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Federal Energy Regulatory Commission

Office of

Energy Projects

April 2016

Eastern Shore Natural Gas Company

Docket Nos. **CP15-18-000**
CP15-18-001
CP15-498-000

White Oak Mainline Expansion Project and System Reliability Project

Environmental Assessment

Washington, DC 20426

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FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas Branch 4
Eastern Shore Gas Company
Docket Nos. CP15-018-000
CP15-018-001
CP15-498-000

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared this environmental assessment (EA) for the White Oak Expansion and System Reliability Projects proposed by Eastern Shore Gas Company (Eastern Shore) in the above-referenced dockets. Eastern Shore requests authorization to construct, install, own, operate, and maintain certain facilities located in Chester County, Pennsylvania and New Castle, Kent, and Sussex, Counties, Delaware. The White Oak Expansion Project would enable Eastern Shore to provide 45,000 dekatherms per day of firm transportation service to the Garrison Energy Center. The System Reliability Project would decrease the likelihood of future "brown outs" for existing Eastern Shore customers during high-demand months; "brown outs" occurred during the winters of 2014 and 2015.

Specifically, the proposed White Oak Expansion Project includes the following facilities:

- 3.3 miles of 16-inch-diameter looping pipeline (the Daleville Loop) in Chester County, Pennsylvania;
- 2.1 miles of 16-inch-diameter looping pipeline (Kemblesville Loop) in Chester County, Pennsylvania; and
- 3,550 horsepower of additional compression at Eastern Shore's existing Delaware City Compressor Station.

Specifically, the proposed System Reliability Project includes the following facilities:

- 2.5 miles of 16-inch-diameter looping pipeline (Porter Road Loop) in New Castle County, Delaware;
- 7.6 miles of 16-inch-diameter looping pipeline (Dover Loop) in Kent County, Delaware;
- installation of associated underground and aboveground facilities (two mainline valves, a meter and regulator station); and
- an additional 1,775 horsepower of compression at Eastern Shore's existing Bridgeville Compressor Station in Sussex County, Delaware.

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The EA assesses the potential environmental effects of the construction and operation of the projects in accordance with the National Environmental Policy Act. The FERC staff concludes that approval of the proposed projects, with appropriate mitigating measures, would not constitute a major federal action significantly affecting the quality of the human environment.

The EA has been placed in the public files of the FERC and is available for public viewing on the FERC's website at www.ferc.gov using the eLibrary link. A limited number of copies of the EA are available for distribution and public inspection at:

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

Copies of the EA have been mailed to federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American tribes; potentially affected landowners and other interested individuals and groups; libraries in the project areas; and parties to this proceeding.

Any person wishing to comment on the EA may do so. Your comments should focus on the potential environmental effects, reasonable alternatives, and measures to avoid or lessen environmental impacts. The more specific your comments, the more useful they will be. To ensure that your comments are properly recorded and considered prior to a Commission decision on the proposal, it is important that the FERC receives your comments in Washington, DC on or before **May 25, 2016**.

For your convenience, there are three methods you can use to submit your comments to the Commission. In all instances, please reference the project docket number CP15-018-001 or CP15-498-000 (as applicable) with your submission. The Commission encourages electronic filing of comments and has dedicated eFiling expert staff available to assist you at (202) 502-8258 or efiling@ferc.gov.

(1) You may file your comments electronically by using the eComment feature, which is located on the Commission's website at www.ferc.gov under the link to Documents and Filings. An eComment is an easy method for interested persons to submit brief, text-only comments on a project;

(2) You may file your comments electronically by using the eFiling feature, which is located on the Commission's website at www.ferc.gov under the link to Documents and Filings. With eFiling, you can provide comments in a variety of formats by attaching them as a file with your submission. New eFiling users must first create an account by clicking on "eRegister." You will be asked to

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select the type of filing you are making. A comment on a particular project is considered a "Comment on a Filing"; or

(3) You may file a paper copy of your comments at the following address:

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington, DC 20426

Although your comments will be considered by the Commission, simply filing comments will not serve to make the commentor a party to the proceeding. Any person seeking to become a party to the proceeding must file a motion to intervene pursuant to Rule 214 of the Commission's Rules of Practice and Procedures (18 CFR 385.214).[1] Only intervenors have the right to seek rehearing of the Commission's decision.

