«First_Name» «Last_Name»
«CorporationTrust»
Tax Parcel ID #(s): «Tax_ID»

SURVEY AUTHORIZATION

I/we, hereby provide to NEXUS Gas Transmission, its affiliates, agents, employees and contractors, the limited permission to enter upon my/our property only for the purposes of conducting civil, environmental and cultural resource surveys, *expressly subject to the condition that I am/we are paid for any and all damages to property or crops that may be directly caused by such activities.* Your answers to the following questions will be most helpful in accurately completing our survey activities.

Is there water well located on this property? ______Yes ______No
Is there a septic system located on this property? ______Yes ______No

Comments: ____

____

____

Signature: ____

Re: Tract No(s): «Tract_Number»

Dated: _________________________

Telephone: ____________________ (home)

____________________ (work)

____________________ (cell)

Page 4

Description of Survey Activities

Depending on the size of an individual parcel, all survey activities described below should only take a minimal amount of time and should not result in any inconvenience to the property owner. All survey work will be performed during reasonable daylight hours only. All work will be performed by authorized professional surveyors and their crews. The surveys that NEXUS Gas Transmission ("NEXUS") will request for each property are:

(a) **Civil Survey**. This activity involves approximately four to five representatives, intermittently placing wooden stakes along a portion of each property to delineate the area described as the "study corridor." Depending upon the length of the proposed study corridor on the property to be surveyed, this activity should take no longer than two days for each property that will be surveyed.

(b) **Environmental Survey.** This activity involves approximately two to three representatives walking within the study corridor, which will be clearly staked, to identify and delineate any vegetative and geological indicators of wetland areas that may be present on the property. The wetlands boundaries will be marked with small colored flags. NEXUS representatives will also look for the presence of any threatened or endangered species, if a suspected habitat is within the staked area. Depending on the length of the proposed route of the pipeline on the property being surveyed, this activity should take no longer than three days for each property that will be surveyed.

(c) **Cultural Resources Survey.** This activity involves two to four representatives walking within the staked study corridor to identify any indicators of potential archaeological resources. If such a site is suspected, then the Archeologists would return to that location with spade shovels and perform a limited excavation of the test hole that would measure approximately 2x2 feet square and approximately 2-3 feet deep. Any area that is excavated for this type of survey will be restored by NEXUS to a condition consistent with its condition prior to the excavation. Depending on the length of the proposed route of the pipeline on the property being surveyed, the archaeological walkover will take less than one day. If a limited archaeological excavation is necessary, it should take no longer than two days, weather permitting.

During any survey work, no trees over 2 inches in diameter or timber will be cut down or removed from any property. Small brush, however, may be cut in order for the civil surveyors to obtain a line-of-sight. If any such brush is cut in residential areas, it will be removed from the property by NEXUS representatives.

6 Ashley Drive
1st Floor
Scarborough, ME 04074

207.879.1930 PHONE
207.879.9293 FAX

www.trcsolutions.com

September 18, 2014

Angela Boyer
U.S. Fish and Wildlife Service
Ohio Ecological Services Field Office
4625 Morse Rd, Suite 104
Columbus, OH 43230

Subject: **NEXUS Gas Transmission, LLC**
NEXUS Gas Transmission Project

NEXUS Gas Transmission, LLC, a joint venture between Spectra Energy and DTE Energy Co., is proposing to construct approximately 245-miles of 42-inch diameter natural gas pipeline from Kensington, Ohio to Willow Run, Michigan. The NEXUS Gas Transmission Project ("NEXUS Project" or the "Project") traverses approximately 199-miles through eleven (11) counties in Ohio, including Columbiana, Stark, Summit, Wayne, Medina, Lorain, Erie, Sandusky, Wood, Lucas, and Fulton. NEXUS is investigating a study corridor as generally depicted on attached Figure 1.

Initial review of the potential pipeline corridor indicated that rare, threatened and/or endangered species may be present based on published county lists. Table 1 is attached and lists the rare, threatened and endangered species that have been previously identified in the counties traversed by the pipeline corridor. On behalf of NEXUS, TRC is requesting the assistance of the U.S. Fish and Wildlife Service ("USFWS") to determine if any of these species are known to occur within the one-mile wide area under investigation. This information will assist us in determining a route to potentially avoid and minimize disruption to sensitive habitat and determine potential seasonal or species specific surveys that maybe required during permitting of the Project. Any further comments or survey guidance regarding rare, threatened, endangered or other important species is also welcomed.

To help facilitate the consultation process, TRC requests a meeting to discuss the general scope of the proposed Project and the consultation process with the USFWS moving forward. This meeting will be the first of many opportunities to participate in the development and review of these projects. We will be contacting you soon and hope to schedule this meeting within the next month. Additional information such as a GIS SHP files of the Project study corridor to aid in the review of the Project can also be provided at that time.

If you have any questions regarding the Project or the request herein, please contact me at TRC by calling (207) 232-1979 or via email at mlychwala@trcsolutions.com

Sincerely,

Michael Lychwala

Michael Lychwala, TRC

cc: Matt Barczyk, Spectra Energy Partners, LP
Angela Gardner, TRC

U.S. Fish and Wildlife Service
September 18, 2014
Page 3 of 3

Table 1- Federally Listed Species Potentially Occurring Within/Near Nexus Project in Ohio			
Common Name	**Scientific Name**	**Status**	**County Traversed By Project With Species Occurrence**
Indiana bat	*Myotis sodalis*	Endangered	All Counties
Northern Long-eared Bat	*Myotis septentrionalis*	Proposed Endangered	All Counties
Kirtland's warbler	*Dendroica kirtlandii*	Endangered	Erie, Lake, Lorain, Lucas, Sandusky
Piping Plover	*Charadrius melodus*	Endangered	Erie, Lake
Red Knot	*Calidris canutus rufa*	Proposed Threatened	Erie, Lake, Lorain, Lucas, Sandusky
Eastern massasauga	*Sistrurus catenatus*	Candidate	Columbiana, Erie, Lucas, Sandusky, Wayne
Rayed bean	*Villosa fabalis*	Endangered	Lucas
Karner blue butterfly	*Lycaeides melissa samuelis*	Endangered	Lucas
Eastern prairie fringe orchid	*Platanthera leucophae*	Threatened	Lucas, Sandusky, Wayne
Lakeside daisy	*Hymenoxys herbacea*	Threatened	Erie

Appendix H: List of Voluntary Landowner Informational Meetings and Open House Meetings

Voluntary Landowner Informational Meetings

DATE	MEETING LOCATION	COUNTY
Tuesday, October 7, 2014	Firelands Elementary School 10779 Vermilion Rd. Oberlin, OH 44074	Lorain
Wednesday, October 8, 2014	Stark State College 6200 Frank Ave. NW North Canton, OH 44720	Columbiana Stark Summit Carroll
Thursday, October 9, 2014	Medina Community Recreation Center 855 Weymouth Rd. Medina, OH 44256	Medina Wayne
Monday, October 13, 2014	Swanton High School 601 N Main St Swanton, OH 43558	Fulton Lucas
Tuesday, October 14, 2014	Margaretta Elementary School 5906 Bogart Rd. W Castalia, OH 44824	Erie
Wednesday, October 15, 2014	Terra Community College 2830 Napoleon Rd. Fremont, OH 43420	Sandusky
Thursday, October 16, 2014	Owens Community College 30335 Oregon Rd Perrysburg, OH 43551	Wood
Wednesday, November 12, 2014	Lincoln High School 7425 Willis Rd Ypsilanti, MI 48197	Washtenaw Monroe
Thursday, November 13, 2014	Adrian High School 785 Riverside Ave Adrian, MI 49221	Lenawee

Open House Meetings

DATE	MEETING LOCATION	COUNTY
Monday, February 2, 2015	The Galaxy Banquet Center 201 Park Center Dr. Wadsworth, OH 44281	Medina Wayne
Tuesday, February 3, 2015	Lorain County Community College 1005 Abbe Rd. N Elyria, OH 44035	Lorain
Wednesday, February 4, 2015	Margaretta Elementary School 5906 Bogart Rd. W Castalia, OH 44824	Erie
Thursday, February 5, 2015	Terra Community College 2830 Napoleon Rd. Fremont, OH 43420	Sandusky
Monday, February 9, 2015	Stark State College 6200 Frank Ave NW North Canton, OH 44720	Summit Stark
Tuesday, February 10, 2015	United Local High School 8143 Ohio 9 Hanoverton, OH 44423	Columbiana Carroll
Wednesday, February 11, 2015	Swanton High School 601 N Main St Swanton, OH 43558	Fulton
Thursday, February 12, 2015	Central Park West 3141 Central Park West Dr. Toledo, OH 43617	Lucas Wood
Tuesday, February 17, 2015	Adrian College 110 S Madison St. Adrian, MI 49221	Lenawee
Wednesday, February 18, 2015	Lincoln High School 7425 Willis Rd. Ypsilanti, MI 48197	Washtenaw Monroe

APPENDIX 1C4

Ohio Natural Gas Market Study

Ohio Natural Gas Market Study:

Prepared for the NEXUS Gas Transmission Project

Susan F. Tierney, Ph.D.
Craig P. Aubuchon
Pavel G. Darling
Analysis Group, Inc.

June, 2015

Acknowledgments

This Report has been prepared at the request of NEXUS Gas Transmission, LLC ("NEXUS") with respect to its proposed NEXUS Gas Transmission project. The purpose of this Report is to review the market for natural gas in Ohio, with a particular focus on the Northern Ohio region that is proposed to be served by the NEXUS Project.

This is an independent report by the authors at the Analysis Group, and reflects the research, analysis, judgment, and opinions of the authors. The authors would like to recognize and thank our Analysis Group colleagues – Maggie Reilly, Shaheen Lavie-Rouse, and Sean Burpoe – for their significant analytic and research support for this Report.

About Analysis Group

Analysis Group provides economic, financial, and business strategy consulting to leading law firms, corporations, and government agencies. The firm has more than 600 professionals, with offices in Boston, Chicago, Dallas, Denver, Los Angeles, Menlo Park, New York, San Francisco, Washington, D.C., Montreal, and Beijing.

Analysis Group's energy and environment practice area is distinguished by expertise in economics, finance, market analysis, regulatory issues, and public policy, as well as significant experience in environmental economics and energy infrastructure development. The practice has worked for a wide variety of clients including energy producers, suppliers and consumers; utilities; regulatory commissions and other public agencies; tribal governments; power system operators; foundations; financial institutions; and start-up companies, among others.

Table of Contents

EXECUTIVE SUMMARY

The purpose of this Report is to review the market needs and potential public benefits associated with increased natural-gas delivery capability in Ohio, with a focus in particular on the market for natural gas as part of Northern Ohio's changing energy landscape. This is a region with significant population and economic activity. It is also close to the Marcellus and Utica Shale plays located in the Appalachian Basin, with growing production of relatively low-cost natural gas. Northern Ohio has an increasing demand for natural gas and will require additional infrastructure to meet its needs in the coming years.

Historically, Ohio's economy has depended deeply on coal for power generation, with natural gas and oil used primarily for other energy needs. The advent of abundant and relatively low-cost shale gas is disrupting this energy landscape in major ways – especially for power plants and for industrial users in particular.

In Northern Ohio,[1] fuel and power supplies used by some of the state's largest cities and businesses must be delivered into the area. Currently, the gas-delivery infrastructure connecting that region with natural-gas production basins limits the amount of gas that can be used in Northern Ohio. Some parts of Northern Ohio lack physical access to pipeline deliveries; and even in those parts where there are gas-delivery points, access to gas may be constrained during peak periods. Energy customers seeking to increase their use of natural gas cannot access firm natural-gas supply on a year-round basis without expansion of the pipeline system. This situation will limit growth in gas use at a time when the outlook for gas prices is attractive and when pressure to use more natural gas may increase as a result of federal regulations that limit carbon emissions from coal-fired power plants.

The proposed NEXUS Gas Transmission project ("NEXUS Project") will expand the natural-gas pipeline capacity in Northern Ohio. The NEXUS Project is designed to transport 1.5 billion cubic feet a day ("Bcf/day") of gas from the growing supply basins in Appalachia to customers in the U.S. Midwest, including Ohio. The proposed route for the new greenfield pipeline proposed by NEXUS would connect to delivery points for Appalachian shale gas in Columbiana County, Ohio and other Northern Ohio counties and traverse Northern Ohio to further delivery points in Southern Michigan.

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[1] For purposes of this report, Northern Ohio is defined as counties that are within 25 miles of the proposed NEXUS route to the south and bounded by Lake Erie to the north.

Just under half of Ohio's population lives in Northern Ohio counties, and the NEXUS Project is close to major population centers in Toledo, Cleveland, Akron and Youngstown. Consumers in these counties currently use over half of Ohio's total natural gas demand. These Northern Ohio counties are also home to roughly 40 percent to the state's total economic activity and just under a third of the state' total fossil-fuel electric generation. In addition to announced coal-fired power plant retirements, and other plants that are planning to switch from coal to natural gas, there are also several proposals for new gas-fired power plants in this region.

In large part because of these market conditions, there is substantial demand for incremental gas delivery and supply in Northern Ohio. Our report has the following conclusions:

- ***A substantial increase in regional production within the Appalachian Basin has already changed the dominant flow of natural gas within the U.S., with new flows expected to move westwardly from the Appalachian region***. This increased production has lowered prices substantially and prices are expected to remain low for the foreseeable future. This has already provided initial economic benefits to consumers in Ohio and elsewhere in the form of lower electricity and natural gas costs, and additional jobs and economic opportunities to the State of Ohio.
- ***Significant potential incremental peak-day demand is associated with known new natural gas combined cycle power plants, coal-to-gas plant conversions and other power plants***. We estimate that the potential incremental gas-delivery demand for currently planned generating units to be 0.535 Bcf/day. Because this potential demand reflects only the currently identified new power-plant projects, there could be much more in the future as the region transitions to an electricity mix that depends less on coal and more on natural gas. Demand of traditional customers (residential, commercial and industrial customers) would be above that daily demand of power generators.
- ***Existing gas-delivery capacity needs to expand to accommodate greater use of natural gas in Northern Ohio***. Potential incremental year-round demand for natural gas of traditional customers and power-generation customers in Northern Ohio would require up to an additional 150 Bcf/year. Much of this demand will need to be served by firm fuel contracts to ensure reliable access during heating season. Further, as natural gas demand grows in other parts of Ohio, additional pipeline capacity will be required to meet that demand. The NEXUS Project's access to Northern Ohio markets may free up capacity on pipelines currently serving that market and allow them to meet the demand needs in other parts of the state along their systems.
- ***A strong industrial base in Northern Ohio needs access to low-cost energy to remain competitive***. For example, studies indicate that with greater access to natural gas,

energy-intensive manufacturing sectors could outperform the growth of U.S. industries as a whole. Providing incremental access to low-cost energy to Ohio's manufacturing base will benefit those industries and the broader state as well.

- ***An opportunity to serve incremental residential heating needs could be accommodated through greater access to natural gas delivery-capability and storage-balancing services***. The ability of local distribution companies ("LDCs") or their retail energy marketers to take on additional firm customers depends upon incremental pipeline capacity such as the NEXUS Project
- ***Incremental gas delivery capacity can support the transition of Ohio's and the region's power sector to an overall fleet with lower overall carbon dioxide ("CO_2") emissions, in order to meet state and federal clean energy goals.*** More than 3,500 megawatts ("MW") of coal-fired capacity in Ohio will retire by 2016. These coal units will be replaced by almost 5,000 MW of natural-gas combined-cycle ("NGCC") capacity, with the vast majority of that capacity located in Northern Ohio. These units support not only Ohio's electricity demand but also a regional economic dispatch of power plants taking CO_2 emissions into account. These units will be expected to run with high capacity factors including operations during winter seasons when incremental firm natural-gas delivery service will be needed to ensure NGCCs' availability for power generation.

The NEXUS Project includes a unique bundle of attributes that can enable it meet these emerging natural gas opportunities in Northern Ohio. These attributes include:

- ***A project that can move forward in development, given the financial commitment of anchor shippers.*** The NEXUS Project's overall economics will allow it proceed now. And it will have the capability to allow other shippers in the future to sign up for firm and interruptible capacity over time to meet new and emerging demand on an as-needed basis. It will also benefit customers (including those directly served by LDCs, and industrials and power generators) that are already connected to existing gas-delivery systems, through increasing their options to access low-cost gas supplies.

- ***Use of existing infrastructure corridors*** with three-fifths of the route's mileage located on existing pipeline or railroad corridors. As such, the NEXUS Project can provide incremental access to natural gas delivery for a large portion of Northern Ohio with less disruption to communities and natural resources than would occur with an entirely new right of way.

- ***Provision of a new, state-of the-art large-diameter and high-capacity line*** in an area populated by relatively small-diameter, lower-pressure systems. The NEXUS Project can help support the new westward flow of natural gas from the Appalachian shale basins.

The NEXUS Project will also be able to provide pressure support to an underserved region, which will benefit existing customers through increased reliability and supply options.

- ***Capability to meet potential incremental demand for natural gas in a time frame that coincides with significant changes in the overall energy landscape in the region.*** These changes include retirements of coal-fired power plants in Northern Ohio that will be replaced by new NGCCs, as well as incremental demand for low-cost natural gas supply by Northern Ohio's important industrial and manufacturing base.

- ***Ability for timely and incremental expansion of infrastructure*** to meet growing demand for natural gas. The NEXUS Project's mainline through Northern Ohio also offers the capability for incremental mainline expansion and lateral lines to new end-use customers that could use natural gas if they could access it economically. For example, households in several Northern Ohio counties continue to rely on distillate fuel oil and electricity for residential heating. With access to sustained low-cost natural gas and increasingly more-efficient boilers, these homes may find it economical to switch to natural gas if more supply and delivery capability becomes available. The NEXUS Project can open access for a whole new set of potential gas-heating customers. LDCs in this region support the conversion of homes to natural gas through the use of financial incentives like rebates.

- ***Support for Ohio's environmental and clean-energy goals, with the ability to help enable timely and cost-effective compliance with CO_2 emission-reduction requirements in the electric sector***. The Ohio Environmental Protection Agency has expressed concern that "an apparent slowdown in the growth" of new pipeline development would make it harder to support a significant transition to and redispatch of natural-gas-fired capacity. The NEXUS Project would provide the capability to address that concern in a timely way and help the state transition to a newer, more-efficient energy mix with lower CO_2 emissions. The region's grid operator, PJM, has found that greater reliance on new NGCCs could help the state meet its emission-reduction goals at lower overall costs to consumers.

This report examines the market for natural gas in Northern Ohio and the ability of the NEXUS Project to serve it. Following a more detailed overview of the NEXUS Project and the overall economic and energy context in the state of Ohio, the report assesses the potential demand for natural gas by traditional end-use sectors and by the power sector in the state. The report also provides an overview of the existing natural gas infrastructure in the State, including historical constraints on the current system. The final section of the report examines the specific value of additional pipeline delivery capability in the parts of Northern Ohio that could be served by the NEXUS Project.

1. DESCRIPTION OF THE NEXUS PROJECT

The NEXUS Gas Transmission Project (“NEXUS Project” or “Project”) will provide up to 1.5 billion cubic feet (“Bcf”) per day of new natural gas pipeline capacity to connect demand in Michigan, Northern Ohio, other parts of the Midwest, and Ontario natural gas markets with production basins in the Appalachian Mountain areas and other source of supply served by the Texas Eastern pipeline system and the Tennessee Gas Pipeline system.

The NEXUS Project has been proposed to satisfy the “market demand pull” associated with serving end-use customers along the route and beyond its terminus in Michigan as well as a “producer push” to deliver increasing production of relatively low-cost natural gas supply from the Appalachian Basins (defined broadly as both the Marcellus and Utica shale regions). The project developers indicate that the Project is intended to help to alleviate market constraints caused by the decrease in supply to the Midwest from Western Canada and conversion of regional gas pipelines to crude oil transmission.[2]

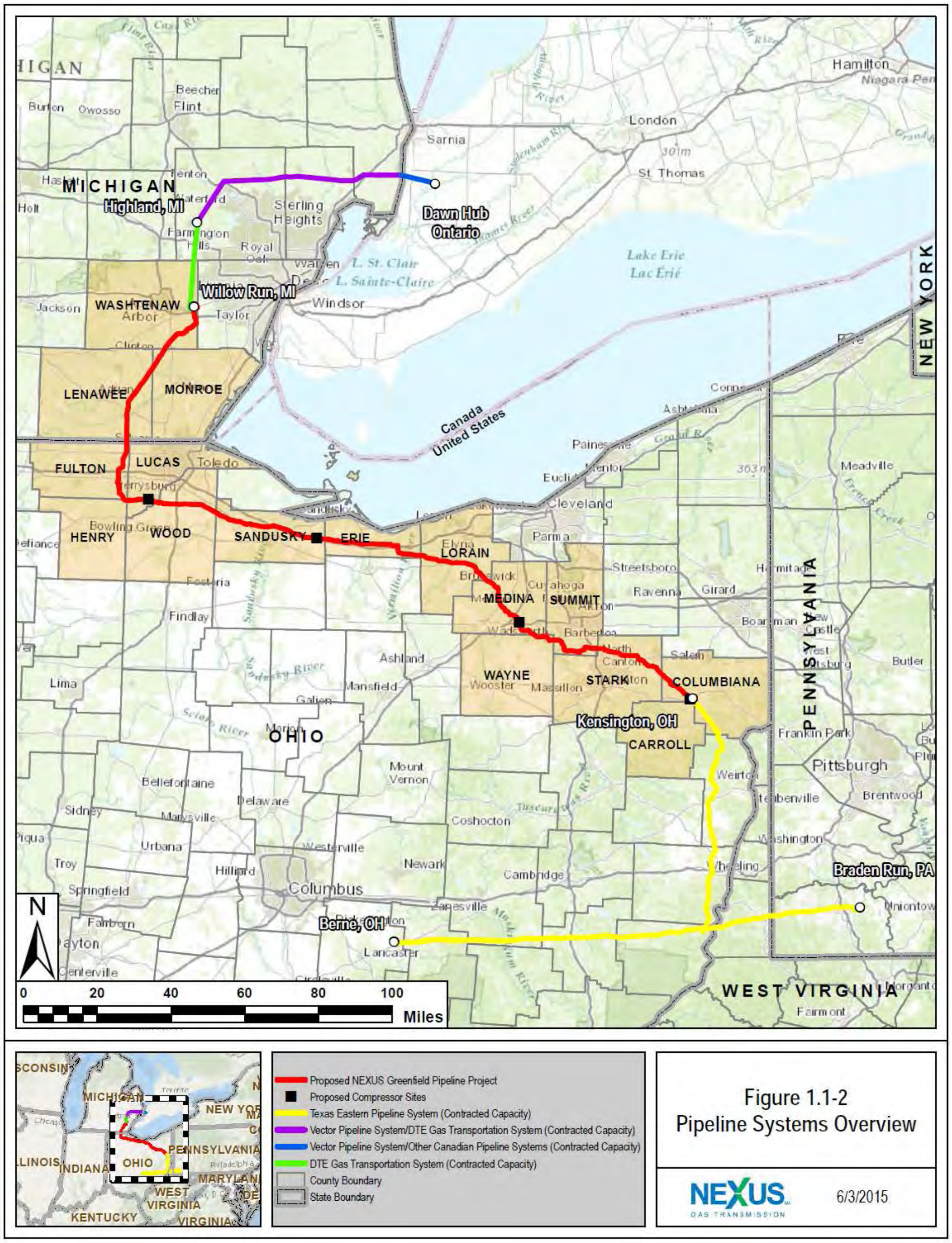
The NEXUS Project includes both new pipeline infrastructure along greenfield and existing rights of way and the expansion of existing infrastructure capacity at both ends of the Project. As shown in Figure 1, below, the new construction is comprised of approximately 250 miles of new natural gas transmission mainline capacity beginning in Kensington, Ohio, and ending west of Detroit in Willow Run, Michigan. The Project route crosses through Northern Ohio, with approximately 60 percent located along existing rights of way (“ROW”).[3] The Project also includes several additional expansions, in both Ohio and Michigan.[4] In Ohio, the expansion of the Texas Eastern Transmission, LP system will allow shippers to access supplies between the current line and Kensington, Ohio. In Michigan, NEXUS will contract for or lease capacity from DTE Energy Gas for transportation services in eastern Michigan to provide NEXUS with access to Vector Pipeline, Michigan markets and natural gas storage and balancing services. Vector Pipeline will provide NEXUS with additional access to eastern Michigan and Canadian markets and natural gas storage and balancing services.

[2] NEXUS Gas Transmission Project, “Resource Report 1: General Project Description,” Federal Energy Regulatory Commission (“FERC”), Docket No. PF15-10-000, January 2015 (hereafter “Resource Report 1”), page 1-4.

[3] Resource Report 1, pages 1-1 through 1-10.

[4] Resource Report 1, pages 1-1 and 1-3. Texas Eastern Transmission, DTE Gas Transportation and Vector will submit separate filings at FERC.

Figure 1
Route of the NEXUS Natural Gas Transmission Project

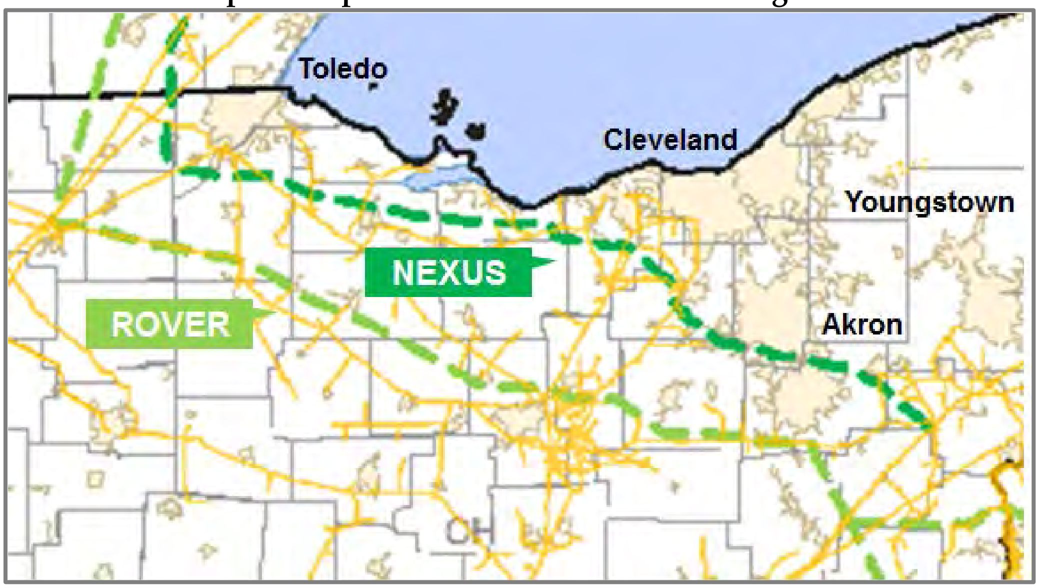


Source: NEXUS Gas Transmission Project, Resource Report, Figure 1.1-2, June 3, 2015

The NEXUS Project is not the only project currently proposed to meet the growing demand for natural gas in the northern parts of Ohio. For example, the Rover Project, under development by Energy Transfer Partner, L.P., would run 409 miles from the Midwest Hub in Defiance

County, Ohio, across Northern Ohio (south of the NEXUS Project's route), through Michigan to an interconnection with Vector Pipeline. Much of the Rover's route would require siting of facilities on new rights of way.[5] (See Figure 2.) The Rover project describes itself as a "producer-driven pipeline" with its primary purpose to move "stranded" Appalachian Basin natural gas out of that basin and into the Midwest and other regions.[6]

Figure 2
Proposed Pipelines in Ohio and Surrounding Area



Source: SNL Financial

2. BACKGROUND AND CONTEXT

Overview: Ohio's Changing Energy Market

As the state with the 7th largest economy in the U.S.[7] and with the 6th largest energy use among industrial customers in the 50 states,[8] Ohio is an important market for competitive energy

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[5] The Rover proposal also includes new lateral pipelines ranging from 4 to 206 miles in length, to connect it to parts of southeast Ohio, Michigan, and Canada, for a total of 823 miles of new pipeline that would provide 3.25 Bcf/day of new pipeline capacity. Much of the Rover's route would require siting of facilities on new rights of way. Sources: Rover Pipeline Project, "Resource Report 1 Project Description," Federal Energy Regulatory Commission ("FERC") Docket No. CP15-93-000, February 2015 (hereafter "Rover Resource Report 1"), pages 1-2 and 1-4; Resource Report, page 1-8; Jon Chavez, "Ohio's natural gas boom brings flurry of pipeline construction," Toledo Blade, December 7, 2014, http://www.toledoblade.com/business/2014/12/07/Ohio-s-natural-gas-boom-brings-flurry-of-pipeline-construction.html.

[6] Rover Resource Report 1, pages 1-2 and 1-4.

[7] U.S. Bureau of Economic Analysis ("BEA"), Gross State Product data, 2013.

commodities like natural gas. Ohio's industrial base is strong: its manufacturing base is the 4th largest in the U.S.[9]

Historically, Ohio has made use of its proximity to coal basins to supply the fuel for much of its power supply. About 70 percent of Ohio's electricity production is fueled by coal, compared to the U.S.'s at 40 percent.[10] Relatively low-cost coal supply has historically helped provide low-cost electricity to Ohio businesses and households for decades.

Natural gas use for power generation in Ohio has historically been quite low. It is only since 2010 that natural gas use has risen above 5 percent of total power generation in Ohio, compared to the national average of at least 20 percent for two decades.[11]

But the energy mix has been changing significantly in recent years, with natural gas displacing coal in many energy applications. As of 2012, for example, natural gas' share of power supply rose to 36 percent in the U.S. and 16 percent in Ohio (see Figure 3); but even with natural gas use growing significant in Ohio, it still lags significantly behind natural gas use in the U.S.

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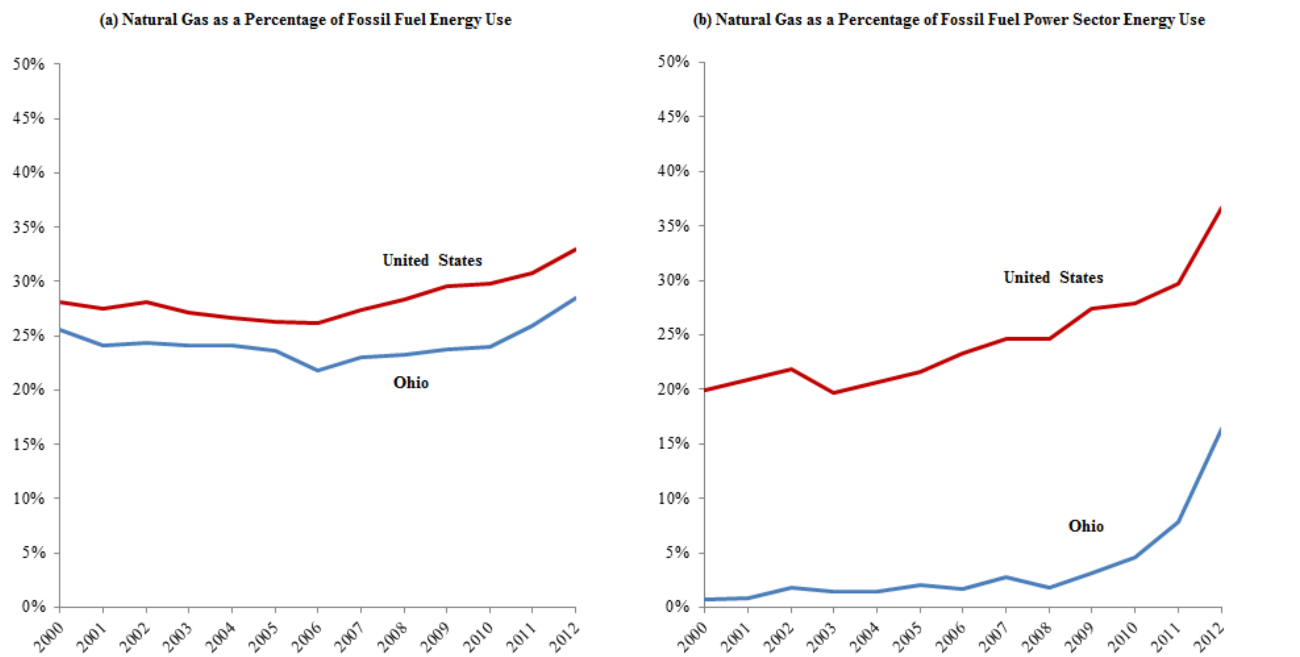
[8] U.S. Energy Information Administration ("EIA"), State Energy Data System ("SEDS"), Table C10. http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep_sum/html/rank_use.html&sid=OH. Accessed June 9, 2015.

[9] BEA: Data on each state's gross state product for manufacturing as a percentage of total Gross Domestic Product (U.S.) for manufacturing. 2013 data.

[10] See Table 2. SNL Financial, 2013 data.

[11] EIA, SEDS 2013 data.

Figure 3
Comparison of Natural Gas Usage in Ohio and the U. S., 2000-2012



Notes & Sources:
[1] U.S. Energy Information Administration, State Energy Data System (SEDS): 1960-2012, available at http://www.eia.gov/state/seds/seds-data-complete.cfm?sid=OH#CompleteDataFile, accessed February 26, 2015.
[2] Figure (a) reflects all natural gas consumption as a percentage of all petroleum, natural gas, and coal consumption in Ohio.
[3] Figure (b) reflects all natural gas consumed by the electric power sector as a percentage of all petroleum, natural gas, and coal consumed by the electric power sector in Ohio.

As described further in the section entitled "Impacts of Increased Natural Gas Production," natural gas production has increased substantially in the Appalachian region, including the Marcellus, the Utica and the Devonian shale gas plays covering parts of Virginia, Ohio, Pennsylvania, and New York. The now-well publicized deployment of hydraulic fracturing and directional drilling in unconventional natural gas reservoirs has provided access to economical supplies of natural gas in new areas of the U.S.

Ohio straddles the intersection of this changing energy landscape. It is proximate to productive coal basins in the southern part of the state and the highly productive Appalachian natural gas plays located on the eastern part of the state (and beyond its borders to the East). It can be expected that Ohio will see changes in the demand for natural gas. Given its historical advantage of being close to low-cost energy (including electricity generated from coal), Ohio developed – and has maintained – a large and robust industrial manufacturing sector with significant demand for relatively low-cost energy.[12] As such, the Ohio market is a critically important piece of this newly emerging energy landscape.

The electric sector is also in the midst of a fundamental transformation, with increased output from existing underutilized natural gas power plants and new, highly efficient natural-gas fired power plants in development and expected to displace electricity produced at various parts of the regional coal-fired generating fleet. The economics of coal-fired generation have deteriorated in recent years due to many factors, including current and proposed air regulations and the falling cost of natural gas and its relative attractiveness for power production.[13] Coal-fired power plants, representing more than 3,500 MW of capacity, are expected to retire in both the immediate future and the next several years in Ohio. These retirements are expected to be offset by almost 5,000 MW of known NGCC power plants in various stages of development. (These issues are discussed in greater detail in the section on "Existing and Forecasted Natural Gas Demand from Ohio's Power Sector.")

Impact of Increased Natural Gas Production

The trends in greater competition between natural-gas-fired power plants and coal-fired power plants have been driven largely by the falling prices of natural gas relative to coal. Natural gas prices have fallen by more than 50 percent since 2008[14] and are expected to remain low for the foreseeable future. Falling natural prices have benefited consumers across the country, both in terms of prices to end users of natural gas and in terms of lowering electricity costs to all consumers as efficient natural gas-fired power plants have become the predominant choice for new construction by generators.

These lower natural gas prices have resulted substantially from increased production at new natural gas fields that began to be commercially accessible starting in the mid-2000s, through the advent of new drilling techniques. The largest of these "new" natural gas plays is in the Appalachian Basin. (See Figure 4.)

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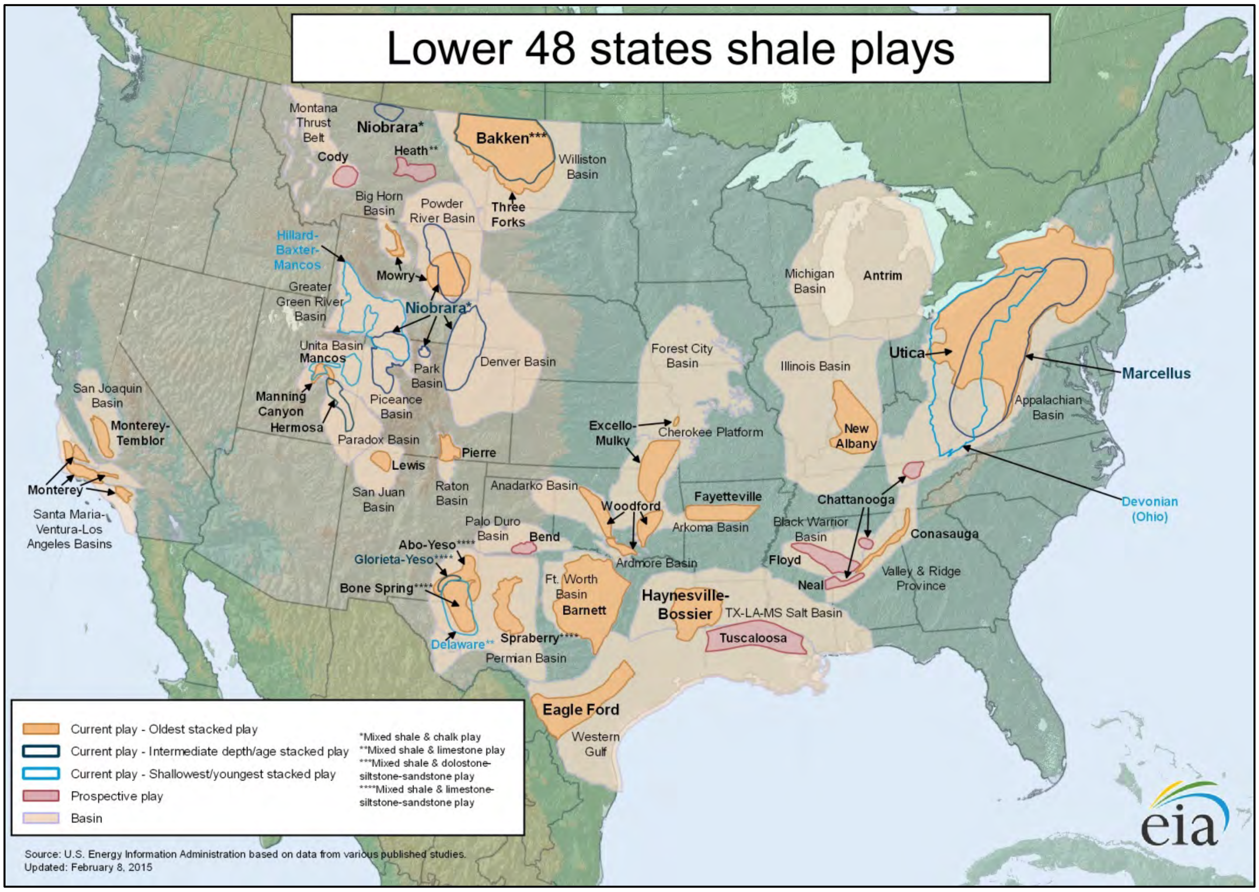
[12] In 2013, Ohio ranked sixth in the nation for energy consumption by the industrial sector. Manufacturing accounted for 18 percent of the State's gross domestic product ("GDP"). EIA notes that in 2013, Ohio accounted for over 3 percent of all U.S. manufacturing-related GDP. See http://www.eia.gov/state/?sid=OH, accessed on 5/27/2015.

[13] See: Susan Tierney, "Why Coal Plants Retire: Power Market Fundamentals as of 2012," March 2012.

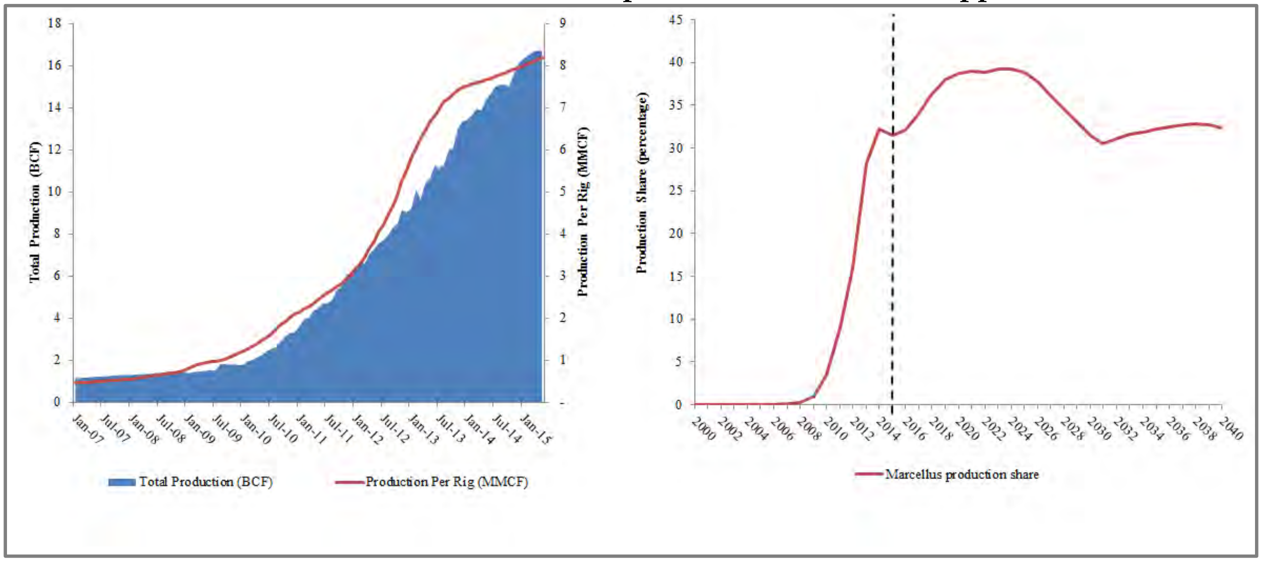
[14] Using the Henry Hub spot price for natural gas: in 2008 the average price of natural gas was $9.13 per Mcf, the price in 2014 was $4.52 per Mcf, and the estimated average annual price for 2015 is $3.01 per Mcf (as of 5-23-2015). http://www.eia.gov/forecasts/steo/tables/?tableNumber=8#endcode=2015&startcode=2008

Figure 4
Shale Gas Plays, Lower 48 States



The expansion of production from natural gas wells in the Marcellus Shale, for example, is unprecedented in U.S. energy history, both in terms of scale and scope. Total production has grown exponentially since 2007, going from less than 2 Bcf/day to more than 16 Bcf/day in 2015. (See Figure 5.) The region has added several hundred rigs during that same period, and those rigs have increased their overall production, even on a per-rig basis. With this activity, natural gas from the Marcellus region has grown from less than 10 percent of total U.S. production consumed east of the Mississippi as recently as 2011 to more than 30 percent of total. And growth is continuing to increase: through April 2015, production was growing in the region close to 20 percent on a year-over-year basis. Production is forecast to remain a critical part of the nation's energy infrastructure, and will continue to provide more than 30 percent of total supplies east of the Mississippi for the next 25 years.

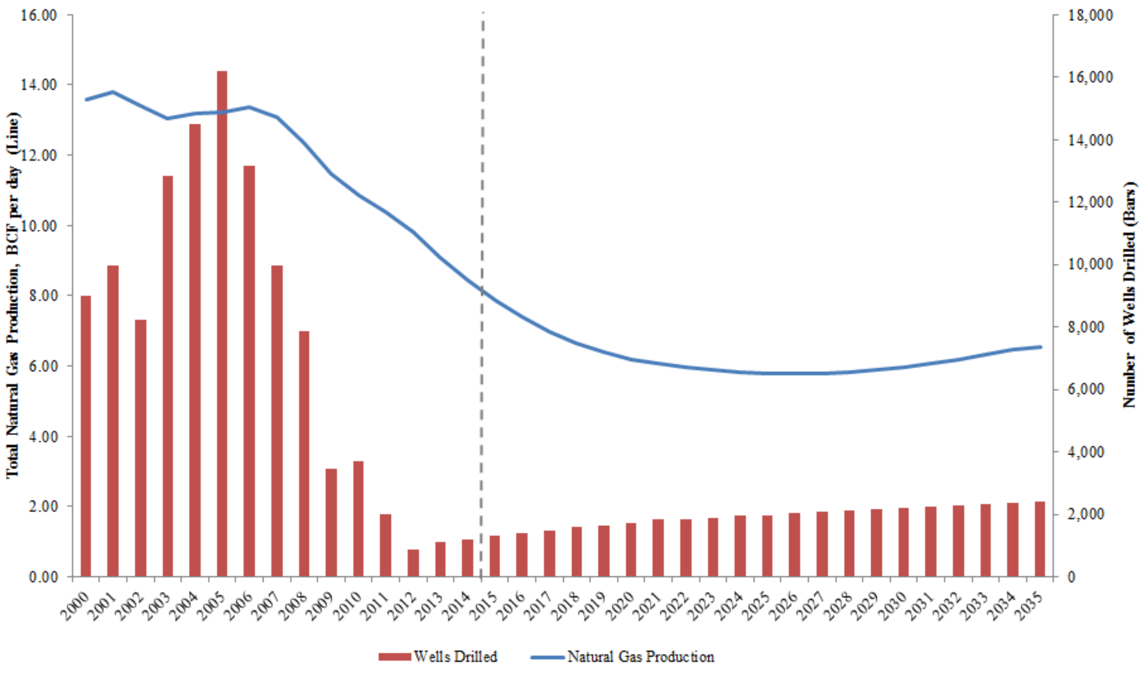
Figure 5
Natural Gas Production in the Marcellus Shale Region
(Total Marcellus production and
Share of U.S. Natural Gas Consumption East of the Mississippi River)



Source: EIA, Drilling Productivity Report and EIA Annual Energy Outlook 2015.