Affected landowners and parties with environmental concerns may be granted intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding which would not be adequately represented by any other parties. **You do not need intervenor status to have your comments considered.**

Additional information about the projects is available from the Commission's Office of External Affairs, at **(866) 208-FERC**, or on the FERC website (www.ferc.gov) using the eLibrary link. Click on the eLibrary link, click on "General Search," and enter the docket number excluding the last three digits in the Docket Number field (i.e., CP15-018; CP15-498). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at FercOnlineSupport@ferc.gov or toll free at (866) 208-3676, or for TTY, contact (202) 502-8659. The eLibrary link also provides access to the texts of formal documents issued by the Commission, such as orders, notices, and rulemakings.

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

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

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TECHNICAL ACRONYMS

AQCR	Air Quality Control Region
ATWS	additional temporary workspace
CAA	Clean Air Act of 1970, as amended in 1977 and 1990
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COE	U.S. Army Corps of Engineers
CRGIS	on-line cultural resource data base
dB	decibel
dBA	decibels on the A-weighted scale
DCNR	Pennsylvania Department of Conservation and Natural Resources
DNREC	Delaware Department of Natural Resources and Environmental Control
DOT	U.S. Department of Transportation
EA	environmental assessment
EDR	Environmental Data Resources, Inc.
EI	Environmental Inspector
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESC Plan	Erosion and Sedimentation Control Plan
FERC	Federal Energy Regulatory Commission
FWS	U.S. Fish and Wildlife Service
GHG	greenhouse gas
GWP	global warming potential
hp	horsepower
HAP	Hazardous Air Pollutant
HCA	high consequence area
HDD	horizontal directional drill
IBA	Important Bird Area
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
MP	milepost
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NGA	Natural Gas Act
NLEB	northern long-eared bat
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NNSR	Non-Attainment New Source Review
NO_x	nitrogen oxides
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places

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TECHNICAL ACRONYMS (continued)

NSA	noise-sensitive area
NSPS	New Source Performance Standards
NSR	New Source Review
O_3	ozone
OEP	Office of Energy Projects
ORV	Outstandingly Remarkable Values
PADEP	Pennsylvania Department of Environmental Protection
PEM	palustrine emergent
PFO	palustrine forested
Plan	*Upland Erosion Control, Revegetation, and Maintenance Plan*
PHMSA	Pipeline and Hazardous Materials Safety Administration
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 microns
PM_{10}	particulate matter with an aerodynamic diameter of 10 microns
Procedures	*Wetland and Waterbody Construction and Mitigation Procedures*
PSD	Prevention of Significant Deterioration
PSS	palustrine scrub-shrub
PTE	potential-to-emit
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SPCC Plan	Spill Prevention Control and Countermeasure Plan
SWPP Plan	Storm Water Pollution Prevention Plan
System Reliability NOI	*Notice of Intent to Prepare an Environmental Assessment for the Proposed System Reliability Project and Request for Comments on Environmental Issues*
tpy	tons per year
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geologic Survey
VOC	volatile organic compound
White Oak NOI	*Notice of Intent to Prepare an Environmental Assessment for the Proposed White Oak Mainline Expansion Project and Request for Comments on Environmental Issues*
White Oak Supplemental NOI	*Supplemental Notice of Intent to Prepare an Environmental Assessment for the Proposed White Oak Mainline Expansion Project and Request for Comments on Environmental Issues*

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A. PROPOSED ACTION

1. Introduction

The staff of the Federal Energy Regulatory Commission (FERC or Commission) prepared this environmental assessment (EA) to address the environmental impacts of the construction and operation of the proposed White Oak Mainline Expansion Project (White Oak Project) and the System Reliability Project.

On November 21, 2014, Eastern Shore Natural Gas Company (Eastern Shore) filed an application in Docket No. CP15-18-000 requesting a Certificate of Public Convenience and Necessity (Certificate) pursuant to Section 7(c) of the Natural Gas Act (NGA) to construct and operate certain natural gas pipeline facilities as part of the White Oak Project in Chester County, Pennsylvania and New Castle County, Delaware. On November 18, 2015, Eastern Shore filed an amendment to its application in Docket No. CP15-18-001 to construct the Kemblesville Loop Alternative 2 along Eastern Shore's existing right-of-way in Chester County. Accordingly, this EA evaluates the former Kemblesville Loop Alternative 2 as the now-proposed "Kemblesville Loop." A comparative analysis of the originally proposed Kemblesville route and the currently proposed Kemblesville Loop is presented in section C.3.1.