At the same time, natural gas production in traditional supply areas has declined over time, as wellhead pressures have been reduced with increased extraction. Production in Alberta, Canada, for example, which has traditionally been a source of supply to the Midwest and Eastern parts of the U.S., has declined more than 50 percent (from a high of 13.5 Bcf/day in 2000 to 8.5 Bcf/day in 2014). (See Figure 6.) Both the total number of wells and the overall production from conventional natural gas basins is expected to remain low for the foreseeable future.

Figure 6
Natural Gas Production, All Well Types, Alberta, 2000 to 2035

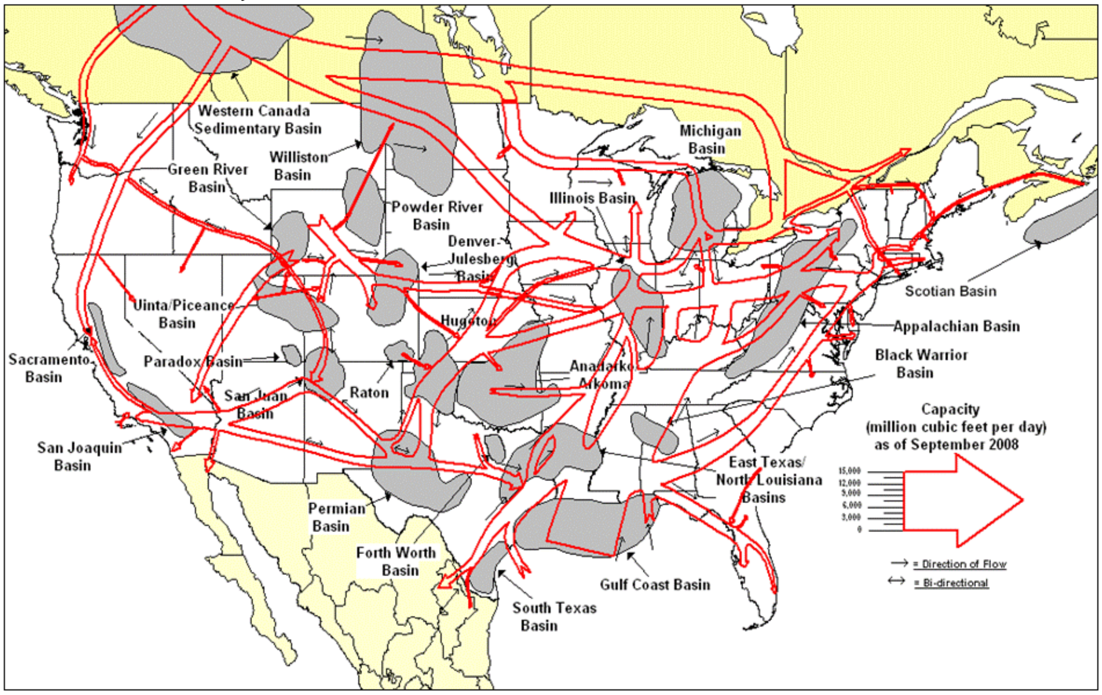


Notes & Sources:
[1] "Canada's Energy Future": https://www.neb-one.gc.ca/nrg/ntgrtd/ftr/index-eng.html
[2] Data represents total natural gas production from solution, non-association, tight, shale, and coalbed methane wells. All data are for the Alberta region, as reported by the Canada National Energy Board.

Taken together, these trends – increased production in unconventional natural-gas plays like the Appalachian Basin and the declining production of traditional supply areas in Western Canada – have redirected the flow of natural gas within the United States. Just a decade ago, the predominant flow of natural gas in the Midwest and Eastern part of the U.S. had been from the Gulf Coast, the Southwest and the U.S. and Canadian Rockies, as shown in Figure 7 (indicating the direction and volume of flows as of 2008). But new production in the Appalachian region has already begun to change the flows of natural gas throughout the U.S.,[15] as illustrated in Figure 8 for the shifts from 2012 to 2013, along generalized pipeline corridors.

[15] "Shifts in pipeline flows across the U.S. emerged as natural gas production from shale displaced conventional sources. Marcellus gas located in the Northeast is a closer and often cheaper source of natural gas for major Northeast demand centers. The 3.5 Bcfd increase of Marcellus gas production displaced natural gas supplies from the Southeast, the Mid-Continent, and Canada. Supplies from those regions fell from around 12 Bcfd in 2008 to less than 6 Bcfd in 2013. In some instances, pipelines reversed physical flows to provide Marcellus gas to the Southeast, Canada, and the upper Midwest." FERC, 2013 State of the Market Report, March 20, 2014, http://www.ferc.gov/market-oversight/reports-analyses/st-mkt-ovr/2013-som.pdf.

Figure 7
Major Natural Gas Transmission Corridors as of 2008

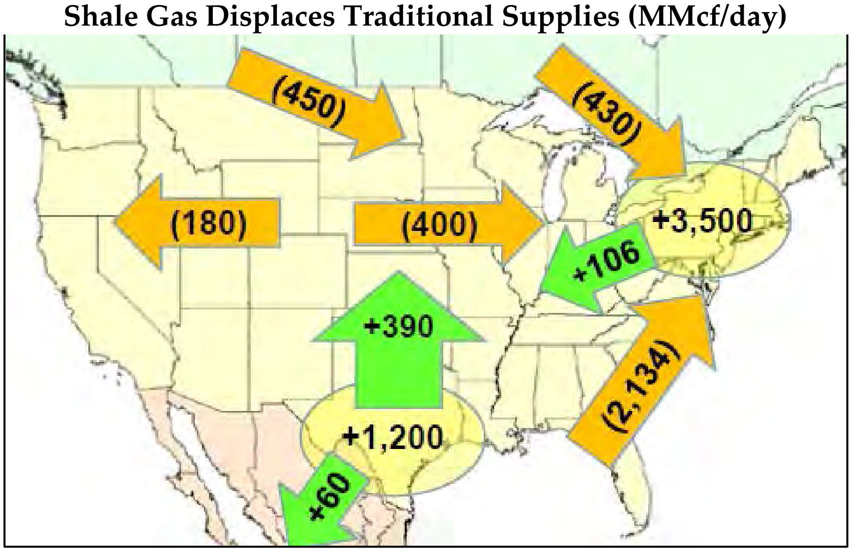


Source: Energy Information Administration, Office of Oil and Gas, Natural Gas Division, GasTran Gas Transportation Information System.

The EIA has determined that the informational map displays here do not raise security concerns, based on the application of the Federal Geographic Data Committee's *Guidelines for Providing Appropriate Access to Geospatial Data in Response to Security Concerns*.

Source: http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/TransportationCorridors.html

Figure 8
Natural Gas Flows: (2012 to 2013)
Shale Gas Displaces Traditional Supplies (MMcf/day)



Notes: Green arrows represent an increase from 2012; orange arrows represent a decline from 2012. Circles represent increases at shale gas production areas. Source: FERC, 2013 State of the Market Report.

These shifting production and pipeline flows have begun to offer new opportunities to industries and residents in areas, including parts of the Midwest, that historically have been limited in how and when they could access this fuel source in economical ways. Underpinning this change is the capacity of the infrastructure – the physical transmission system – that can help move natural gas to the cities, industries, power-production facilities, and households that may seek to use it for parts of their energy needs whenever it provides a more attractive option than remaining on coal (or other fuels). Given this new reality, the Appalachian Basin natural gas production is expected to provide significant economic benefits to Ohio, and not just from lowering costs to energy users.

Overall economic benefits to the state include a number of investment streams into Ohio, such as expenditures on mineral leases, road and bridge upgrades, well drilling, and post-production infrastructure needs. A study prepared by a consortium of Ohio universities estimated that the total economic value of natural gas production was $4.8 billion in 2014.[16] Shale production has also brought additional jobs to Ohio's population. In 2010, direct jobs from the Natural Gas and Oil Industry amounted to 4,490, with an estimated additional 204,000 jobs to be created due to exploration and drilling by 2015.[17]

Spotlight on Northern Ohio's Economic Conditions

Much of Ohio's population and economic activity resides in Northern Ohio.[18] These counties include several major population centers – Toledo, Cleveland, Akron, and Youngstown – and almost half of the state's population, despite accounting for only 20 percent of the State by area. These regions are important economic engines of the state, with diverse and robust manufacturing, health-care and trade sectors. (See Figure 9.) In 2012, these metropolitan areas accounted for 40 percent of the total Ohio's total Gross Domestic Product ("GDP").

Manufacturing continues to drive economic output in Ohio. In 2012, manufacturing as a whole accounted for 18 percent of statewide GDP and in 2013, Ohio accounted for 3.4 percent of all U.S. manufacturing,[19] with 45 percent of the manufacturing activity located in Northern Ohio.

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[16] "An Analysis of the Economic Potential for Shale Formation in Ohio," Cleveland State University, Ohio State University, and Marletta College, sponsored by the Ohio Shale Coalition, 2014, page 2.

[17] "Ohio's Natural Gas and Crude Oil Exploration and Production Industry and Emerging Utica Gas Formation," Kleinhenz & Associates, sponsored by Ohio Oil & Gas Energy Education Program, September, 2011, page 3.

[18] For purposes of this report, we define Northern Ohio as counties that are within 25 miles of the proposed NEXUS route to the south and bounded by Lake Erie to the north.

[19] Ohio State Energy Profile, EIA, http://www.eia.gov/state/?sid=OH, accessed on 5/27/2015.

Northern Ohio, in particular, has a high concentration of energy-intensive manufacturing industries, such as non-metallic mineral products, primary metals manufacturing and chemical products manufacturing. Measured by employment, the industrial facilities located in Northern Ohio account for a disproportionate share of those industries in Ohio overall: between 56 percent (Chemical Manufacturing) and 73 percent (Primary Metal Manufacturing) of all Ohio jobs in these industries occur in Northern Ohio.

Figure 9
Economic Activity in Northern Ohio ($2012 GDP)

Note: "F/R" = Finance and Real Estate. "GDP" = Gross Domestic Product. "Mfg"" = Manufacturing. "PS" = Professional Services. "SQMI" = square mile. "T" = Trade. Percentage of GDP by North American Industry Classification System ("NAICS") code is depicted for the top 3 industries in each metropolitan statistical area ("MSA"): Mfg (31-33), F/R (52-53), T (42, 44-45), PS (54-56).
Sources: SNL Financial and U.S. Bureau of Economic Analysis.

These energy-intensive sectors stand to benefit more than others from continued and increased access to low-cost natural gas. A 2013 report from IHS found that lower natural gas prices could increase U.S. industrial production 2.8 percent by 2015 and 3.9 percent by 2025, and that these energy-intensive sectors could outperform the average growth of U.S. industries as a whole.[20] This resurgence in energy-intensive industrial activity in these sectors is expected to be driven, in part, by the availability of low-cost energy (spurred by shale natural gas). In turn, other industries (like primary metal manufacturing) will experience increased demand to produce the necessary components for drilling and pipeline expansion.[21] These industries compete with low-cost manufacturing centers abroad.

Simply put, access to low cost energy is critical to ensuring that these industries remain cost competitive going forward. Nowhere is this more important than in Northern Ohio – one of the most productive manufacturing centers in the Nation.

3. EXISTING AND FORECASTED NATURAL GAS DEMAND FROM OHIO'S RESIDENTIAL, COMMERCIAL AND INDUSTRIAL SECTOR

Ohio's Wholesale and Retail Natural Gas Markets: A Brief Overview

The retail natural gas market in Ohio has been deregulated for many years, allowing end-use customers to buy either bundled natural gas service from their local distribution company ("LDC") or unbundled commodity service from a competitive supplier, with delivery provided by the LDC. LDCs do not have exclusive franchise areas, according to the state utility regulatory agency, the Public Utilities Commission of Ohio ("PUCO"). Figure 10 shows the LDCs that serve end-use customers in each county, with PUCO-regulated investor-owned LDCs shown in black letters, cooperative LDCs in red, and municipal LDCs in blue.

Gas delivery service to LDCs and end-use customers taking service directly from an interstate pipeline is provided by companies regulated by the Federal Energy Regulatory Commission ("FERC"). Multiple interstate natural gas pipeline companies have delivery facilities in various parts of the state. That said, LDCs and end-use customers taking service off of the interstate system in some parts of Ohio face constraints in contracting for incremental firm transportation service. (See later section on "Current and Proposed Ohio Gas Infrastructure.")

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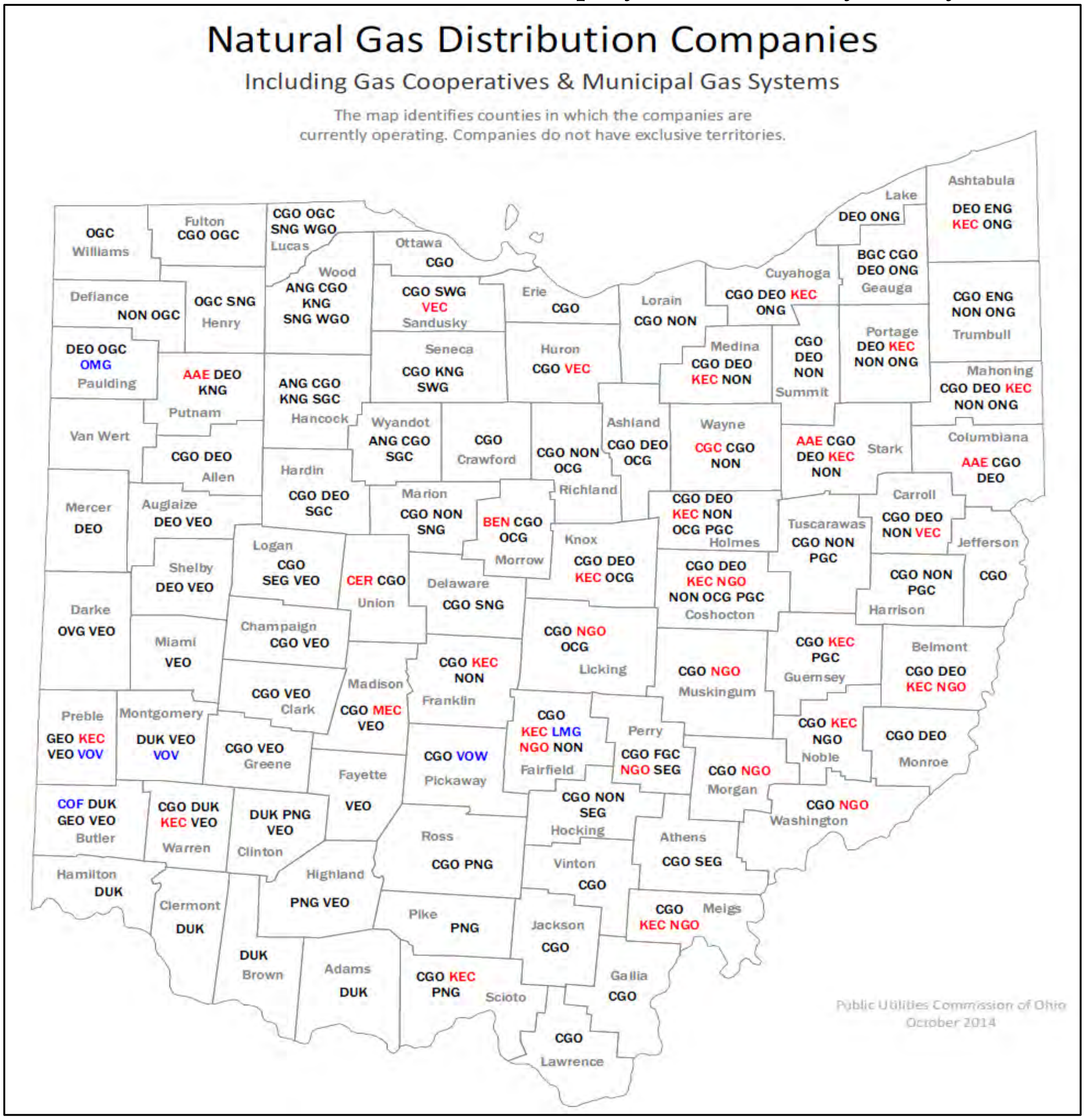
[20] IHS Consulting, "America's New Energy Future: The Unconventional Oil and Gas Revolution and the U.S. Economy," Volume 3 A: Manufacturing Renaissance Main Report, September 2013, page 2.

[21] IHS Consulting's analysis presents a dynamic analysis of energy prices and manufacturing activity. This is different than other studies that do not capture these dynamic interactions: see, for example, Ohio Department of Job and Family Services, "2012 Ohio Job Outlook: Employment Projections, Appendix Table C," http://ohiolmi.com/proj/projections.htm.

Figure 10
Ohio's Local Gas Distribution Company Service Areas by County



Source: PUCO (data as of October 2014) Key:

PUCO REGULATED COMPANIES (22)

ANG - Arlington Natural Gas Co.	BGC - Brainard Gas Corp.	CGO - Columbia Gas of Ohio, Inc.	DEO - Dominion East Ohio
DUK - Duke Energy Ohio (Gas)	ENG - Eastern Natural Gas	FGC - Foraker Gas Co.	GEO - Glenwood Energy Oxford,
KNG - KNG Energy, Inc.	NON - Northeast Ohio Natural Gas Corp.	OCG - Ohio Cumberland Gas Co.	OGC - Ohio Gas Co.
OVG - Ohio Valley Gas Corp.	ONG - Orwell Natural Gas Co.	PGC - Piedmont Gas Co.	PNG - Pike Natural Gas Co.
SGC - Sheldon Gas Co.	SEG - Southeastern Natural Gas Co.	SNG - Suburban Natural Gas Co.	SWG - Swickard Gas Co
VEO - Vectren Energy Delivery Ohio	WGO - Waterville Gas and Oil Co.		

COOPS (8)

AAE - All American Energy	BEN - Bright Energy	CER - Community Energy Resource Coop	CGC - Consumers Gas Coop
KEC - Knox Energy Coop Assn	MEC - Madison Energy Coop Assn. Inc.	NGO - National Gas and Oil Coop	VEC - Village Energy Coop Ass

MUNICIPAL GAS SYSTEMS (5)

COF - City of Hamilton	LMG - Lancaster Municipal Gas	OMG - Oakwood Municipal Gas	VOV - Village of Verona
VOW - Village of Williamsport			

Natural Gas Demand in Ohio

Within Ohio (like the U.S. as a whole), natural gas represents an important resource for residential home heating and cooking, commercial processes and heating needs, and large-scale industrial manufacturing processes. As such, Ohio tends to use natural gas in ways similar to the rest of the U.S., except for power generation.

To understand changes in customer demand for natural gas and as part of its long-term planning process, PUCO periodically prepares a 20-year forecast of energy requirements. The most recent report, issued in March 2012 and using data through 2010, was developed at a time when the nation had begun to realize falling natural gas prices and increasing demand for and supply of natural gas. At that time, the PUCO recognized the potential of access to increasing quantities of natural gas to benefit Ohio:

> As production from these resources continues to escalate, downward pressure on prices is expected to persist as storage inventories reach unprecedented levels and supply continues to outstrip demand in the short to medium term… As Ohioans benefit directly from shale gas extraction through low prices, the state also benefits from direct investment in traditionally economically depressed regions and through indirect macroeconomic benefits, both upstream and downstream from the shale plays.[22]

Figure 11 summarizes Ohio's historical natural gas usage by end-use sector. Ohio has experienced relatively flat and even slightly negative growth in residential, commercial, and industrial use of natural gas over the past decade, due to both increases in end-use efficiency and sensitivity to weather conditions.[23] Since 2010, however, actual consumption by these end-user sectors increased relative to the forecast developed by the PUCO. Falling prices and increased availability have helped to address the 'singularity' concern raised by PUCO in its 2012 forecast.