On May 22, 2015, Eastern Shore filed an application in Docket No. CP15-498-000 requesting a Certificate to construct and operate certain natural gas pipeline facilities as part of the System Reliability Project in Kent, New Castle, and Sussex Counties, Delaware.

Staff is preparing a single EA for the two projects because of the proximity of the projects to each other and the similarity in their timing. Because the EAs for both projects would have been issued within the same general timeframe, and because they are being proposed by the same applicant, our consideration of company-proposed construction techniques and mitigation measures is facilitated by a combined analysis; and preparing one EA is more efficient and streamlines staff's environmental review of both projects. **Nevertheless, the White Oak Project and the System Reliability Project are indeed two separate projects with independent utility and customers**. As presented in the following section, each project has separate customers. Accordingly, any Certificate the Commission may issue for these projects would be individual and separate for each project.

We[1] prepared this EA in compliance with the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality regulations for implementing NEPA (title 40 of the Code of Federal Regulations, parts 1500-1508 [40 CFR 1500-1508]), and the Commission's implementing regulations under 18 CFR 380.

The assessment of environmental impacts is an important and integral part of the FERC's decision on whether to issue Eastern Shore Certificates to construct and operate the proposed facilities. As such, we prepared this EA to assess the environmental impacts that would likely

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

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occur as a result of the proposed construction of each project. We have developed and incorporated measures into this EA that we believe would appropriately and reasonably avoid, minimize, or mitigate environmental impacts associated with construction and operation of the projects.

2. Project Purpose and Need

White Oak Project

Earlier in 2014, Eastern Shore constructed the White Oak Lateral[2] which connects the Garrison Energy Center to Eastern Shore's mainline pipeline system. The Garrison Energy Center is a 309-megawatt electric generation facility that was constructed by Garrison Energy Center, Limited Liability Company, an affiliate of Calpine Energy Services, Limited Partners. The White Oak Project would result in incremental expansion capacity sufficient to support Eastern Shore's agreement to provide 45,000 dekatherms per day of firm transportation service to the Garrison Energy Center.

System Reliability Project

Eastern Shore states that the System Reliability Project would increase the reliability of natural gas to Eastern Shore's existing customers during high demand winter months; this need was not fully met in 2014 and 2015 and resulted in gas compression "brown outs." The proposed expansion capacity and additional compression would decrease the likelihood of future "brown outs" for existing Eastern Shore customers.

Under Section 7 of the NGA, the Commission determines whether interstate natural gas transportation facilities are in the public convenience and necessity and, if so, grants a Certificate to construct and operate them. The Commission is an independent regulatory agency and therefore conducts a complete independent review of project proposals, including an environmental review of the proposed facilities. The Commission bases its decision on technical competence, financing, rates, market demand, gas supply, environmental impact, long-term feasibility, and other issues concerning a proposed project.

3. Public Review and Comment

White Oak Project

On January 22, 2015, the Commission issued a *Notice of Intent to Prepare an Environmental Assessment for the Proposed White Oak Mainline Expansion Project and Request for Comments on Environmental Issues* (White Oak NOI). On July 9, 2015, the Commission issued a *Supplemental Notice of Intent to Prepare an Environmental Assessment for the Proposed White Oak Mainline Expansion Project and Request for Comments on Environmental*

[2] The White Oak Lateral Project was authorized on November 27, 2013, under Docket No. CP13-498-000.

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*Issues (*White Oak Supplemental NOI*)* for the project and opened a scoping period specific to the newly proposed Kemblesville Loop Alternative Route 2. These notices were sent to affected landowners; federal, state, and local government agencies; elected officials; environmental and public interest groups; other interested parties; and local libraries and newspapers.

In response to the White Oak NOIs, the Commission received environmental comments from the U.S. Fish and Wildlife Service (FWS), the Delaware Nation, the Franklin Township Historical Commission, the National Oceanic and Atmospheric Administration (NOAA), the National Park Service (NPS), the Franklin Township, the Pennsylvania Department of Conservation and Natural Resources (DCNR), the Chester County Water Resources Authority, and 11 private landowners. The primary concerns raised were regarding wetland and waterbody impacts; impacts due to forest clearing; impacts on the White Clay Creek National Wild and Scenic River; impacts on watersheds within the project area; impacts on the Kemblesville Village Historic District; impacts on bog turtle habitat; cultural resources; alternative routes (including the Kemblesville Loop Alternative Route 2); old growth forested areas along the pipeline routes; pipeline safety; and pipeline installation within proximity to residences. We also received a letter from the Natural Resources Conservation Service (NRCS) regarding potential NRCS easement holdings crossed by the proposed White Oak Project.