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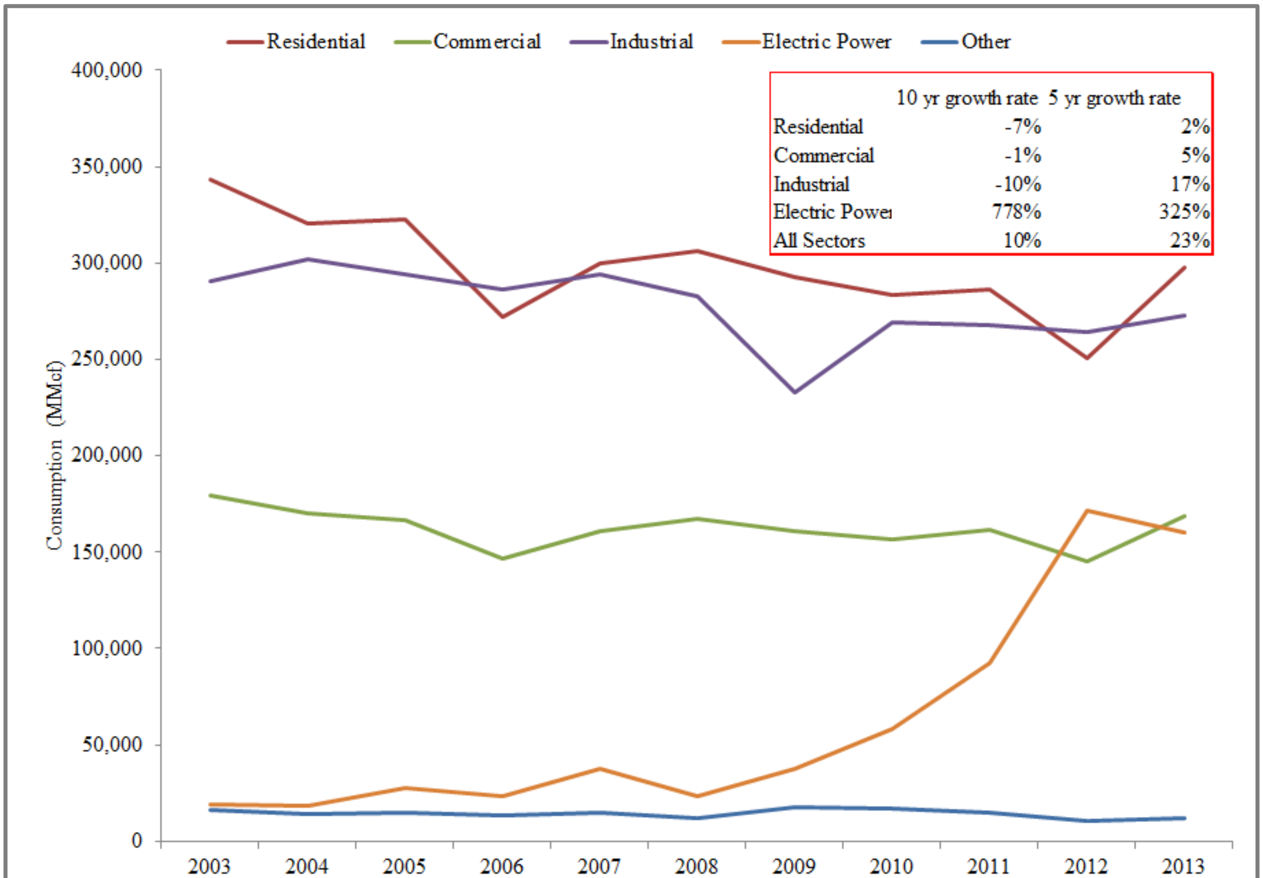
[22] PUCO, "Ohio Long Term Forecast of Energy Requirements 2011-2030", March 31, 2012 (hereafter "PUCO 2012 Energy Forecast"), pages 10-11: "While these developments appear to have the characteristics of a singularity as that term is used herein, the power of the forecast methodology employed by staff lies in its ability to recognize and project long-term trends. While the significant potential that exists as a result of the natural gas phenomenon is indisputable, it is not yet established as influencing the historical observations upon which long-term trends are based. It is simply too early." Note a definition of singularity: "The everyday English definition of Singularity is a noun that designates the quality of being one of a kind, strange, unique, remarkable or unusual," http://www.singularitysymposium.com/definition-of-singularity.html.

[23] PUCO 2012 Energy Forecast, page 43.

Figure 11
Historical Natural Gas Consumption in Ohio, by End-User



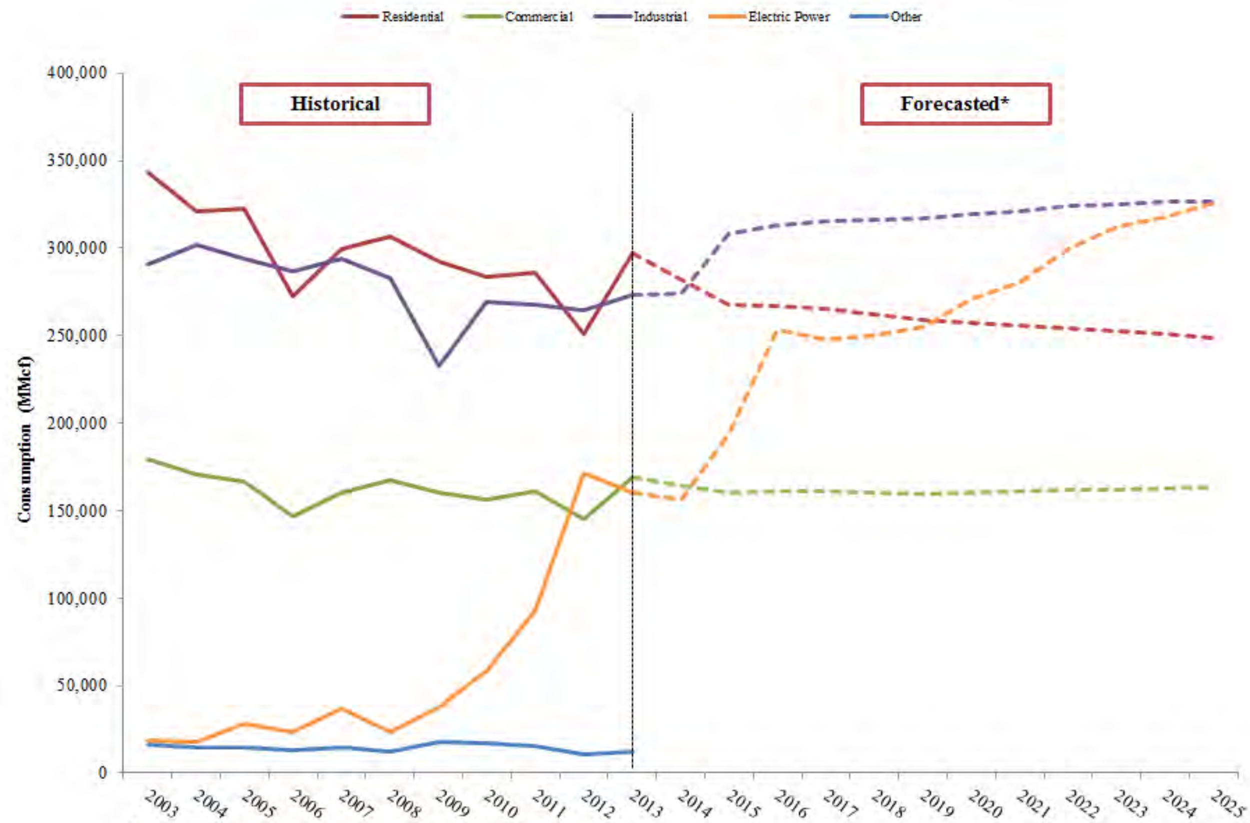
Source: EIA.

By contrast, the electric sector has seen a dramatic rise in use of natural gas (as explained in greater detail, below). Taking into account natural gas usage across all sectors, Ohio's natural gas consumption has actually increased 10 percent in the past decade, and 23 percent in the past five years in large part due to power sector use of gas.

The U.S. Energy Information Administration ("EIA") anticipates continued growth in demand for natural gas in Ohio – also largely reflecting future usage from electric power producers as well as Ohio's industrial users. Figure 12 shows forecasted natural gas demand by end-user and in total, respectively.[24]

Figure 12

Historical and Forecasted Natural Gas Consumption in Ohio by Source



Source: EIA.

*Forecasted by applying the annual growth rates from EIA Annual Energy Outlook 2014 for natural gas consumption in the East North Central Region. The AEO includes natural gas forecasts to 2040.

These demand forecasts are based on regional growth rates, which do not necessarily account for the unique characteristics of Ohio. For example, residential demand is forecasted to decline slightly over the foreseeable future. According to PUCO,[25] this trend is usually attributed to increased end-use efficiency within households and not a reduction in the number of customers.

[24] Forecasts are based on the estimated annual growth rates for the East/North Central Region from the EIA 2014 Annual Energy Outlook. PUCO is expected to release its updated Long Term Forecast at some point during the 2nd Quarter of 2015. At the time of this writing, it was not available.

[25] PUCO 2012 Energy Forecast, page 43.

Within Northern Ohio, natural gas is the most utilized home heating source, and more homes on average use natural gas for heating needs than in the State as a whole (81 percent on a population weighted basis to 74 percent state-wide). This is driven primarily by counties in the Cleveland and Toledo metro areas, including Lucas, Lake, Cuyahoga, and Summit. However, many households still use a heating source other than natural gas, such as electricity or home heating oil. With greater access to relatively low-cost natural gas, some portion of these households may choose to switch.[26] To promote fuel-switching, some regional LDCs, such as Columbia Gas of Ohio ("CGO") in Northern Ohio, offer instant discounts and rebates of several hundred dollars for the purchase of efficient natural gas furnaces.

A large number of homes that use home heating oil are located in Northern Ohio (see Table 1 and Figure 10). For example, an additional 75,700 homes could switch to natural gas.[27] This includes a number of counties in the Cleveland metro area, such as Medina, Summit and Erie. Doing so would require an additional 6.28 Bcf of natural gas on an annual basis.[28] Because the price of distillate fuel oil is expected to remain high relative to natural gas prices, switching may be economical for many of these households who would then enjoy economic benefits from access to low-cost gas supply and delivery. Notably, this example likely underestimates the total potential demand from fuel switching, because it does not consider any of those homes above the 81 percent average that currently do not use natural gas. Accounting for these homes, incremental new demand could be much higher. For example, 91 percent of homes in Summit County (the second largest of Ohio's counties by population) use natural gas for home heating. At this ratio, up to 180,000 houses could switch to natural gas, with incremental demand of 14.94 Bcf per year.

[26] One study found that Ohio customers saved a total of $1.5 billion on their natural gas bills due to suppressed prices in 2010. See, "The Economic Impacts of US Shale Gas Production on Ohio Consumers," Continental Economics, Inc., sponsored by Industrial Energy Users-Ohio, January 2012, page EX-4.

[27] This calculation is based on an assumption that residents in any county having less gas heating in homes than the 81-percent average among Northern Ohio counties would convert at levels to achieve the 81-percent average of all Northern Ohio homes that use natural gas.

[28] Assuming average annual household consumption of 83 Mcf. See: EIA, Residential Energy Consumption Survey, 2009. Note that Ohio and Indiana are reported together.

Table 1
Percent of Occupied Household Heating Fuel/Energy Source (2010)
Select Counties in Northern Ohio

County	Natural Gas	Oil Heating	Electric	Other	Number of Households
Jefferson	52%	15%	26%	7%	32,826
Belmont	56%	15%	23%	7%	32,452
Geauga	60%	12%	17%	11%	36,574
Columbiana	56%	12%	26%	7%	47,088
Ashtabula	66%	8%	16%	10%	46,099
Portage	70%	7%	19%	4%	67,472
Wayne	68%	6%	19%	7%	45,847
Trumbull	80%	6%	11%	3%	96,163
Richland	72%	4%	21%	4%	54,599
Tuscarawas	72%	3%	21%	4%	40,206
Stark	83%	3%	12%	3%	165,215
Mahoning	83%	3%	12%	3%	111,833
Medina	80%	2%	14%	4%	69,181
Lake	86%	2%	11%	1%	101,202
Lorain	80%	1%	17%	2%	127,036
Summit	91%	1%	7%	1%	245,109
Hancock	75%	1%	20%	4%	33,174
Erie	73%	1%	23%	3%	37,845
Lucas	85%	1%	13%	1%	202,630
Cuyahoga	86%	0%	12%	2%	621,763
Wood	83%	0%	15%	2%	53,376

Notes & Sources:
[1] Data are not available for every county in the Northern Ohio Nexus Corridor.
[2] Percentage of heating source for households represents the portion of occupied homes that are heated by the corresponding fuel/energy source.
[3] 2010 Census data, General Housing Characteristics, Table GCT-H2.

Neither the PUCO nor the EIA forecast demand specifically in Northern Ohio. But based on the demand forecasts shown in Figure 12 for the entire state of Ohio, the total annual residential, commercial and industrial demand for natural gas in Northern Ohio could approach 400 Bcf/year by 2018.[29] Relative to 2014 totals of gas consumption, the industrial, commercial, and

[29] Northern Ohio demand from traditional gas-market customers is estimated as total annual demand in Ohio multiplied by the proportion of total residents (residential demand), proportion of non-manufacturing establishments (commercial demand), and the proportion of manufacturing establishments (industrial demand)

residential sectors in Northern Ohio could require at least an additional 12 Bcf/year, with the majority (if not all) of this demand requiring firm service. Also taking into account the additional demand of power plant conversions and new builds, demand in 2018 would be approximately 500 Bcf per year and the incremental demand would be approximately 115 Bcf per year in Northern Ohio.

4. EXISTING AND FORECASTED NATURAL GAS DEMAND FROM OHIO'S POWER SECTOR

Natural gas demand for power generation in Ohio has increased substantially in the past five years, driven by falling prices for natural gas relative to coal and by environmental requirements to reduce mercury and air toxics emissions from existing power plants. Such trends are likely to continue, especially given future requirements that fossil-fuel power plants reduce their carbon dioxide ("CO_2") emissions. Given the structure of the electric industry in Ohio, power-sector demand for natural gas is tied to activities within a larger region, as explained further below.

Ohio's Wholesale and Retail Electricity Markets: A Brief Overview

Ohio has a fully deregulated residential energy market, with retail choice for both electric and natural gas service. As a result of its electric industry restructuring that began in the late 1990s, Ohio eventually required investor-owned utilities to put their wires functions (i.e., distribution and transmission) and their power-generation functions (i.e., power plants) into distinct business units. Ohio's four investor-owned utilities (AEP Ohio, FirstEnergy, Duke Energy Ohio, and Dayton Power and Light) provide wires service to more than 90 percent of all electric consumers, with the rest served by cooperative and municipal electric companies.[30] Now that these investor-owned utilities no longer own generation but still provide default service to many customers, they must purchase electricity produced by the multi-state wholesale electricity market, operated by the PJM Interconnection, Inc. ("PJM"). That same regional power market is the one in which power plants in Ohio participate to supply power.

The PJM wholesale power market (shown in Figure 13) is the largest in the country, in terms of total electric generating capacity. PJM covers all or part of 13 states and the District of

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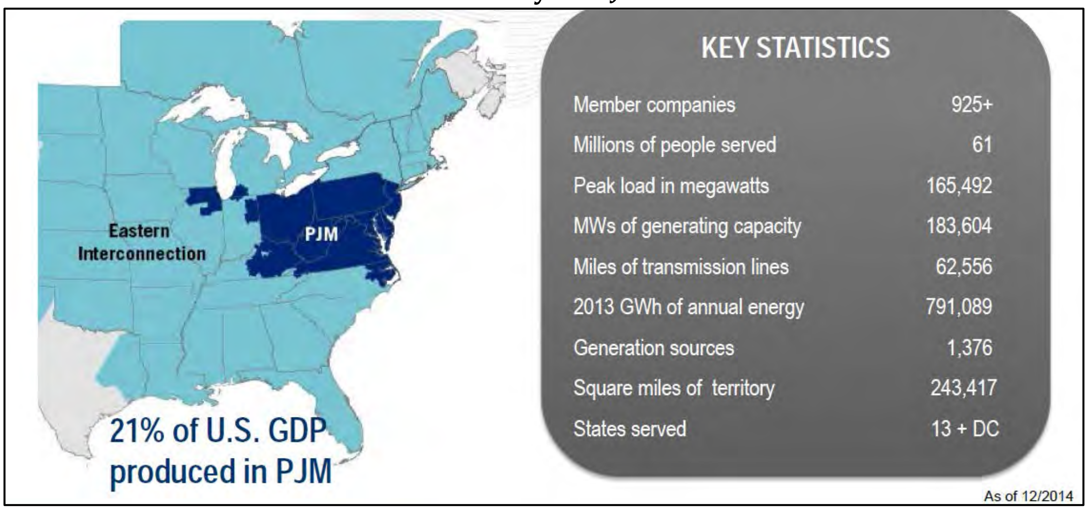
located in Northern Ohio counties. Population values are from the U.S. Census. Establishment data are from the U.S. Census County Business Patterns. GDP data by industry are from the BEA regional data.

[30] Based on EIA 861 data, 2012 for bundled and delivered electricity service. See also Figure 10.

Columbia. Power plants within the PJM footprint (along with power imported from neighboring regions) are dispatched to meet the electrical energy requirements of customers in the PJM area (as well as exports of power to neighboring regions).[31] Accordingly, electricity customers in Ohio derive their power supply from the entire region, and power plants in Ohio similarly support power supply to the entire region.

Figure 13
Summary of PJM[32]



Source: PJM, "Evolution of Supply: Managing the Evolving Fuel Mix in Markets and Operations," February 2015.

Within PJM, Ohio is the largest PJM state as measured by total load.[33] Ohio accounts for nearly 10 percent of all power production, but historically, Ohio has been a net importer of electricity from PJM, with in-state generation equal to about 85 percent of its total electric demand. As

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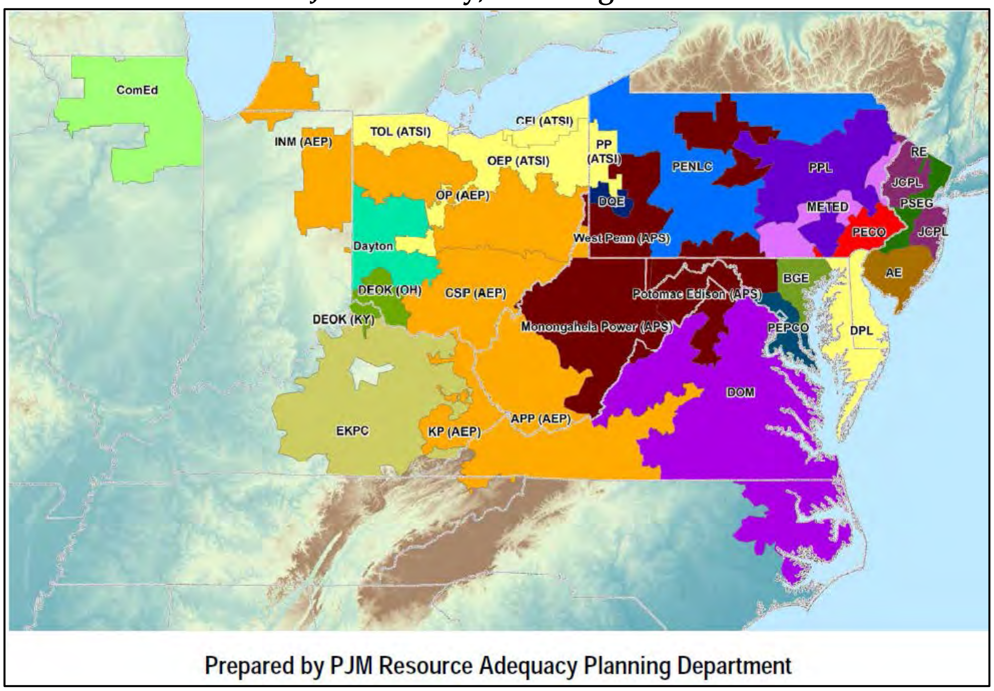
[31] As a Regional Transmission Operator ("RTO"), PJM administers the transmission tariffs of wires companies in the region, as well as competitive market for electric energy and capacity. PJM is responsible for ensuring the reliability of the electric power system. As part of these functions, PJM dispatches electric generators in real time to meet system demand using a "security constrained economic dispatch" model. This ensures that the most efficient and lowest-cost resources are dispatched with priority to meet system energy needs, subject to transmission security and other operational reliability constraints, taking into account limitations on dispatch that result from electric transmission constraints within PJM and between PJM and neighboring regions. As part of this process, generating resources (as well as demand-side resources) bid into the market for the right to be dispatched and supply power in specific hours, with those bids largely based on each unit's marginal cost of production. Each generating unit's marginal cost of production reflects unit-specific variable operating costs (including fuel costs and operating and maintenance costs) to run the unit, as well as the operating efficiency of the plant (also known as the heat rate – which reflects the energy requirement to produce a kilowatt-hour of electricity, or Btu/KWh).

[32] PJM, "Evolution of Supply: Managing the Evolving Fuel Mix in Markets and Operations," February 2015.

[33] Comments Submitted on Behalf of the PUCO, filed December 1, 2014, Carbon Pollution Emission Guidelines for Existing Stationary Sources Electric Utility Generation Units. EPA-HQ-OAR-2013-0602, page 4.

illustrated in Figure 14, Ohio is situated on the western half portion of the PJM market. Power plants and customer loads in Northern Ohio are served by two zones: the "ATSI" (American Transmission Systems, Inc.) transmission and capacity zone, and the "OP/AEP" (Ohio Power/American Electric Power Company, Inc.) zone.

Figure 14
PJM Territory, Showing Zones



Source: PJM, "Load Forecast Report," February 2014.

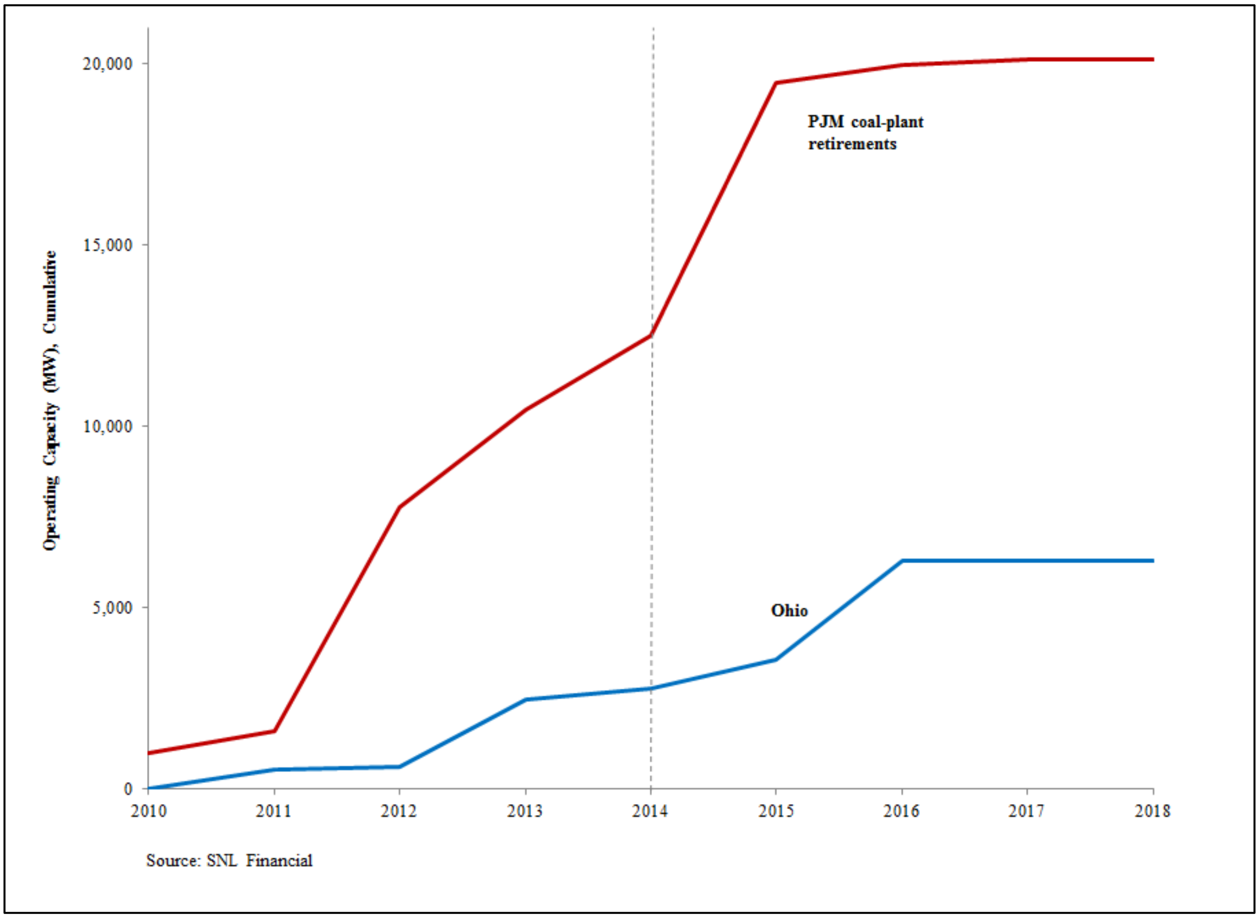
The Changing Power Generation System in Ohio

Across the full PJM footprint, coal-fired power plants constituted 40 percent of the system's total generating capacity of approximately 215,000 MW (as of 2012). Currently, more than 9,000 MW (approximately five percent of total PJM operating capacity) of coal-fired capacity is expected to retire by between 2014 and 2018.[34] When a power plant intends to retire, it no longer participates in PJM's forward capacity market, thus freeing up greater opportunity for other power plants (including new ones seeking to enter the market) to supply power in subsequent years.