System Reliability Project

Subsequent to filing its application for the System Reliability Project, Eastern Shore held three open house informational meetings for the Dover Loop, Bridgeville Compressor Station, and Porter Road Loop on July 7, 9, and 15, 2015, respectively. Eastern Shore filed all of the comments received during these open houses. Three individuals provided comments during the Dover Loop open house regarding landowner notification during construction, tree clearing, and impacts on wetlands and waterbodies. Three individuals commented during the Bridgeville Compressor Station open house regarding community safety and gas leaks. One individual commented during the Porter Road Loop open house, but it was not related to environmental issues.

On September 4, 2015, the Commission issued a *Notice of Intent to Prepare an Environmental Assessment for the Proposed System Reliability Project and Request for Comments on Environmental Issues* (System Reliability NOI). The notice was sent to affected landowners; federal, state, and local government agencies; elected officials; environmental and public interest groups; other interested parties; and local libraries and newspapers.

In response to the System Reliability NOI, the Commission received comments from the NPS and two landowners. The NPS noted potential impacts on the Bridgeville Playground, which was funded through a Land and Water Conservation Fund Grant. Landowners submitted comments about public safety; effects on private property; wetlands; the 100-year floodplain; noise; vibration from trains; property values; less expensive alternatives to the project; and whether the Porter Road Loop would be necessary for system reliability.

This EA addresses the potential environmental impacts of the White Oak and System Reliability Projects as proposed by Eastern Shore and concerns identified in response to the

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NOIs (as well as the System Reliability Project open houses), and presents our independent review of the environmental issues. The comments received that are within the scope of the environmental analysis are addressed in this EA.

4. Proposed Facilities

White Oak Project

The White Oak Project consists of 3.3 miles of 16-inch-diameter looping pipeline (the Daleville Loop) and 2.1 miles of 16-inch-diameter looping pipeline (Kemblesville Loop) in Chester County, Pennsylvania, and 3,550 horsepower (hp) of additional compression at Eastern Shore's existing Delaware City Compressor Station in New Castle County, Delaware.

The Daleville Loop in Cochranville, Chester County, Pennsylvania would commence at Eastern Shore's existing right-of-way along Limestone Road and extend approximately 3.3 miles southeast to the existing Daleville Compressor Station along Street Road. The pipeline route generally parallels or follows the existing Eastern Shore right-of-way, except in the area of Gap Newport Pike. The proposed route consists of mostly existing roads and road right-of-way. No new aboveground facilities are proposed for the Daleville Loop portion of the project.

The Kemblesville Loop in Kemblesville, Chester County, Pennsylvania would commence near the intersection of Hess Mill Road and Wingate Drive and extend about 2.1 miles south to tie in to the existing Eastern Shore pipeline at a valve cluster south of Walker Road. The pipeline route generally parallels or follows the existing Eastern Shore right-of-way. No new aboveground facilities are proposed for the Kemblesville Loop.

Eastern Shore also proposes to install and operate two new 1,775-hp compressors and related facilities at the existing Delaware City Compressor Station. The new compression would be constructed on 7.1 acres of additional land, which represents an expansion of the existing compressor station footprint and fenced boundary.

System Reliability Project

The System Reliability Project consists of 2.5 miles of 16-inch-diameter looping pipeline in New Castle County, Delaware (Porter Road Loop); about 7.6 miles of 16-inch-diameter looping pipeline in Kent County, Delaware (Dover Loop); installation of associated underground and aboveground facilities (two mainline valves, a meter and regulator station); and an additional 1,775 hp of compression at Eastern Shore's existing Bridgeville Compressor Station in Sussex County, Delaware. All new and modified aboveground facilities would be constructed on land owned by Eastern Shore.

The Porter Road Loop would commence at Eastern Shore's existing Glasgow Control Station, near the intersection of Glasgow Avenue and Summit Bridge Road, and extend about 2.5 miles east along Porter Road to an existing valve cluster along Wrangle Hill Road. The proposed route consists almost entirely of existing road right-of-way with a small portion of Eastern Shore's right-of-way. Eastern Shore would acquire some additional permanent easement

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from an individual property owner and utilize additional temporary workspace (ATWS) as staging areas. Eastern Shore would install one new mainline valve assembly at the Glasgow Control Station, within the station's existing fenced boundary. The new valve assembly would allow pigging[3] operations for the Porter Road Loop.