[34] SNL Financial. Notably, these numbers do not include any potential retirements that may arise as a result of the need for power plant owners to comply in the future with the U.S. Environmental Protection Agency's proposed Clean Power Plan (as of 2020). See the discussion in the following section.

In 2012, these power plants that are expected to retire accounted for 20 million MWh of generation, equal to 3 percent of the total PJM electricity generated. These retirements include seven Ohio power plants (where a total of 19 separate generating units will retire). (See Figure 15.) These seven Ohio plants represent 3,525 MW of capacity, and will retire by 2016. In 2012, these Ohio generating units accounted for nearly six percent of Ohio's total electricity production (equal to seven million MWh).[35]

Figure 15
Actual and Announced Coal Retirements (2010-2014, 2015-2018): PJM and Ohio



These retirements – in Ohio and PJM more broadly – are occurring for several reasons. First, many early retirements (more than half of the capacity noted above retired as of the end of 2014) were driven by economic pressures from relatively low natural gas prices, low or no load

[35] SNL Financial.

growth, and the inefficiencies of smaller, older generating units.[36] Second, other units have announced retirements in 2015 and 2016, likely in response to requirements under the Mercury Air Toxics Standards ("MATS") rule, which went into effect on April 16, 2015.[37]

These retirements will be replaced by a diverse set of resources, with incentives from both the wholesale markets and State policies. Ohio's energy plan, authorized in 2012 under Senate Bill 315 ("SB315"), includes a number of policies to support a diverse mix of reliable, low-cost energy sources. That bill included both a renewable portfolio standard ("RPS"), requiring 12.5 percent of the State's energy to come from renewable resources by 2027, and an alternative energy portfolio standard ("AEPS"), requiring an additional 12.5 percent to come from any process (including coal-to-natural-gas conversions) that increases output without additional CO_2 emissions.[38]

The PJM region has experienced a large quantity of proposals to construct new gas-fired (and other) generating capacity additions. There are also many proposals to repower existing coal-fired generating facilities with natural gas. Since 2010, the PJM region has attracted more than 25,000 MW of new capacity, 70 percent of which are highly efficient, new natural-gas combined-cycle power plants, which can be dispatched to meet base load power needs throughout the year. (See Figure 16.)

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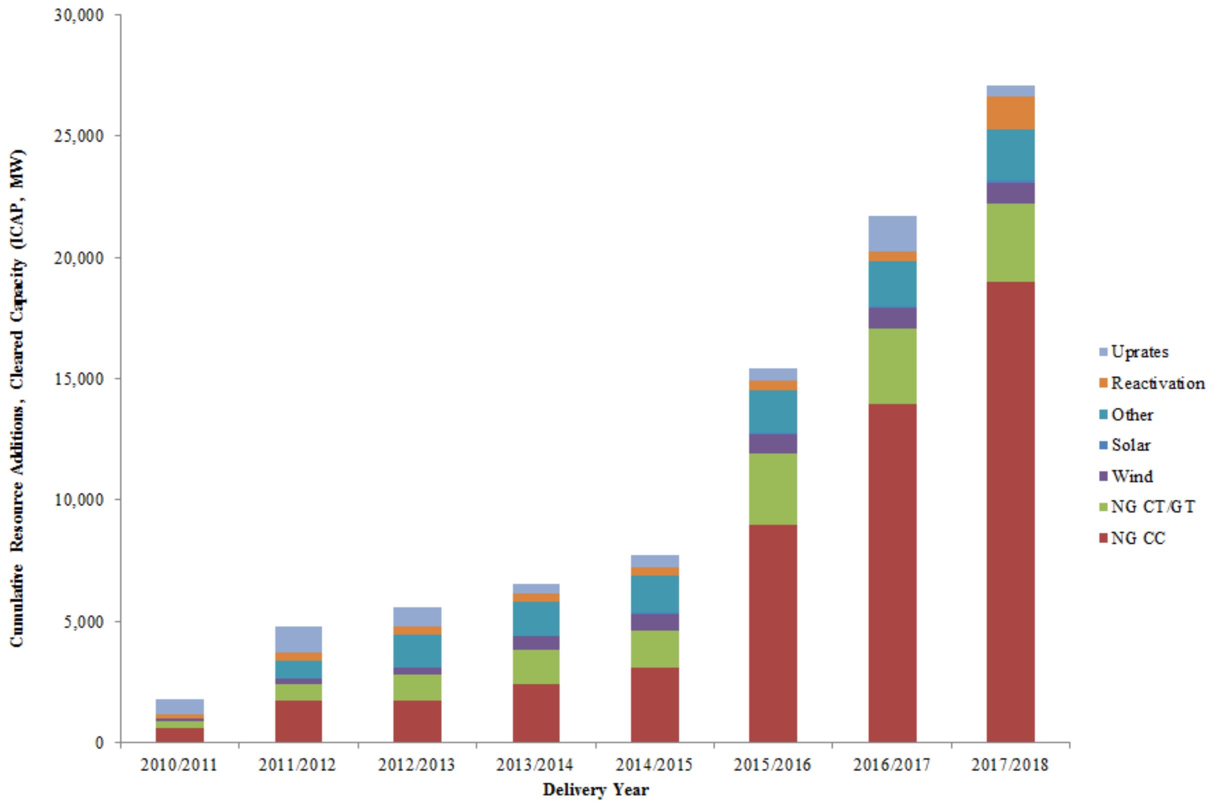
[36] See: Susan Tierney, "Why Coal Plants Retire: Power Market Fundamentals as of 2012," March 2012.

[37] Power plants not in compliance with the emissions standards for mercury and other toxic air pollutants must retire by May 2015, unless there received extensions for reliability or other reasons.

[38] For a description of the AEPS, see North Carolina Clean Energy Technology Center, DSIRE Database. Ohio Alternative Energy Portfolio Standard. As part of this law, the Governor offered strong support for and encouraged conversions of coal-fired power plants to natural gas. For a description of the Governor's support, see "SB 315: Ohio's Energy Policy," available at: http://governor.ohio.gov/.

Figure 16
PJM New Capacity, Base Residual Auction Results, 2010 to 2018



Source: 2017/2018 PJM Base Residual Auction Results, Table 8.

The expected capacity additions in Figure 16 include power plants that have cleared in recent capacity auctions. (For example, the auction for the 2017/2018 delivery year was held in 2014.) Recent filings with the Ohio Power Siting Board ("OPSB") and the PJM interconnection queue indicate that more resources are under development in Ohio than have cleared so far in PJM's capacity markets, and these new projects could be offered in future capacity auctions. Several of these resources are located in Northern Ohio.

Regional Markets and Proposed Carbon Air Pollution Regulations

In June 2014, the U.S. Environmental Protection Agency ("EPA") proposed regulations under Section 111(d) of the Clean Air Act, under which CO_2 emissions from existing power plants would be regulated after 2020.[39] Because coal-fired power plants have relatively high CO_2 emissions, the new regulations are likely to affect the level of output from some coal-fired power plants, and may also lead to further retirements of coal-fired power plants in upcoming years.

PJM has begun to consider how these EPA regulations might impact power plant dispatch and power flows within the region. In a series of analyses,[40] PJM evaluated the likely dispatch of existing and new resources under several scenarios. These scenarios assumed different levels of renewable energy and energy efficiency within each state. For Ohio, this included the state's AEPS and energy-efficiency goals. PJM also included all existing fossil-fired resources, and the addition of 14,500 MW of known resources that are commercially feasible given their current status.[41]

PJM found that under all scenarios, a multi-state, mass-based approach minimized overall compliance costs, and that increasing levels of new natural-gas-fired capacity (and renewable energy and energy efficiency) could improve the economics of existing steam-fired power plants.[42] PJM found that the majority of likely power-plant retirements are in the western part of PJM, while the majority of new project entry is located in the eastern portion of PJM. As a result, westward power flows have the potential to increase congestion costs and increase

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[39] Under the proposed Clean Power Plan, each state is required to meet interim target CO_2-emission rate (averaged during a 2020-2029 period) and final CO_2 emission rate targets (by 2030) for those fossil fueled power plants located within the state's borders. States must file individual State Plans by mid-2016, with a possible one year extension through 2017. Under the EPA's proposal, states will be granted considerable flexibility in how they meet these proposed targets, including the option to form a multi-state region and submit a multi-state plan to reduce emissions across the relevant states. Multi-state plans are due by June 2017 with a one year extension possible to June 2018. See, for example: Susan Tierney, Paul Hibbard and Craig Aubuchon, "Electric System Reliability and EPA's Clean Power Plan: The Case of PJM," March 16, 2015; Susan Tierney, Paul Hibbard and Craig Aubuchon, "Electric System Reliability and EPA's Clean Power Plan: Tools and Practices," February 2015.

[40] PJM released its final economic analysis of the EPA Clean Power Plan on March 2, 2015 ("PJM Interconnection Economic Analysis of the EPA Clean Power Plan Proposal, March 2, 2015", hereafter "PJM Economic Analysis"). See, for example, PJM's November 11-2014 presentations to its Members Committee on the analyses it had underway on the carbon rules (see Item 03). Later updates included: Paul Sotkiewicz and Muhsin Abdur-Rahman, "EPA's Clean Power Plan Proposal: Review of PJM Analyses Preliminary Results," presented to the Members Committee Webinar, November 17, 2014 (hereafter, "PJM Preliminary Analyses"); Transmission Expansion Advisory Committee, January 7, 2015 (hereafter, "PJM Transmission Committee Analyses"); Muhsin K. Abdur-Rahman and Paul Sotkiewicz, "PJM's Economic and Reliability Analysis of the EPA's Clean Power Plan (CPP)," presented to the Members Committee Webinar, January 20, 2015 (hereafter, "PJM At-Risk Analysis").

[41] PJM Economic Analysis, Appendix A1, page 99. Specifically, PJM included resources with a completed Interconnection Services Agreement and/or Facilities Services Agreement. PJM notes that the commercial likelihood of these projects is greater than 70 percent and 50 percent, respectively. PJM Risk-Analysis, page 20.

[42] See broadly, PJM Economic Analysis, pages 6-7.

electricity prices in the western region.[43] Similarly, in scenarios with individual state compliance approaches, net importing States – like Ohio – must dispatch less-efficient and more-expensive in-state resources.[44]

These modeling results suggest that in the future, Ohio will need to meet a larger proportion of its in-state generation, and it will increasingly need to do so using highly efficient and low-emitting power sources (such as natural gas-fired units).

Changes in Ohio Electric Markets

Over the next ten years, both PUCO and PJM anticipate increased electricity demand in Ohio, and specifically, in the Northern Ohio region. In 2012, PUCO estimated that demand would grow at more than 0.5 percent per year, and total demand would increase more than 18.8 million MWh between 2010 and 2030.[45] This represents a 12-percent increase in total demand relative to 2010. Similarly, in its most recent forecast, PJM found that load growth for the entire RTO was expected to increase 0.90 percent per year until 2030, adding almost 110,000 MWh during that period. The ATSI region, which covers all of Northern Ohio (as shown in Figure 15), is predicted to grow at a 0.7 percent average annual rate and add almost 7,000 MWh during that period.[46]

As recently as 2010, Ohio met almost 95 percent of its energy needs from coal, with natural gas beginning to show up as an increasing but still relatively small percentage of power generation. Within PJM, only West Virginia, Kentucky, and Indiana generated a higher proportion from this resource. (See Table 2.) The trend toward greater reliance on natural-gas-fired generation (shown in Figure 17) is likely to continue (and deepen), in light of anticipated retirements of coal-fired power plants in Ohio. (Table 3 lists the existing generating resource mix in the state.)

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[43] PJM Transmission Committee Analyses, page 65.

[44] PJM At-Risk Analysis, page 8.

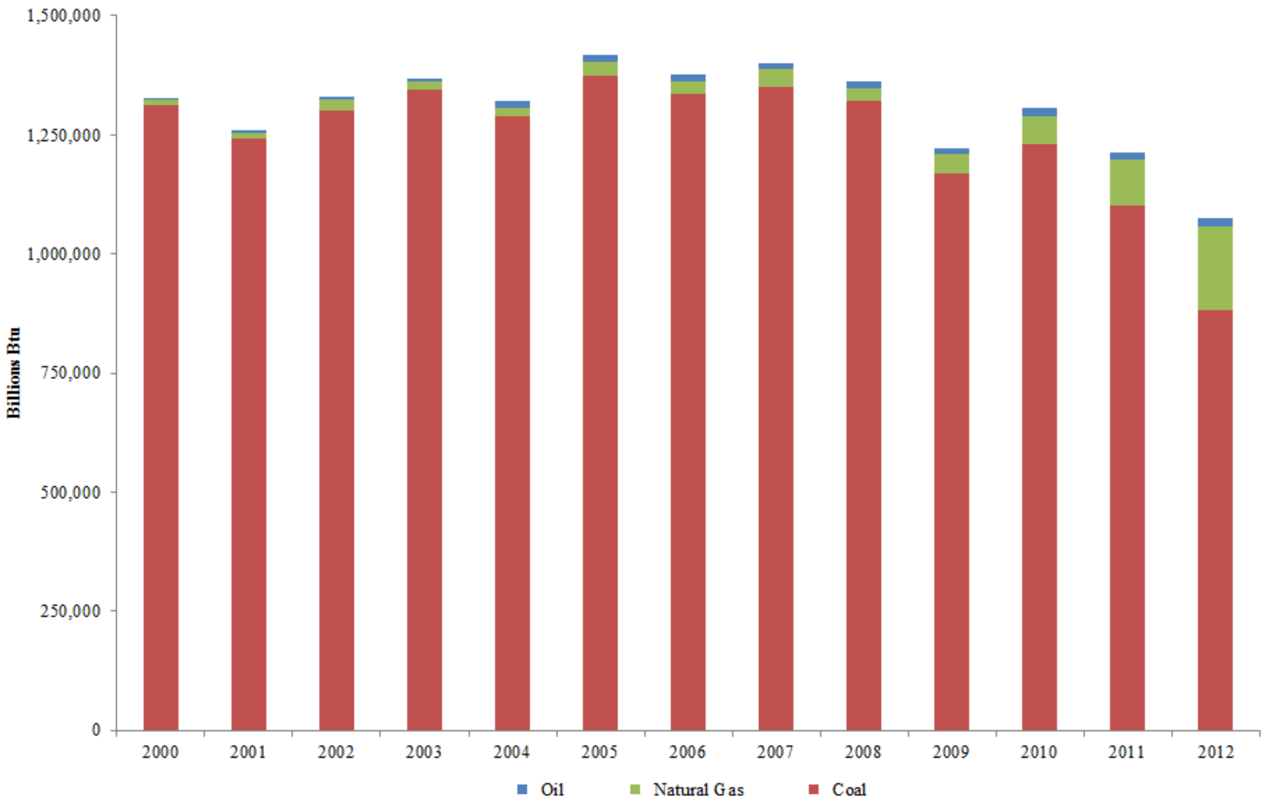
[45] The PUCO estimated that growth would be approximately evenly split between the Residential (0.53-percent compound annual growth rate ("CAGR"), 6.4 million MWh), Commercial (0.66-percent CAGR, 6.9 million MWh) and Industrial (0.47-percent CAGR, 5.5 million MWh) sectors.

[46] These load forecasts already account for the energy-efficiency goals set out by the State, which require Ohio electric utilities to reduce energy sales by 22 percent by 2027 relative to a 2009 baseline. Senate Bill 221 established the Energy Efficiency Resource Standard. See generally, http://programs.dsireusa.org/system/program/detail/4542.

Table 2
Percent of Generation by Fuel: U.S., PJM, and the States in PJM
(Ranked by Dependence on Coal as a Share of Total Generation in 2012)

	Coal	Nuclear	Natural Gas	Hydro, Wind, Biomass, Solar, Geothermal	Other
West Virginia	96%	0%	0%	4%	0%
Kentucky	94%	0%	3%	3%	0%
Indiana	82%	0%	12%	4%	3%
Ohio	**67%**	**13%**	**17%**	**2%**	**1%**
Michigan	47%	25%	21%	6%	0%
Tennessee	45%	32%	10%	12%	0%
PJM	44%	33%	18%	3%	1%
North Carolina	44%	34%	17%	5%	0%
Maryland	44%	36%	5%	7%	8%
Illinois	41%	49%	6%	4%	0%
Pennsylvania	39%	33%	24%	4%	0%
USA	38%	19%	30%	11%	1%
Virginia	17%	38%	33%	11%	1%
Delaware	17%	0%	79%	1%	3%
New Jersey	4%	50%	41%	3%	1%
District of Columbia	0%	0%	87%	0%	13%
Source: SNL Financial					

Figure 17
Fossil Fuel Use in the Ohio Electric Power Sector, 2000-2012



Notes & Sources:
[1] U.S. Energy Information Administration, State Energy Data System (SEDS): 1960-2012, available at http://www.eia.gov/state/seds/seds-data-complete.cfm?sid=OH#CompleteDataFile, accessed February 26, 2015.
[2] Figure reflects all petroleum, natural gas, and coal consumed by the electric power sector in Ohio.

Table 3
Ohio Power Plants by Fuel and Technology Type, 2013

Fuel and Technology Type	Number of Power Plants	Nameplate Capacity (MW)	Operating Capacity (MW)	Net Generation (MWh)	Capacity Factor	Heat Rate (Btu/kWh)
Biomass						
Gas Turbine	1	6	5	5,619	13%	25,126
Internal Combustion	11	83	83	460,061	63%	12,386
Steam Turbine	5	127	119	552,553	53%	33,538
Coal	31	20,478	19,143	96,514,886	57%	10,291
Natural Gas						
Combined Cycle	7	4,414	4,207	20,743,747	56%	7,597
Gas Turbine	25	6,571	6,469	832,774	1%	12,449
Internal Combustion	2	33	32	1,576	1%	9,538
Steam Turbine	2	525	482	54,852	1%	16,593
Nuclear	2	2,237	2,206	16,121,250	83%	-
Oil						
Gas Turbine	12	565	610	-	-	-
Internal Combustion	44	245	238	3,923	0.2%	11,157
Other Nonrenewable						
Steam Turbine	3	121	117	233,750	23%	26,905
Solar	7	31	30	38,217	14%	-
Water Hydro	5	129	108	549,239	58%	-
Wind	7	423	423	1,144,999	31%	-

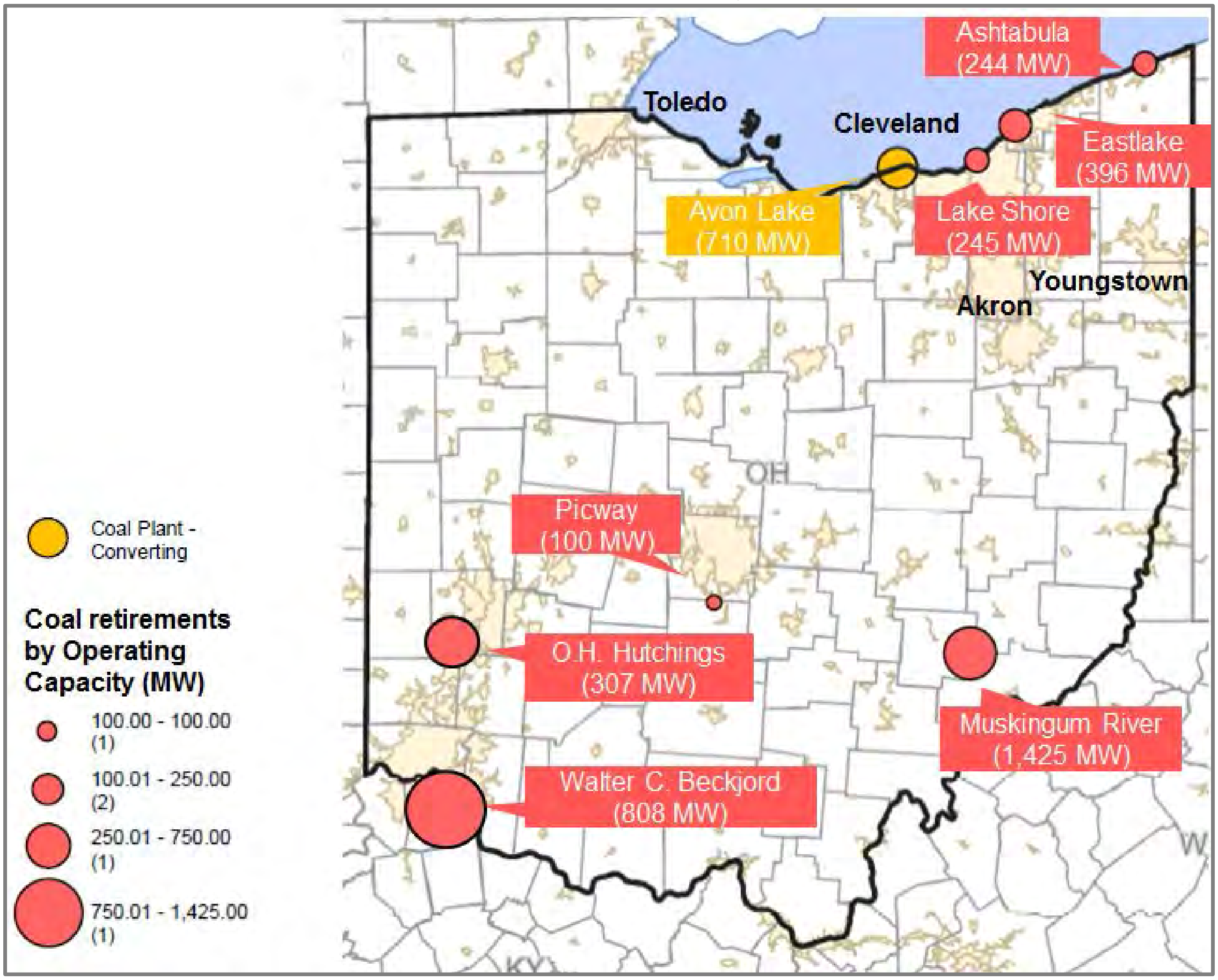
Notes & Sources:
[1] SNL Financial power plant database.
[2] Analysis limited to power plants in Ohio with non-missing generation in 2013.
[3] Fuel Type is the majority fuel for the power plant.

Figure 18 depicts the known Ohio coal-plant retirements that have occurred or will occur between 2014 and 2016. The significant number of known and potential retirements in Northern Ohio have posed specific challenges to the operation of the grid. For example, in February 2012, FirstEnergy submitted a deactivation request for 14 units representing 2,705 MW in Ohio, Pennsylvania, and Maryland. This represents one of the largest single deactivation requests received to date, and at that time, PJM identified more than 190 reliability violations. Transmission solutions were immediately identified, and PJM determined that it needed to retain five units in Northern Ohio totaling 885 MW in service through 2015. These units include: Ashtabula 5, Eastlake 1-3, and Lake Shore 18.[47] New natural gas-fired generation has

[47] See: http://www.pjm.com/planning/generation-deactivation/gen-deactivation-rmr.aspx. These remained on Reliability Must Run ("RMR") contracts, for the period through April 15, 2015. Transmission projects were put in place ahead of schedule, and the RMR contracts for all but one generator (Ashtabula) were ended on September 15, 2014.

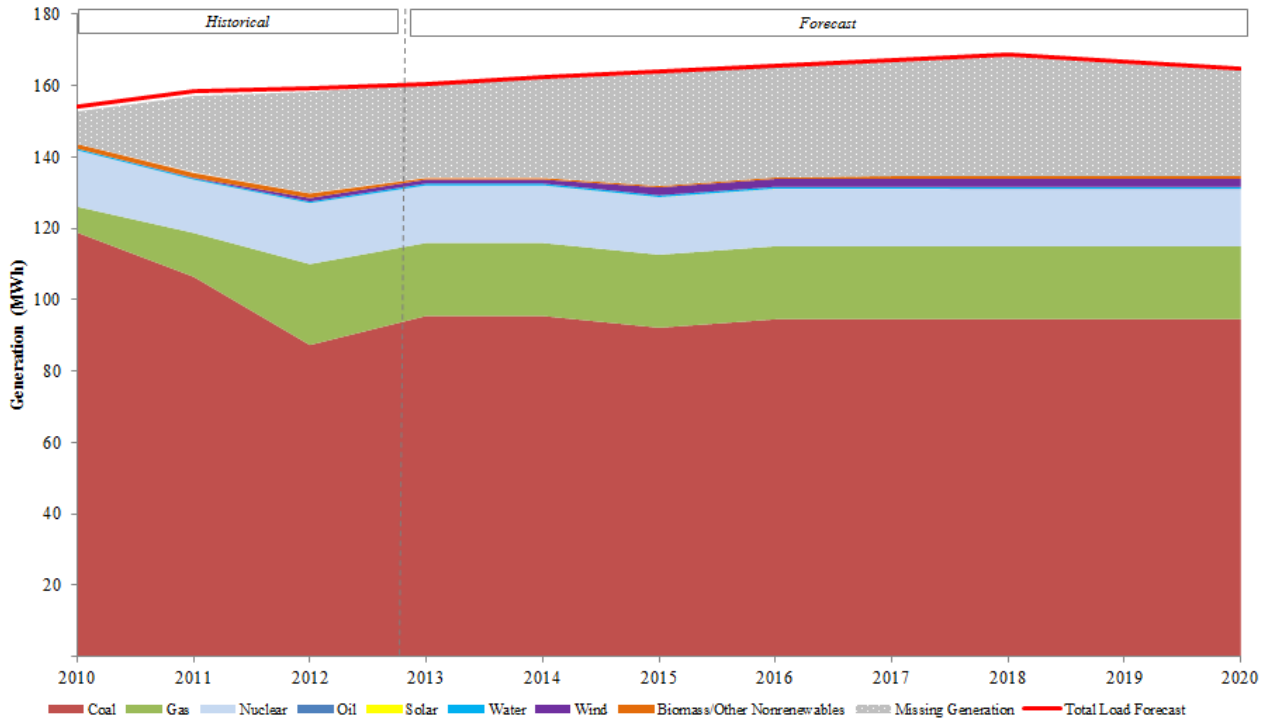
already been approved and is under construction in Northern Ohio to meet this resource adequacy need. (These new resources are described in the next section.)

Figure 18
Known and Planned Coal Retirements, Ohio 2014-2016



Taken together, the combination of load growth, generator retirements, and the potential for more expensive (i.e., constrained) PJM imports suggests that by 2017, Ohio may need to replace up to an additional 30 million MWh (shown as "missing generation" on Figure 19, below). While a portion of this will be met through the AEPS, a significant portion will need to be met through new baseload and intermediate load natural gas-fired capacity.

Figure 19
Ohio Historical and Forecast Electric Supply by Fuel Type, 2010-2020[48]



Notes & Sources:
[1] SNL Financial power plant unit database.
[2] Historical generation used for 2010 through 2013.
[3] Annual generation by fuel type for 2014 through 2020 assumes 2013 generation with planned additions less planned retirements. Total Ohio generation for 2014 through 2020 is estimated using the average annual growth rate for Ohio's total load forecast for 2011 through 2030. See Public Utilities Commission of Ohio, Ohio Long Term Forecast of Energy Requirements 2011-2030, March 2012. Missing generation is calculated as the difference in total Ohio generation and the total expected generation.
[4] Planned additions for all fuels except gas fired units assume 2013 capacity factors when available. If 2013 capacity factors were not available, then 2012 data were used. For natural gas units, a capacity factor of a capacity factor of 70% was used.
[5] Planned additions includes all capacity additions identified in SNL Financial power plant unit database with a current operating status of "Advanced Development" and "Under Construction".

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[48] This figure assumes that in the future, existing fossil-fuel plants will continue to operate at their historical capacity factors. Over time, however, as more efficient and zero-cost resources are dispatched, existing fossil-fired steam turbines will be expected to provide less energy. To the extent that resources outside of Ohio and within the PJM footprint displace these coal resources, Ohio may be expected to increase its total net imports.

Demand for Natural Gas for Power Generation in Northern Ohio

New Resources

Ohio is positioned to meet its future electric generation demands, even accounting for known power-plant retirements and future load growth.[49] There are currently seven new natural gas-fired power plant projects (including the Avon Lake coal-to-natural gas conversion) underway and totaling 4,800 MW of new generating capacity in Ohio overall. (See Table 4.)

Table 4
Planned Generating Units: Ohio

Plant Name	Capacity (MW, Nameplate)	Technology	County	In-Service Date	PJM Status	OPSB Status
New Natural Gas Plants						
Rolling Hills	610 uprate (1,460 Net)	Combined Cycle	Vinton	Q1 2017	Feasibility	Approved
Oregon Clean Energy Center	799	Combined Cycle	Lucas	Q2 2017	FSA/ISA	Approved
Carroll County Energy Center	742	Combined Cycle	Carroll	Q3 2017	FSA/ISA	Approved
Middletown Energy Center	513	Combined Cycle	Butler	Q2 2018	ISA	Approved
Meigs County	652	Combined Cycle	Meigs	*-Delayed*	*Feasibility*	*Approved*
Lordstown Generating Station	800	Combined Cycle	Trumbull	Q2 2019	Feasibility	Pending
Coal to Gas Conversions						
Avon Lake	710	Steam Turbine	Lorain			Pending

Notes:
[1] PJM estimates that the commercial likelihood of units with completed Facility Study Agreements (FSA) and Interconnection Services Agreements (ISA) is 50 percent and 70 percent, respectively.

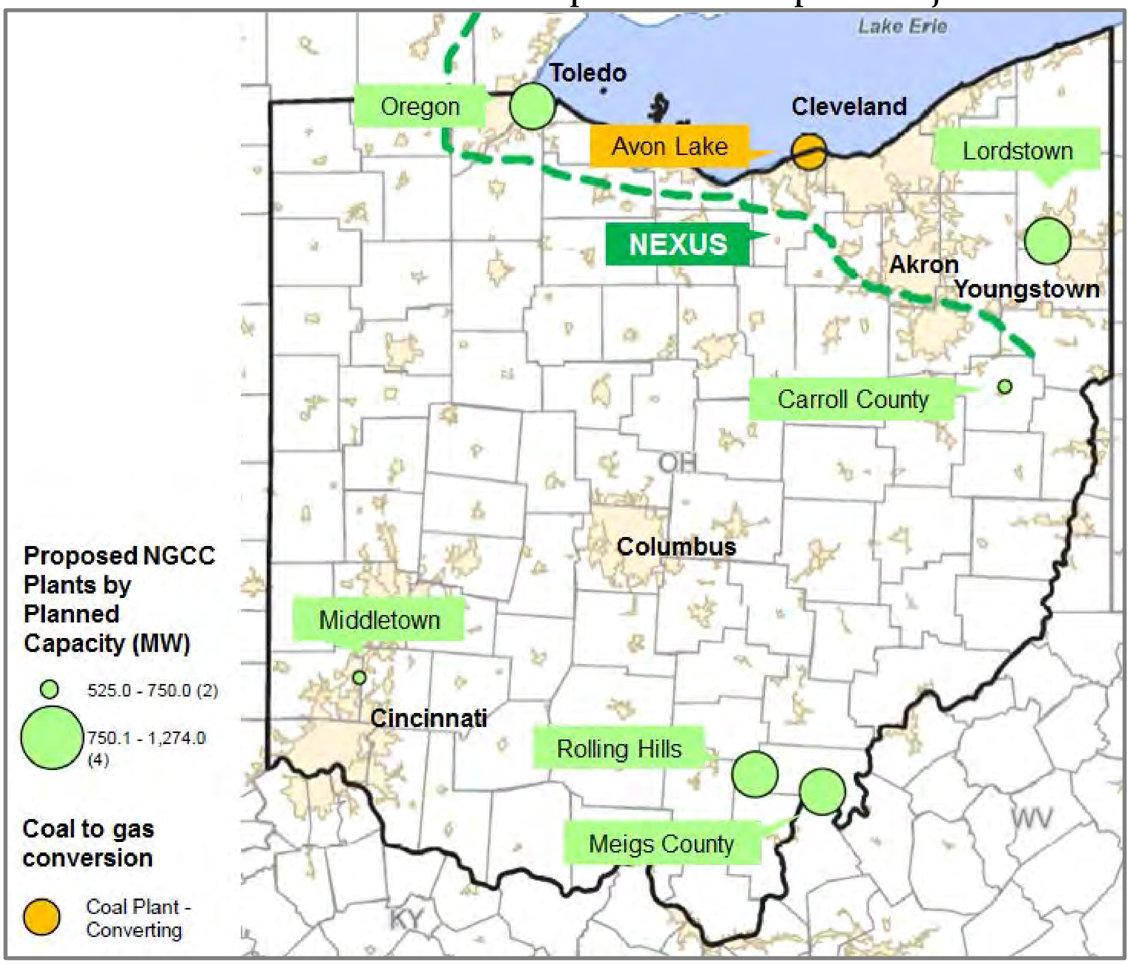
Sources:
[1] Ohio Power Siting Board, Accessed April 2015, available: http://www.opsb.ohio.gov/opsb/
[2] PJM Interconnection Queue, Accessed April 2015, available: http://www.pjm.com/planning/generation-interconnection/generation-queue-active.aspx

Given both resource adequacy needs and the location of known retirements (see Figure 18), most of these new natural gas-fired resources (i.e., approximately 3,050 MW) are located in Northern Ohio (Figure 20). These Northern Ohio plants are also the farthest along in their respective development and will be in-service before 2018.

[49] Ohio currently has two nuclear plants (Davis-Besse and Perry) which account for 2,206 MW of current capacity. Perry, located in Lake County in Northern Ohio, is due for relicensing in 2027; this report assumes it will remain in operation beyond then. If it retires then, this would mean the loss of 1,298 MW operating capacity that would need to be replaced.

As shown in Figure 20, the NEXUS Project is relatively close to several of the proposed NGCC and coal-to-gas-conversion projects.

Figure 20
New Gas-Fired Power Plants in Northern Ohio
Relative to the Route of the Proposed NEXUS Pipeline Project



PUCO has expressed concern that "the apparent slowdown in growth" of new pipeline development would not be able to support a significant transition to and redispatch of natural gas-fired capacity.[50] The NEXUS Project could provide the capability to address that concern, and help the state transition to a newer and cleaner energy mix.

[50] Comments Submitted on Behalf of the PUCO, filed December 1, 2014, Carbon Pollution Emission Guidelines for Existing Stationary Sources Electric Utility Generation Units. EPA-HQ-OAR-2013-0602, page 68.

Notably, the NEXUS Project represents a new, large-diameter high-capacity resource that, if approved and entered into service, would traverse Northern Ohio relatively close to these new power plants, and could deliver natural gas to such projects on either a firm or non-firm basis. Going forward, the NEXUS Project could support additional natural-gas transportation requests for future, as yet unplanned, expansions of power plants in Northern Ohio.

As shown in Figures 21, the NEXUS route is relatively close to many Northern Ohio generators, including:

- Oregon Clean Energy Center, an 800 MW 2x1 Combined Cycle located in Lucas County;[51]
- Carroll County Energy Center, a 742 MW 2x1 Combined Cycle located in Carroll County;[52]
- Lordstown Generating Station, an 800 MW 2x1 Combined Cycle located in Trumbull County;[53]
- Avon Lake Coal-to-Gas repowering, a 710 MW facility located in Lorain County.[54]

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[51] OPSB 14-1396-El-BGA. The Oregon Clean Energy Center filed with an application to interconnect to either the ANR TransCanada pipeline or the Panhandle Eastern Pipeline. OPSB staff noted that "the Applicant is considering connection with two gas transmission pipeline companies in the area; the ANR/TransCanada Pipeline Company's existing lines, which can deliver approximately 390 million cubic feet per day (MMCFD), and the Panhandle Eastern Pipeline Company's (PEPL) existing lines, which can deliver approximately 330 MMCFD. The Oregon Clean Energy Center would require approximately 135 MMCFD at least 255 days per year, which is approximately 18% to 20% of the total capacity of the two interstate pipelines." The OPSB also noted that "the procurement of adequate natural gas supplies and pipeline capacity are necessary components for the successful operation of the facility." (OPSB, "Staff Report Investigation: Oregon Clean Energy Center Case Number 12-2959-EL-BGN," March 18, 2013, page 6.) As discussed in Section V, the existing pipelines may not be able to adequately meet this demand in all months of the year over the life of the plant. During its initial filing, the Oregon Clean Energy Center indicated that NEXUS – if approved – would remain available as an option for interconnection. (Oregon Clean Energy Center, "Application to the Ohio Power Siting Board for a certificate of environmental compatibility and public need," January 2013, page 21.)

[52] OPSB 14-2085-EL-BGA and OPSB 13-1752-EL-BGN. The Carroll County Energy Facility is located just 0.4 miles from the Tennessee Gas Pipeline. (See OPSB Docket 13-1752-EL-BGN, Carroll County Energy, "Application of Carroll County Energy, LLC.," filed November 15, 2013, Page 21.) Carroll County Energy indicated that their interconnection request would be filed separately with the OPSB. In the same filing, Carroll County Energy indicated anticipated fuel usage of 5,224 mmBtu/hr. The Tennessee Gas Pipeline may not have sufficient capacity at all times during the year to serve Carroll County.

[53] OPSB 14-2322-EL-BGN. On March 23, 2015, the Lordstown Energy Center filed an updated application, indicating that it was pursuing two gas delivery options that involve the development of new infrastructure.

[54] OPSB 14-1717-GA-BLN. The OPSB filed its Staff Report of Investigation on March 27, 2015. Avon Lake has filed plans to construct, own, and operate a 20-mile pipeline that will connect the plant with existing infrastructure in the village of Grafton.

Table 5 shows these power plants' incremental demand for natural gas.

Table 5
Incremental Gas Demand from
Planned (Known) New Gas-Fired Power Projects Located in Northern Ohio

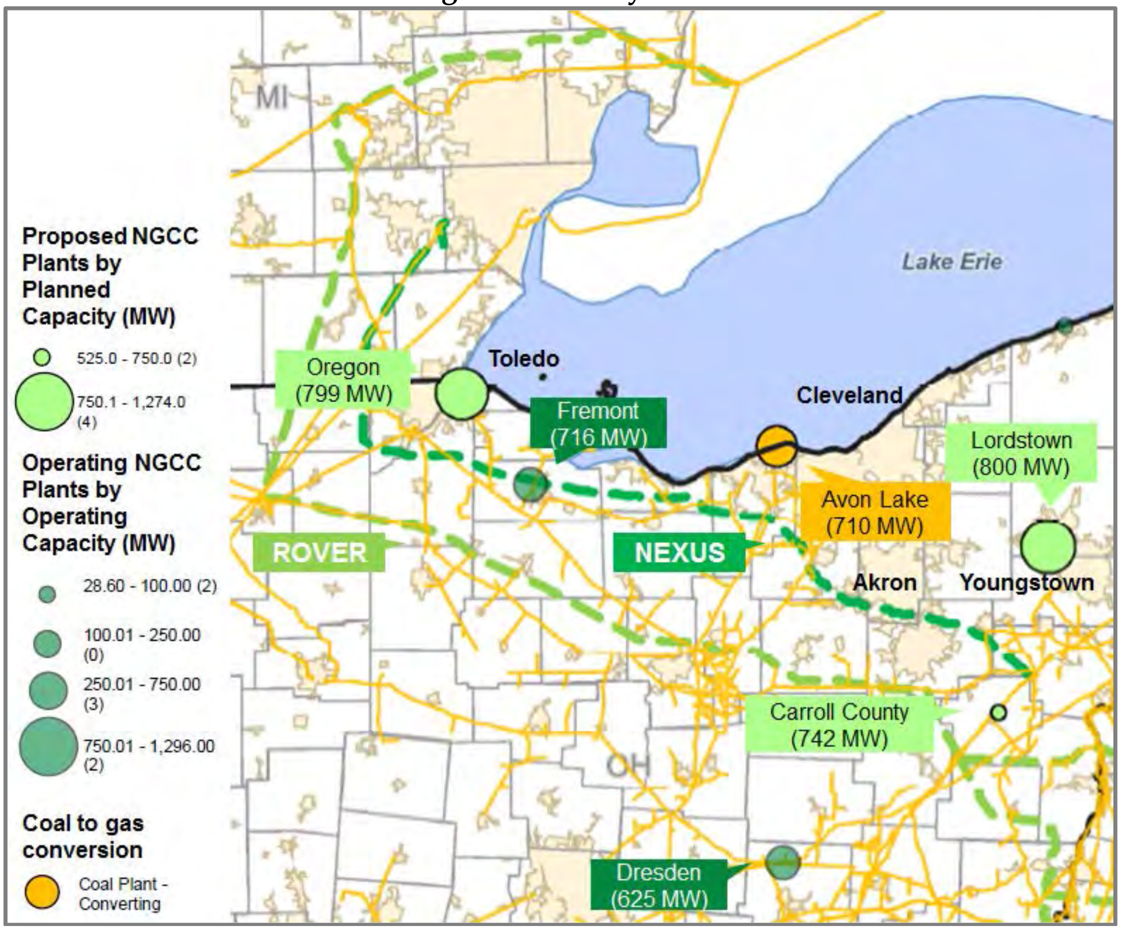
Plant Name	Capacity (MW, Nameplate)	Max Gas Demand (BCF/day)	Annual Generation (MWh)	Incremental Gas Demand (BCF/Year)
New Natural Gas Plants				
Oregon Clean Energy Center	799	0.140	4,899,468	35.77
Carroll County Energy Center	742	0.130	4,549,944	33.21
Lordstown Generating Station	800	0.140	4,905,600	35.81
Coal to Gas Conversions				
Avon Lake	710	0.124	4,353,720	31.78
Total		0.53	18,708,732	136.57

Notes:
[1] Estimates assume a nominal 7,300 Btu/kWh heat rate and a 70% average annual capacity factor.

Sources:
[1] Ohio Power Siting Board, Accessed February 2015, available: http://www.opsb.ohio.gov/opsb/
[2] PJM Interconnection Queue, Accessed February 2015, available: http://www.pjm.com/planning/generation-interconnection/generation-queue-active.aspx

Although some of these projects have filed interconnection applications to other pipelines, the NEXUS Project could provide optionality for these generators, potentially enabling them to deliver natural gas from alternative sellers and on alterative pipeline systems. Also, some of the other systems may not be able to fulfill requests for firm transportation, and the NEXUS Project could add incremental delivery capacity to these shippers as well as additional supply reliability.

Figure 21
Map of New Gas-Fired Power Plants in Northern Ohio
Relative to the Proposed NEXUS Pipeline and the Rover Pipeline Routes,
And Existing Gas-Delivery Infrastructure



Source: SNL Financial

As new power-generation resources with relatively low heat-rates (i.e., high fuel-conversion efficiency) and relatively low CO_2 emissions enter the market, the new natural gas-fired power plants in Northern Ohio will be expected to be dispatched frequently by PJM and operate as base-load capacity to provide energy throughout the year. Ohio (and PJM more generally) will need to operate plants with lower carbon emission more frequently in order to comply with emissions-reduction targets. In the future, these plants may be expected to run at higher capacity factors, with some estimates at higher than 80 percent utilization.[55]

[55] For example, PJM recently found that new natural gas resources would be dispatched at up to an 83.9 percent capacity factor, assuming a regional mass based compliance approach. See PJM Economic Analysis, page 87.

If these natural-gas-fired generating units might be called upon to operate in baseload mode, they would require reliable, firm gas-transportation service on a year-round basis. As discussed in the following section, this incremental demand will also represent a new source of demand during the peak winter months, coincident with increased demand from residential consumers. The Ohio Environmental Protection Agency expressed concern that disruptions in the current pattern of gas consumption (historically, non-coincident demand from the residential sector in winter and electric power generation demand in the summer) could lead to unforeseen power-generation costs during peak periods.[56] The Nexus Project will provide access to natural gas storage services which can be used to balance the average supply requirements with peak day demand to provide reliability or reduce overall cost.