The Dover Loop would commence at Eastern Shore's existing North Dover Meter and Regulator Station, near the intersection of McKee Road and Fork Branch Road, and extend about 7.6 miles in a southern direction. The loop would connect to an existing Eastern Shore pipeline near the intersection of Southern Boulevard and South Railroad Avenue in the town of Wyoming, Delaware. The proposed route consists almost entirely of existing road right-of-way with a small portion of Eastern Shore's right-of-way. Eastern Shore would acquire new permanent and temporary right-of-way from individual property owners along the route. Eastern Shore proposes to install one new mainline valve assembly to allow pigging operations at the North Dover Meter and Regulator Station, within the station's existing fenced boundary. The new valve assembly would allow pigging operations for the Dover Loop.

Eastern Shore also proposes to install and operate one new 1,775-hp compressor unit and related facilities at the Bridgeville Compressor Station. Eastern Shore would construct a new compressor building adjacent to the existing compressor building. Eastern Shore would also construct a new operations control station at the compressor station. A total of 18.4 acres would be used for the compressor station modifications.

Eastern Shore was not completely clear in its application about the actual footprint of construction within this 18.4 acres, but based on our analysis of the maps, this acreage represents the proposed Bridgeville Compressor Station expansion (Eastern Shore would extend the station's fence line by about 2.4 acres to accommodate the expansion and the new building), the footprint of the existing Bridgeville Compressor Station facility (about 4.7 acres of the existing station building and fenced area in which there would be no additional ground disturbance), and two access roads leading to the station. The remaining balance of acres represents Eastern Shore using its existing owned parcel adjacent to the compressor station for staging and contractor yards.

A general location of the projects facilities is shown in figures 1 and 2. The projects' aerial maps are shown in appendices 1 and 2. The projects' aboveground facility plot plans are shown in appendices 3 and 4.

5. Non-jurisdictional Facilities

Under Section 7 of the NGA, the FERC is required to consider, as part of its decision to authorize jurisdictional facilities, all factors bearing on the public convenience and necessity. The jurisdictional facilities for a project typically include infrastructure such as pipelines and associated aboveground facilities (for example, mainline valves and pig launcher/receivers), compressor units, compressor and auxiliary buildings, inlet and outlet piping, and related

[3] A "pig" is a tool that the pipeline company inserts into and pushes through the pipeline for cleaning the pipeline, conducting internal inspections, or other purposes.

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supporting facilities (for example, cathodic protection[4] and communications facilities). The specific facilities proposed for the two Eastern Shore projects are identified in section A.4 of this EA.

Occasionally, proposed projects have associated facilities that do not come under the jurisdiction of the Commission. These non-jurisdictional facilities may be integral to the need for the proposed facilities (for example, a gas-fueled power plant at the end of a jurisdictional pipeline) or they may be minor, non-integral components of the jurisdictional facilities that would be constructed and operated as a result of the proposed facilities. We did not identify any non-jurisdictional facilities associated with either of these projects.

6. Construction, Operation, and Maintenance Procedures

Eastern Shore would follow FERC's *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures)[5], without modifications; Eastern Shore's Erosion and Sedimentation Control Plans (ESC Plan); Eastern Shore's standard construction practices and policies; and any additional project-specific requirements that may be imposed by federal, state, and local agencies or negotiated with landowners for construction and restoration of the projects.

On March 11, 2016, the Chester County Conservation District approved Eastern Shore's ESC Plan and found it adequate for construction of the White Oak Project.

On December 17, 2015, the Delaware Department of Natural Resources and Environmental Control (DNREC) Division of Watershed Stewardship approved Eastern Shore's ESC Plan for construction of the System Reliability Project Porter Road Loop. Eastern Shore anticipates approval of its ESC Plan for construction of the Dover Loop by March 2016.

For each project, Eastern Shore developed a project-specific Spill Prevention Control and Countermeasure Plan (SPCC Plan) for operations involving storage of fuel and other hazardous materials. Eastern Shore proposes to use best management practices for stormwater management in accordance with National Pollution Discharge Elimination System (NPDES) permits required for the projects.