PJM has recognized the value of this firm fuel and fuel-delivery service to electric system reliability. In its 2014 report on fuel assurance, PJM noted that its recent Capacity Performance Proposal includes provisions for generators to include fuel assurance costs – such as firm natural gas and natural-gas-transportation contracts – in their market offers.[57]

Assuming these plants were to operate at a 70-percent capacity factor, the three NGCCs located in Northern Ohio would require up to 105 Bcf/year of natural gas to generate approximately 19 million MWh of electricity. This output would help Ohio (and the larger PJM region) to more easily meet its (proposed) CO_2-emission reduction targets under the EPA Clean Power Plan while also minimizing costs.[58] Including the Avon Lake coal-to-natural gas conversion, the total incremental natural gas demand in Northern Ohio could approach 0.535 Bcf/day and approximately 140 Bcf/year.[59]

Assuming that some portion of this incremental demand for gas transportation is needed (and valued in PJM markets) in the future, generating units will eventually sign up for firm delivery

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[56] Ohio Environmental Protection Agency, comments on the EPA Clean Power Plan, page 69.

[57] PJM also noted other projects, including the establishment of a gas unit commitment coordination committee, that are designed to ensure adequate natural gas for generators. As part of this effort, PJM is also developing more robust geographical databases on the location of gas-fired generators, natural gas pipelines, and operational information on gas pipelines. See PJM Interconnection, L.L.C., "Report on Fuel Assurance Activities," Federal Energy Regulatory Commission Docket No. AD13-7-000 and No. AD14-8-000.

[58] In its state-by-state analysis of the Clean Power Plan, PJM found that Ohio was a net negative emission position and that it was one of four states that binds on its mass target (as opposed to an emission rate target) under an individual state compliance approach. PJM noted that "the State has a significant amount of new combined cycle resources not subject to the Clean Power Plan, whose ability to increase generation helps reduce the net negative emissions position." See PJM State by State Economic Analysis, page 72.

[59] This amount assumes that the four NGCCs in Table 5 (under the column Max Gas Demand (Bcf/day)) all operate at full-load operation on a simultaneous basis on a given day).

service on the pipeline system. As alluded to earlier, one way to guarantee firm service is a direct connection with a high capacity transmission system which can provide access to natural gas storage balancing services. By this measure, then, distance to an interstate pipeline is more than a matter of convenience. The costs to interconnect with an interstate pipeline will affect the competitiveness of power-generation facilities in a wholesale power market.

For example, the most recent study examining the cost for new power plants to enter the market in PJM included natural gas interconnection costs of $3.5 million per mile.[60] Relative to the Rover pipeline, the proposed NEXUS Project is closer to many of these Northern Ohio generating units. (See Figure 21.) Interconnection with the NEXUS Project would reduce the total installed capital costs of natural-gas interconnection facilities by approximately $243 million for these four power plants in Northern Ohio. To remain profitable, power plant owners will need to recover these costs in the combined electric energy, capacity and ancillary service markets, and ultimately incorporate these costs into their capacity market offers. On an annualized basis, the preferred route of the NEXUS pipeline could save up to $31 million annually relative to the same connections to the Rover pipeline– some, if not all of which, would be reflected in wholesale electricity cost savings to consumers.[61]

Table 6 calculates the cost savings to power plant owners, which would be reflected in their offer prices in PJM. Under PJM pricing mechanisms, customers would realize savings at any point when such generators set the clearing price(s) in energy and/or capacity markets. In any event, lower interconnection costs would affect the economic feasibility of these power plant projects in Northern Ohio.

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[60] Estimates expressed in $2014 as part of the 2017/2018 net Cost of New Entry ("CONE") study prepared for PJM by The Brattle Group. Brattle based its estimates on a review of eight recent gas lateral projects, as identified through EIA and FERC. See, S. Newell, et al., "Cost of New Entry Estimates for Combustion Turbine and Combined Cycle Plants in PJM, with June 1, 2018 Online Date," prepared for PJM Interconnection, L.L.C., page 21 and Table 14. The PJM net CONE estimate assumes an average distance of five miles per interconnection.

[61] Consistent with the PJM net CONE study, these costs are levelized in real terms over the full life of the plant using an estimated 12.69-percent capital charge rate, including the effects of taxes and depreciation.

Table 6
Estimated Gas Interconnection Costs, $2015

Plant Name	Location (County)	Distance (miles) Nexus	Distance (miles) Rover	Cost Savings ($million)	Annualized Savings ($million/year)
New Natural Gas Plants					
Oregon Clean Energy Center	Lucas	14.28	32.55	$65	$8.29
Carroll County Energy Center	Carroll	11.16	11.19	$0.11	$0.01
Lordstown Generating Station	Trumbull	25.45	43.83	$66	$8.34
Coal to Gas Conversions					
Avon Lake	Lorain	16.56	47.83	$112	$14.20
Total				**$243**	**$30.85**

Notes:

[1] Estimates assume Gas Interconnection costs of $3.58 million per mile in $2015. Levelized values are expressed in real $2015 and are based on the PJM 2017/2018 net Cost of New Entry ("CONE") study, and assume a 60/40 debt/equity ratio, 13.8% cost of equity, a 7% cost of debt, 35% Federal tax rate and 20 year MACRs depreciation. Estimates exclude fixed operations and maintenance expenses.

[2] Distance to Nexus and Rover is provided as the line tangent to the pipeline that minimizes total distance.

Sources:

[1] Newell, S., et al., "Cost of New Entry Estimates for Combustion Turbine and Combined Cycle Plants in PJM, with June 1, 2018 Online Date", Prepared for PJM Interconnection, L.L.C., p. 21.

[2] SNL Financial.

At present, all of these facilities have provided preliminary notice that they plan to interconnect to existing natural gas delivery points. As discussed below (in the section "Current and Proposed Ohio Gas Infrastructure"), many of the delivery points on interstate pipelines near these generating resources are small, with maximum capacities well below the estimated 135 MMcf/day required to run a plant of this size. To connect to a high capacity line, these resources would need to extend out to an interconnection point or other large system line that may have sufficient capacity on an interruptible basis but not the ability to provide firm fuel contracts.

The NEXUS Project represents a new, large-diameter and high-capacity resource that traverses through the respective service territory of these power plants and can accept new firm-transportation service contracts at the location of need.

Existing Resources

There are also 27 existing natural gas-fired generating units in Northern Ohio. In 2012, these units provided approximately 3 million MWh (approximately one fourth of all Ohio natural gas-fired generation). In contrast to planned capacity, most of these existing natural-gas-fired units are combustion turbine providing peaking-power supply on an as-needed basis. These units typically operate at low annual capacity factors, but may operate at max capacity for shorter durations. As such, their natural gas demand is typically characterized by interruptible service and many units rely on dual-fuel capabilities that allow them to burn oil during periods of natural gas shortages.[62]

In recent years, some of these plants have relied more heavily on distillate fuel oil to fuel their output. For example, the West Lorain Power Plant includes seven combustion turbines located along Lake Erie in Lorain, Ohio. In 2012, when natural gas prices were among the lowest in recent years, the West Lorain facility operated 100 percent on natural gas and generated 207,000 MWh of energy. In contrast, during 2014, the West Lorain facility operated 100 percent on distillate fuel oil and generated just 56,000 MWh.[63] Access to additional economical natural gas supplies could offer the West Lorain Facility additional dispatch flexibility and lower the marginal cost of power supply. Based on historical differentials in fuel prices and estimated interconnection costs, West Lorain could see a simple payback period of under four years.[64]

Total Electric Power Natural Gas Demand

Taken together, these findings support the conclusion that new natural-gas-delivery capacity is needed in Northern Ohio consistent with the projected in-service date of the NEXUS Project.

Measured on a peak-day basis (and not taking into account, for example, the summer demand from the West Lorain facility), total gas demand from the electric power sector could approach 0.535 Bcf/day, with total annual demand of 140 Bcf per year by the year 2019 (Figures 22 and 23). This estimate includes only the potential demand of known projects that have filings in both the PJM interconnection queue and at the OPSB. Beyond 2020, demand could be far greater, as additional aging steam-turbine plants eventually face retirement decisions. As described previously, the ability of the NEXUS pipeline to take additional customers as estimated demand develops provides important flexibility to power-plant developers and public officials within Ohio when making long-term energy siting decisions.

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[62] Sam Newell, et al., "Cost of New Entry Estimates for Combustion Turbine and Combined Cycle Plants in PJM, with June 1, 2018 Online Date," Prepared for PJM Interconnection, L.L.C., page 15.

[63] West Lorain generated 112,000 MWh in 2011, and 58,000 MWh in both 2010 and 2013. SNL Financial data.

[64] In 2014, West Lorain spent $18.7 million dollars on distillate fuel oil; in 2012, West Lorain spent $7.8 million on natural gas. At an estimated interconnection cost of $3.5 million per mile, total capital costs would be approximately $36 million dollars in $2015. SNL Financial data.

Figure 22
Maximum Potential Incremental Peak Demand Associated with Known Natural Gas Power Plant Projects in Northern Ohio (Bcf/Day)

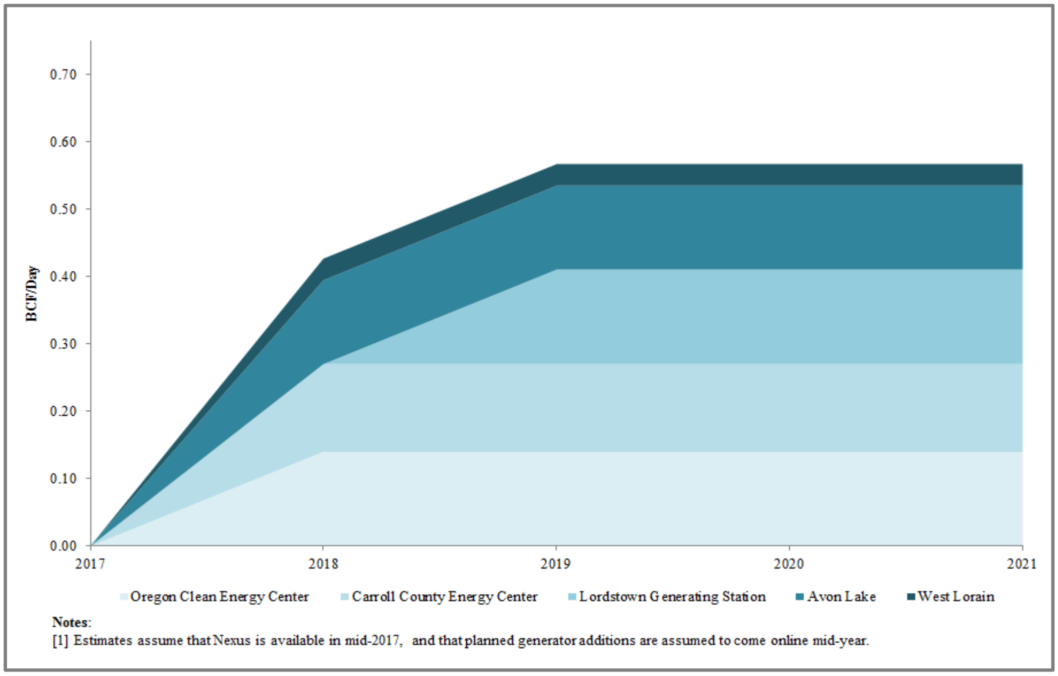
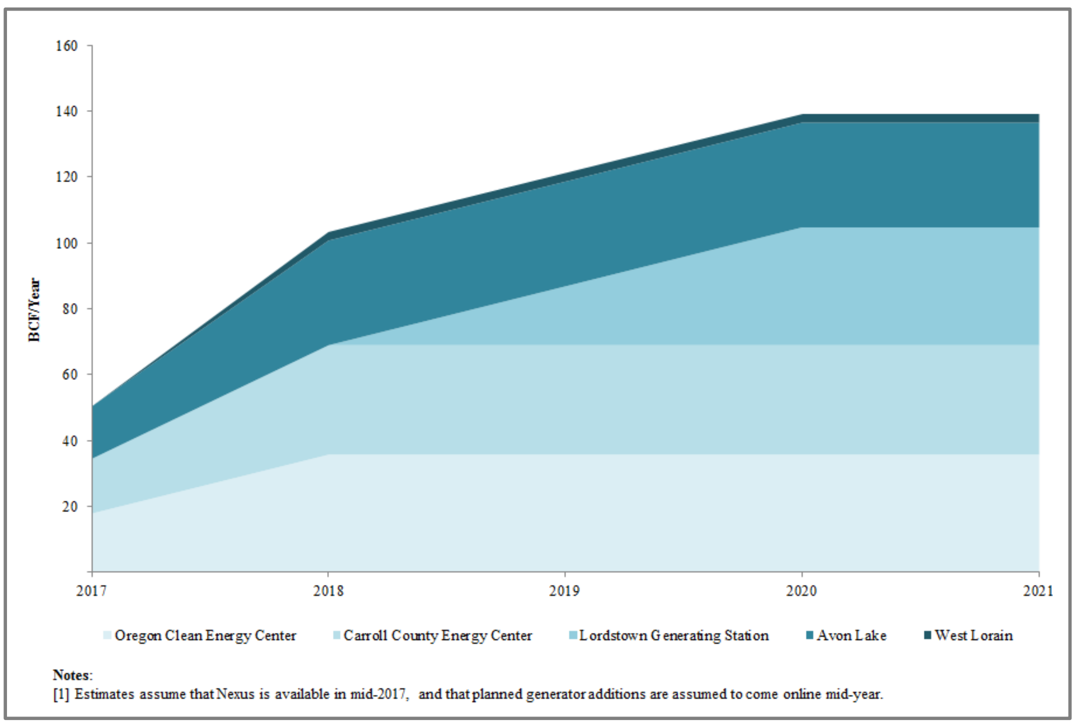


Figure 23
Maximum Potential Incremental Peak Demand Associated with Known Natural Gas Power Plant Projects in Northern Ohio (Bcf/Year)



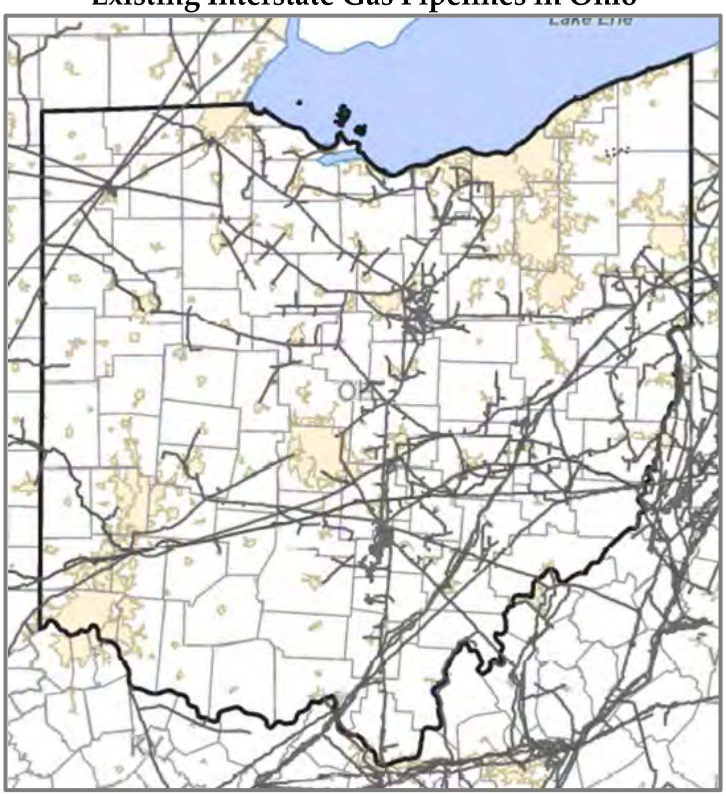
5. CURRENT AND PROPOSED NATURAL-GAS DELIVERY INFRASTRUCTURE IN OHIO

Existing Natural-Gas-Delivery Infrastructure

Ohio's current natural-gas-delivery infrastructure ranges from interstate pipelines that cross through the state to more localized networks of lower-pressure delivery pipelines. The eastern part of the state – home to Ohio's shale gas reserves and bordering the well-known Marcellus and Utica shale gas basins – contains overlapping interstate pipeline capacity. Other parts of the state, however, such as the northeast and southwest of the Ohio, contain far fewer networks. (See Figure 24.)

Much of Ohio's existing high-pressure interstate pipeline infrastructure is part of large interstate natural-gas pipeline systems that span thousands of miles. While these pipelines are extensive with large throughput capacity generally, their service territory is such that much of their natural gas-delivery capacity ultimately serves customers outside of Ohio. (See Table 7.)

Figure 24
Existing Interstate Gas Pipelines in Ohio



Source: SNL Financial

Table 7
Summary of Interstate Natural Gas Infrastructure Crossing Ohio (2014)

Pipeline Name	Ultimate Parent	Starting State(s)	Ending State(s)	Pipeline Capacity (BCF/d)	Total Length (miles)	Capacity to serve Ohio (BCF/d)	Length in Ohio (miles)
ANR Pipeline	TransCanada Corporation	Louisiana/Texas/Oklahoma	Wisconsin/Michigan	6.3	8,890	0.6	378
Columbia Gas Transmission, LLC	NiSource Inc.	Kentucky	New York	10.5	9,651	0.9	3,661
Crossroads Pipeline Company	NiSource Inc.	Indiana	Ohio	N/A	203	0.3	63
Dominion Transmission, Inc.	Dominion Resources Inc.	Virginia	New York	5.1	3,691	0.6	234
Panhandle Eastern Pipeline	Energy Transfer Partners LP	Texas	Michigan	2.6	6,009	0.2	348
Rockies Express Pipeline, LLC	Kinder Morgan, Inc.	Colorado	Ohio	2.1	1,698	1.6	239
Tennessee Gas Pipeline Company, LLC	Kinder Morgan, Inc.	Texas	Massachusetts	10.2	12,195	0.2	876
Texas Eastern Transmission, LP	Spectra Energy Partners, LP	Texas	New York	9.5	9,554	-0.3	1,159
Texas Gas Transmission, LLC	Loews Corp.	Louisiana	Ohio	4.7	5,859	1.0	86

Notes:

[1] Pipeline capacities and total line length come from the 2014 FERC Form 2 filings for each pipeline. In each respective filing, pipeline capacity information can be found on page 518, and pipeline length information can be found on page 514. The exception is the filing for the Crossroads pipeline, whose information is on page 211. No total capacity information was available for the Crossroads Pipeline Company.

[2] Capacity in Ohio information came from the EIA state-to-state capacity data. Capacity in Ohio is calaculated as the amount of natural gas that flows into the state minus the amount of natural gas that flows out of the state.

[3] Pipeline lengths are rounded to the nearest whole number. Capacity is rounded to the nearest tenth decimal place.

Sources:

[1] SNL Financial.

[2] FERC Form 2 & 2A "Major and Non-major Natural Gas Pipeline Annual Report," 2014.

[3] http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/MajorInterstatesTable.html.

[4] http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/StatetoState.xls.

When evaluating a pipeline's ability to serve demand, there are several key measures to consider: total capacity, total scheduled capacity (and hence, available capacity), and peak day demand. The ratio of scheduled capacity relative to total capacity is known as the peak-day utilization rate.

There are several other measures of utilization rates, including, for example use measured based on average day conditions or as the average over a total year. These aggregate utilization rates are typically measured at state or regional borders by entities such as the EIA. Utilization rates are also calculated and assessed at individual delivery points for specific points in time. The detailed utilization rates vary throughout the day and nomination cycle; they also vary seasonally, owing to changes in peak day gas demand.

Peak-day gas demand can be a critically important measure of capacity, since certain types of demands will tend to be concentrated by season. For example, demand from residential customers for home heating is highest in the winter, during cold periods and typically must be delivered on a firm basis. And historically, demand from the electric power generation sector is highest in the summer, when demand for electricity is greatest but when there may be greater interruptible capacity available on the pipeline system. This is one reason why average year-round utilization is not always the appropriate measure of available capacity – low pipeline utilization in March does not mean that the same pipeline can meet peak demands for heating in December or for electricity in July.

Pipeline utilization rates are difficult to calculate and interpret with respect to a particular state, region or set of delivery points on a pipeline traversing multiple states and regions.[65] As such, a detailed analysis of the utilization rates of existing interstate pipelines in Ohio presents many difficulties, especially assessing delivery trends in aggregate.[66] For example, the EIA reported total inflow capacity to Ohio of 13,259 MMcf/day and a total outflow capacity from Ohio of 8,076 MMcf/day in 2014. This suggests an 'average' annual utilization rate of 39 percent. This fails to account, however, for important constraints on the system at different times throughout the year and at various locations throughout Ohio. The Ohio Environmental Protection Agency expressed concern that new gas demand from the electric generation sector and in particular

[65] See, for example, http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/usage.html.

[66] Notably, the Ohio Environmental Protection Agency recently expressed concern that the full range of available capacity was declining in recent years, following a rapid expansion from 2005 to 2010. The agency noted that due to this slowdown, existing infrastructure may not be able to fully accommodate the redispatch of existing natural gas combined cycle power plants, as assumed by the U.S. EPA under the proposed Clean Power Plan. See Comments Submitted on Behalf of the Public Utilities Commission of Ohio, filed December 1, 2014, Carbon Pollution Emission Guidelines for Existing Stationary Sources Electric Utility Generation Units. EPA-HQ-OAR-2013-0602, page 68.

from NGCCs like those entering Northern Ohio, will lead to new demand in winter months, during periods of peak residential and overall system demand.[67]

Instead, by focusing on specific delivery point types (e.g., delivered to power plants) and other areas of interest allows for a reasonable analysis of the natural gas utilization rates in Ohio. Based on the information on the existing high-capacity gas-delivery infrastructure presented in Figure 24 and Table 7, combined with data on actual pipeline flows as reported by the pipeline companies, it appears that many of the critical delivery points in Ohio are (or have recently been) close to full throughput capacity in recent years.

Figures 25 and 26 reflect the maximum daily capacity utilization of existing interstate natural gas pipelines in Ohio at each month throughout the year. These figures show the highest daily utilization rate per month for timely natural-gas day at delivery points associated with LDCs in Northern Ohio (Figure 25) and with electric sector power plants throughout Ohio (Figure 26).[68] These figures highlight the seasonal nature of natural gas demand. LDCs typically operate at low capacity utilization rates in summer months, when residential heating loads are virtually non-existent. Then, during the winter months, these pipelines operate at or near 100 percent – and in some rare cases, operate above their named capacity rates for shorter periods of time.

At the same time, power plants – particularly NGCCs that may be economical to operate throughout the year – consume natural gas with less seasonality. (Low delivery rates may reflect situations where a power plant's interruptible delivery service has been curtailed or where a plant is out of operations for maintenance.) Therefore, any incremental demand for firm transportation service from the power sector will be coincident with peak demand from the residential sector, thereby increasing stress on the current system.