In order to monitor for environmental compliance during construction, Eastern Shore would employ a lead environmental inspector (EI) for each project, as specified in FERC's Plan, and would employ additional EIs as needed.

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[4] Cathodic protection is a technique to reduce corrosion (rust) of the natural gas pipeline through the use of an induced current or a sacrificial anode (like zinc) that corrodes at faster rate to reduce corrosion.

[5] The FERC Plan and Procedures are a set of construction and mitigation measures that were developed in collaboration with other federal and state agencies and the natural gas pipeline industry to minimize the potential environmental impacts of the construction of pipeline projects in general. Copies of our Plan and Procedures may be accessed on our web site (http://www.ferc.gov/industries/gas/enviro/guidelines.asp) or copies may be obtained through our Office of External Affairs at 1-866-208-3372.

Figure 1. Project Location Map of the White Oak Project

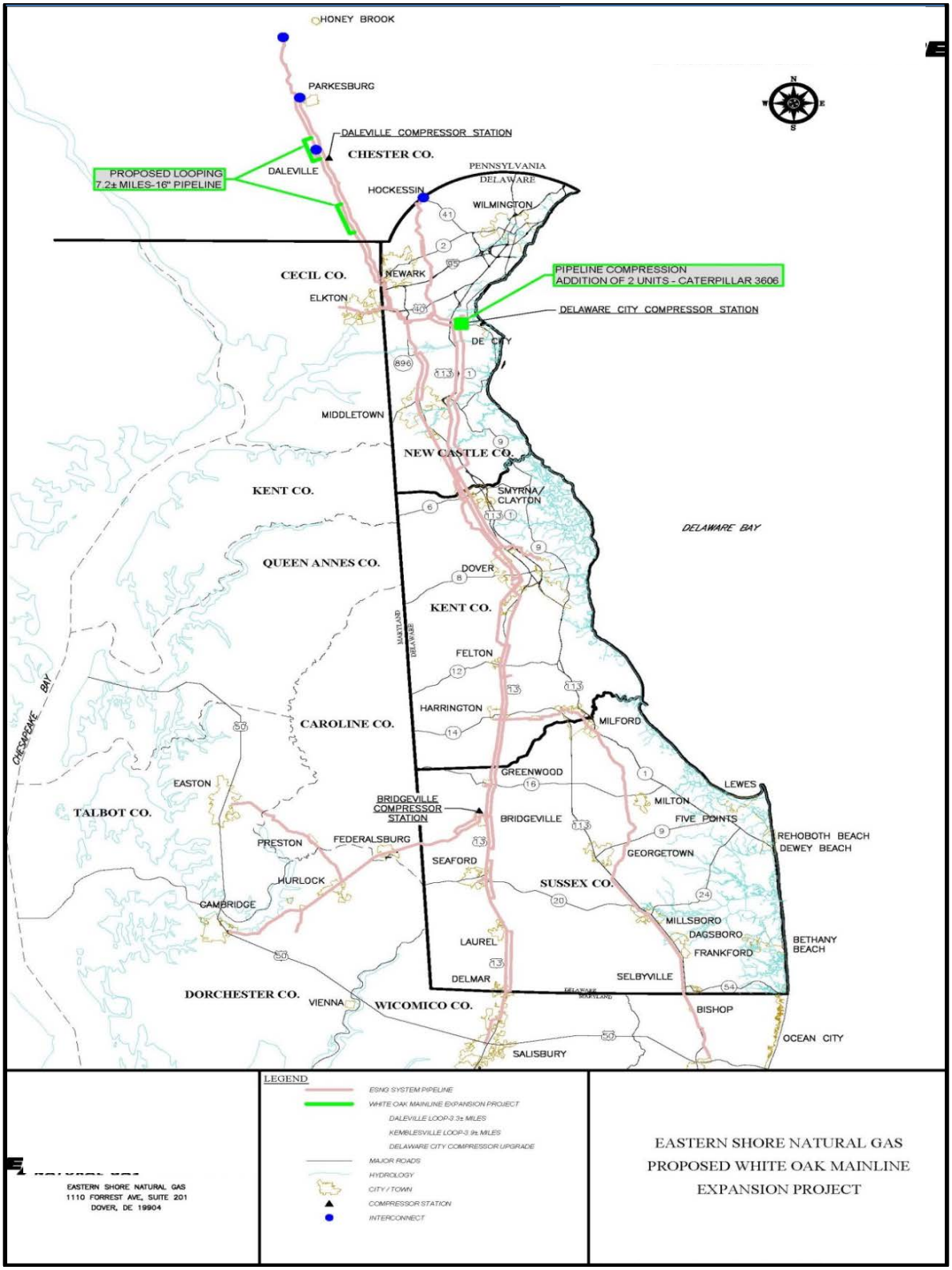
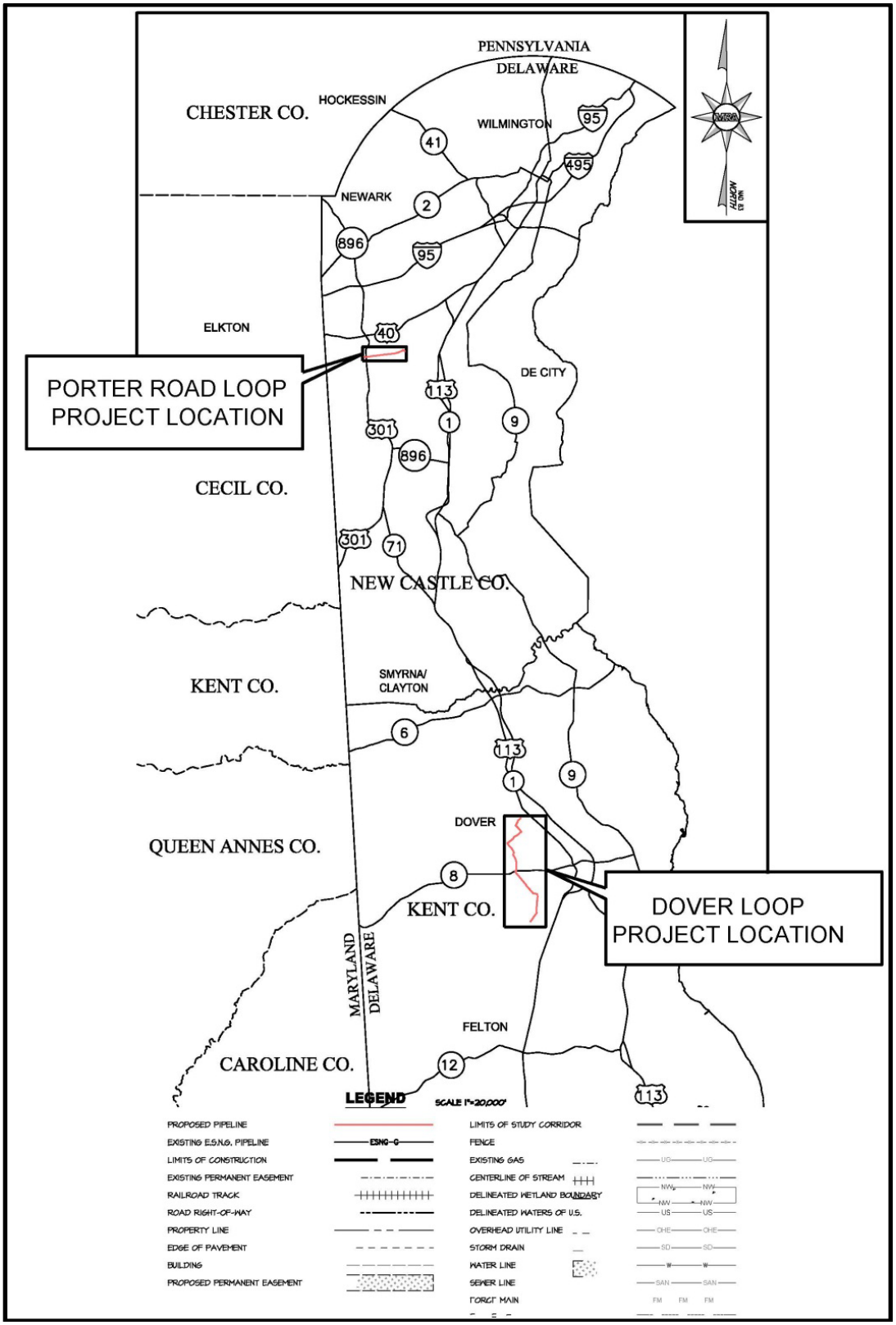


Figure 2. Project Location Map of the System Reliability Project



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Each EI would have authority to stop activities that violate the environmental conditions of the Certificate or other applicable permits. The EI would be responsible for ensuring that construction activities are in compliance with the environmental conditions imposed on the project. This includes the requirements of FERC's Plan and Procedures; environmental conditions of the Certificate; mitigation measures proposed by Eastern Shore; and the requirements of any other environmental permits and approvals. The EI would also be responsible for identifying, documenting, and overseeing any corrective actions to bring an activity back into compliance.