Two of these plants (Waterford Energy Facility and Dresden Energy Facility) operated at close to 100 percent natural gas utilization rates throughout the year. Both of them obtain their fuel through firm-fuel contracts. Two others – the Washington Energy Center and the Hanging Rock Facility – operated at delivery-capacity-utilization rates above 50 percent and steadily increased their demand throughout 2014, with monthly utilization rates above 100 percent in the 2014/15 winter. In 2013 and 2014, the Washington Energy Facility operated with interruptible natural gas service. Both the Waterford and Washington Facilities operated above

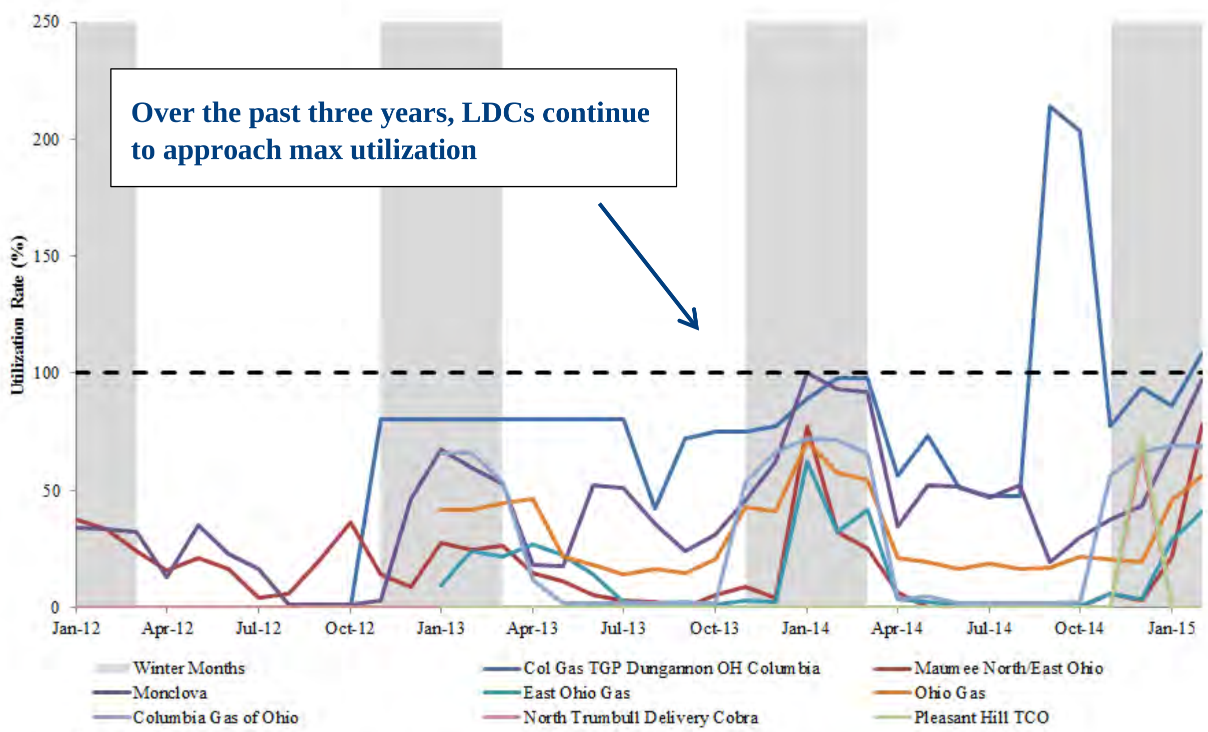
[67] Ohio Environmental Protection Agency, comments on the EPA Clean Power Plan, page 69.

[68] This includes all delivery points with delivery type identified as 'power plant' in the SNL Operational Pipeline Capacity database. SNL only tracks delivery points on interstate pipelines. Therefore, any power plants connected to intrastate pipelines are not represented here.

100 percent in winter months – at the exact period when LDCs also required the most natural gas – highlighting the importance of natural gas availability to service these units.

Recently, PJM has prepared a fuel-assurance plan and capacity-performance proposal that are designed, in part, to shore up the availability of fuels for power generation during winter-peak-season electrical demand.[69] These changes are designed to avoid situations where demand from firm-gas-transportation customers makes gas unavailable to a natural gas-fired generating unit.

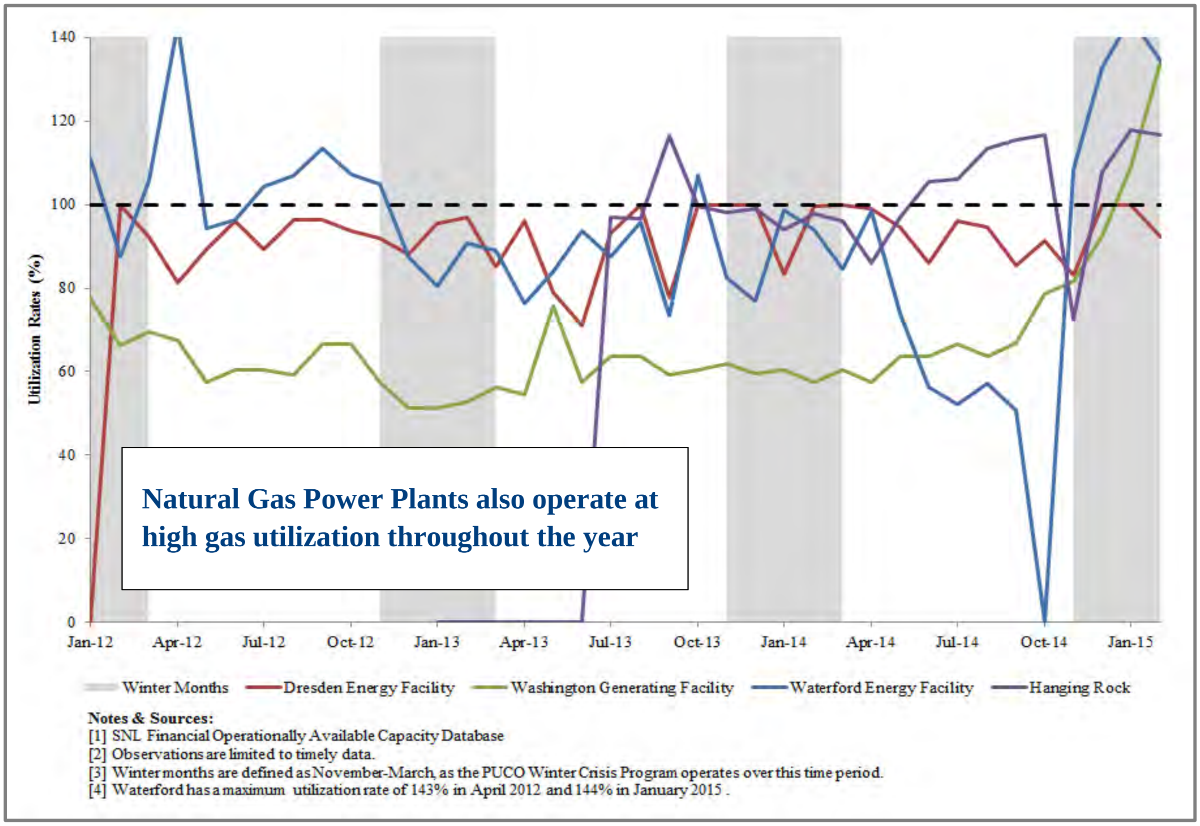
Figure 25
Capacity Utilization Rates at Select LDCs in Northern Ohio
January 2012 – February 2015



Notes & Sources:
[1] SNL Financial: Operationally Available Capacity Database
[2] Observations are limited to timely data and LDCs that are located within twenty-five miles of the prospective NEXUS route.
[3] Winter months are defined as November-March, as the PUCO Winter Crisis Program operates over this time period.
[4] Col Gas TGP Dungannon has a maximum utilization rate of 214% in September 2014 and 203% in October 2014.

[69] In 2014, PJM's proposed new "Capacity Performance" allows, among other things, for natural gas-fired units to include the cost of firm fuel assurance in their market offers into daily energy and capacity markets. PJM also elected to let natural gas-fired units change their bid offers within a single day to account for changes in fuel delivery costs. See, PJM Interconnection, L.L.C., "Report on Fuel Assurance Activities," submitted in FERC Docket No. AD13-7-000 and No. AD14-8-000.

Figure 26
Maximum Monthly Utilization Rates, Select Natural Gas Plants in Northern Ohio
January 2012 – February 2015



The majority of LDC and commercial/industrial consumers typically require firm service.[70] But with new market rules to support fuel assurance in PJM, this will become increasingly true for NGCCs that seek to provide electric generation service year round as well.[71]

Taken together, this highlights the potential for constraints to arise on the existing natural gas-delivery system, and the need for incremental gas-delivery capacity to serve power plants in Northern Ohio. There may be existing or potentially new NGCCs that have traditionally taken

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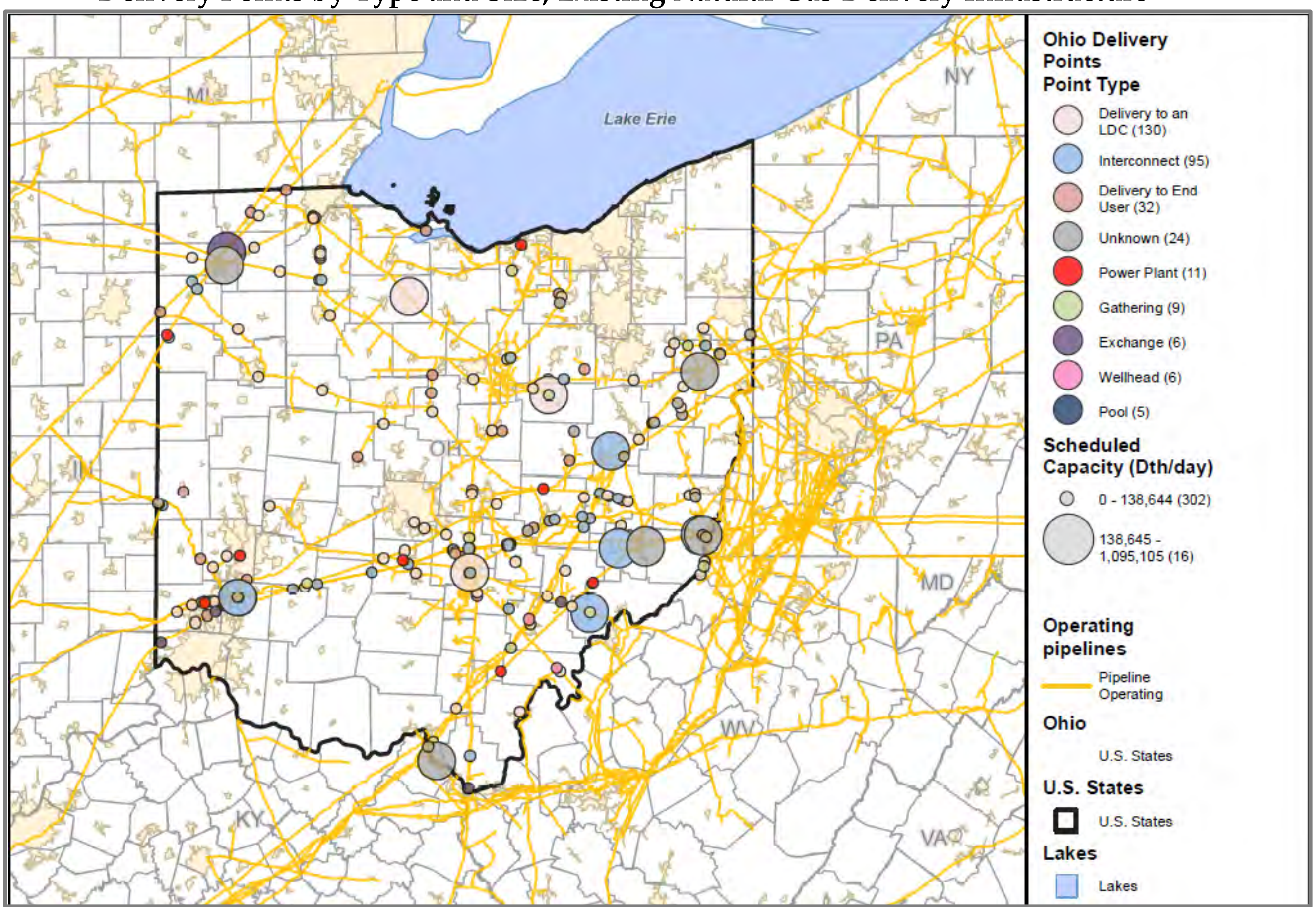
[70] Firm transportation service is "service offered to customers (regardless of class of service) under schedules or contracts which anticipate no interruptions. The period of service may be for only a specified part of the year as in off-peak service. Certain firm service contracts may contain clauses that permit unexpected interruption in case the supply to residential customers is threatened during an emergency." http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/deliverability/pdf/glossary.pdf.

[71] In 2013, Ohio purchased 43 percent of its natural gas on firm fuel contracts. In contrast, Pennsylvania purchased 75 percent of its gas using firm contracts. Across all PJM states (including regions not served by PJM), more than 60 percent of all natural gas was purchased on firm contracts. EIA 923 Fuel Receipts and Costs, 2013.

natural gas-service on an interruptible basis who will find it economically attractive to firm up delivery service. Also, many of the current interstate delivery points on pipelines in Northern Ohio are on smaller-diameter lines that typically operate at lower pressures and that cannot deliver the volumes at the pressure that than are needed by large customers – like energy-intensive industrial applications or power plants that are currently being installed on the system. As illustrated in Figure 27, the majority of interstate delivery points that are sized with a maximum capacity larger than 135 MMcf/day (the estimated quantity of fuel for an 800 MW natural-gas combined-cycle unit running at full operation) are located at exchange points, near the borders of the state. There is insufficient high-capacity, large-diameter resources to meet incremental firm demand in Northern Ohio.

Figure 27
Delivery Points by Type and Size, Existing Natural Gas Delivery Infrastructure



Source: SNL Financial

6. PROPOSED PIPELINES: NEED FOR AND POTENTIAL BENEFITS OF THE NEXUS GAS PIPELINE

Overall Incremental Demand for Natural Gas and Gas-Delivery Infrastructure in Ohio

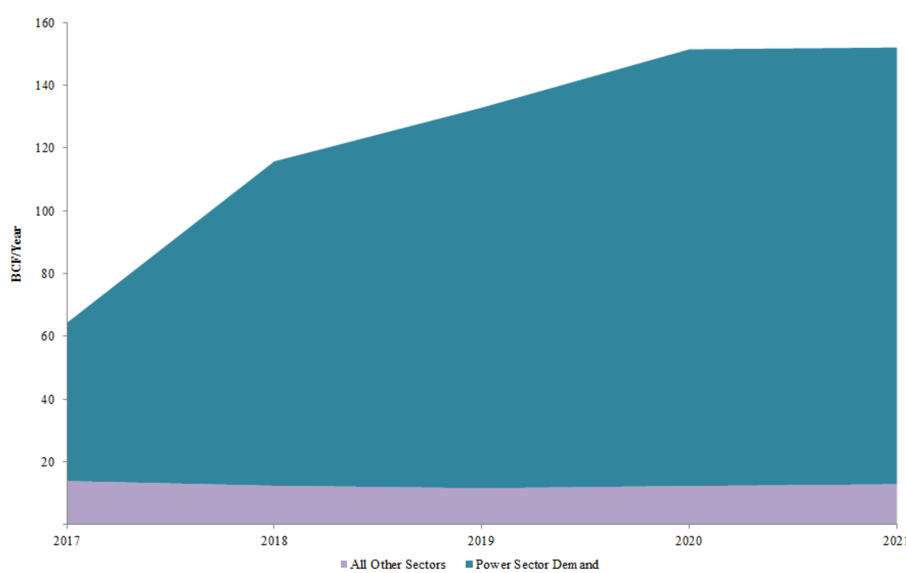
There is strong incremental demand for natural gas-delivery capability to meet potential customer needs in the state. This demand is driven by a number of important factors, including:

- ***A substantial increase in regional production within the Appalachian Basin has already changed the dominant flow of natural gas within the U.S., with new flows expected to move westwardly from the Appalachian region, crossing through Ohio into Michigan, Canada and beyond.*** This increased production has lowered prices substantially in the near term and prices are expected to remain low for the foreseeable future. This has already provided initial economic benefits to consumers in Ohio and elsewhere in the form of lower electricity and natural gas costs, and additional jobs and economic opportunities to the State of Ohio
- ***Significant potential incremental peak-day demand is associated with known new natural gas combined cycle power plants, coal-to-gas plant conversions and other power plants***. We estimate that the potential incremental gas-delivery demand for currently planned generating units to be 0.535 Bcf/day. Because this potential demand reflects only the currently identified new power-plant projects, there could be much more in the future as the region transitions to an electricity mix that depends less on coal and more on natural gas. Demand of traditional customers would be above that daily demand of power generators.
- ***Existing gas-delivery capacity needs to expand to accommodate greater use of natural gas in Northern Ohio***. Figure 28 summarizes potential incremental year-round demand for natural gas of traditional customers and power-generation customers in Northern Ohio, which would require up to an additional 150 Bcf/year. Much of this demand will need to be served by firm fuel contracts to ensure reliable access during heating season. Further, as natural gas demand grows in other parts of Ohio, additional pipeline capacity will be required to meet that demand. The NEXUS Project's access to Northern Ohio markets may free up capacity on pipelines currently serving that market and allow them to meet the demand needs in other parts of the state along their systems.
- ***A strong industrial base in Northern Ohio needs access to low-cost energy to remain competitive***. For example, studies indicate that with greater access to natural gas,

energy-intensive manufacturing sectors could outperform the growth of U.S. industries as a whole. Providing incremental access to low-cost energy to Ohio's manufacturing base will benefit those industries and the broader state as well.

- ***An opportunity to serve incremental residential heating needs could be accommodated through greater access to natural gas delivery-capability and storage-balancing services***. The ability of LDCs or their retail energy marketers to take on additional firm customers depends upon incremental pipeline capacity such as the NEXUS Project
- ***Incremental gas delivery capacity can support the transition of Ohio's and the region's power sector to an overall fleet with lower overall CO_2 emissions, in order to meet state and federal clean energy goals.*** More than 3,500 MW of coal-fired capacity in Ohio will retire by 2016. These coal units will be replaced by almost 5,000 MW of NGCC capacity, with the vast majority of that capacity located in Northern Ohio. These units support not only Ohio's electricity demand but also a regional economic dispatch of power plants taking CO_2 emissions into account. These units will be expected to run with high capacity factors including operations during winter seasons when incremental firm natural-gas delivery service will be needed to ensure NGCCs' availability for power generation.

Figure 28
Potential Near-Term Incremental Demand for Natural Gas in Northern Ohio: Potential Residential, Commercial, and Industrial Demand and Demand for Known/Planned Power Plants (Bcf/Year)



Notes:
[1] Estimates assume that Nexus is available in mid-2017, and that planned generator additions are assumed to come online mid-year.
[2] Demand for residential, commercial, and industrial customers is forecasted by applying the annual growth rates from the EIA Annual Energy Outlook 2014 ("AEO") reference case for natural gas consumption in the East North Central Region to historical demand in Ohio (using 2013 data from EIA). North Ohio demand is estimated using census data by applying the percentage of population and employees in North Ohio to the Ohio demand projections.

The NEXUS Project includes a unique bundle of attributes that can enable it meet these emerging natural gas opportunities in Northern Ohio. These attributes include:

- ***A project that can move forward in development, given the financial commitment of anchor shippers.*** The NEXUS Project's overall economics will allow it proceed now. And it will have the capability to allow other shippers in the future to contract for firm and interruptible capacity over time. This will allow the NEXUS Project to meet new and emerging demand on an as-needed basis Northern Ohio customers can decide when and how to access new fuel supplies. It will also benefit customers (including those directly served by LDCs, and industrials and power generators) that are already connected to existing gas-delivery systems, through increasing their options to access low-cost gas supplies and natural gas storage, and increasing competition and potentially lowering consumer prices over the long-term.

- ***Use of existing infrastructure corridors*** with three-fifths of the route's mileage located on existing pipeline or railroad corridors. As such, the NEXUS Project can provide incremental access to natural gas delivery for a large portion of Northern Ohio with less disruption to communities and natural resources than would occur with an entirely new right of way.

- ***Provision of a new, state-of-the-art large-diameter and high-capacity line*** in an area populated by relatively small-diameter, lower-pressure systems. The NEXUS Project can help support the new flow of natural gas from the Marcellus Shale basin into the Midwest and Canada. This new westwardly flow is even more important because traditional supply areas in Western Canada and Alberta are expected to continue to decrease their production. The NEXUS Project will be able to transport large volumes of natural gas at the pressures required to support NGCC projects as well as providing pressure support to an underserved region, which will benefit both existing and new customers through increased reliability and supply options.

- ***Capability to meet potential incremental demand for natural gas in a time frame that coincides with significant changes in the overall energy landscape in the region.*** These changes include retirements of coal-fired power plants in Northern Ohio that will be replaced by new NGCCs, as well as incremental demand for low-cost natural gas supply by Northern Ohio's important industrial and manufacturing base.

- ***Ability for timely and incremental expansion of infrastructure to meet growing demand for natural gas.*** The NEXUS Project's mainline through Northern Ohio also offers the capability for incremental mainline expansion and lateral lines to new end-use customers that could use natural gas if they could access it economically. For example, households in several Northern Ohio counties continue to rely on distillate fuel oil and electricity for residential heating. With access to sustained low-cost natural gas and increasingly more-efficient boilers, these homes may find it economical to switch to natural gas if more supply and delivery capability becomes available. The NEXUS Project can open access for a whole new set of potential gas-heating customers. LDCs in this region support the conversion of homes to natural gas through the use of financial incentives like rebates.

- ***Support for Ohio's environmental and clean-energy goals, with the ability to help enable timely and cost-effective compliance with CO_2-emission reduction requirements in the electric sector***. The Ohio Environmental Protection Agency has expressed concern that "an apparent slowdown in the growth" of new pipeline development would make it harder to support a significant transition to and redispatch of natural-gas-fired capacity. The NEXUS Project would provide the capability to address that concern in a timely way and help the state transition to a newer, more-efficient energy mix with lower CO_2 emissions. The NEXUS Project would provide the capability to address that concern in a timely way and help the state transition to a newer, more-efficient energy mix with lower CO_2 emissions. The region's grid operator, PJM, has found that greater reliance on new NGCCs could help the state meet its emissions-reduction goals at lower overall costs to consumers.