For the White Oak Project, construction of the Daleville and Kemblesville Loops would require a construction right-of-way width of 100 feet, consisting of a 35-foot-wide permanent right-of-way with 65 feet of temporary workspace. For the System Reliability Project, construction of the Porter Road and Dover Loops would require a construction right-of-way width of 75 feet, consisting of a 35-foot-wide permanent right-of-way with 40 feet of temporary workspace.

Construction of the proposed pipeline facilities for both projects would incorporate conventional overland construction techniques and standard sequences of activities. Specifically, construction of the projects would consist of: surveying and staking the workspace limits; clearing of vegetation and debris; grading of the right-of-way; trenching; pipe stringing, bending, welding, and lowering-in; backfilling soil into the trench and re-grading contours; hydrostatically testing the buried pipe; and restoring and cleanup of the right-of-way.

The construction of aboveground facilities along the pipeline, such as the tie-ins and block valves, would generally occur at the same time as construction of the pipeline facilities for each respective project. Therefore, activities associated with construction of the aboveground facilities would occur as part of a single construction effort for each project. Upon completion of construction, the meter station and mainline valve sites would be fenced, graveled, and maintained to allow permanent access for operation and maintenance.

Pipeline construction typically involves numerous work crews working their way along the right-of-way in an assembly-line fashion. For example, the survey crew begins by marking the pipeline centerline and construction work area and moves down the right-of-way, followed by the clearing crew, the grading crew, the trenching crew, and so on, until the finish cleanup crew completes the process. Typically, each crew follows relatively closely behind the proceeding crew to minimize the size of the active construction spread and begin the restoration as soon as possible.

Eastern Shore anticipates three construction spreads for each project; one spread for each of the pipeline loops and one for work at each compressor station. Construction of the pipeline components of each project would take about 6 months to complete with between 30 – 60 total onsite workers for each project. The expansion of the Delaware City (White Oak Project) and Bridgeville (System Reliability Project) Compressor Stations would take about 6 months each to complete with between 30 – 60 site workers at each station. Although the two projects are separate and would proceed at their own pace/schedule, using project-specific crews and spreads,

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Eastern Shore may elect to coordinate timing in order to increase certain efficiencies (for example, shared use of specialized crews).

Eastern Shore would require its contractors to incorporate dust mitigation measures into their operating programs. Various methods would be used to mitigate fugitive dust emissions, including minimizing the extent of the areas disturbed, minimizing the duration of the disturbance, application of dust suppressants, rinsing construction vehicles before they leave the work site, covering loads, and prohibiting excessive vehicle speeds on unpaved roads. Disturbed areas would be re-vegetated as appropriate. At any construction areas within 25 feet of a residence, Eastern Shore would require its contractors to wet all excavation areas, all unpaved work areas, and stockpiles of dusty materials. In addition, synthetic cover and wind breaks would be used as needed.

Eastern Shore would implement topsoil segregation methods to prevent the mixing of topsoil and subsoil. Areas designated for topsoil segregation would involve temporary stripping of up to 12 inches of topsoil along the construction right-of-way; the topsoil and subsoil from the trench would be temporarily stockpiled in separate windrows on the construction right-of-way. For the White Oak Project, Eastern Shore would use full-width topsoil segregation methods along the construction right-of-way for the Daleville and Kemblesville Loops. Eastern Shore would segregate topsoil from the ditch plus spoil side for the entire System Reliability Project Porter Road Loop. Eastern Shore would also segregate topsoil from the ditch plus spoil side in locations where the proposed Dover Loop parallels road and railroad rights-of-way. Eastern Shore would use full-width topsoil segregation methods for the remaining locations along the Dover Loop. Topsoil would be placed as the final backfill layer at the completion of construction. Appendices 5 and 6 show the right-of-way cross-section diagrams, including the topsoil segregation methods for different configurations and topsoil segregation methods along the pipeline routes for both projects.

Consistent with the U.S. Department of Transportation (DOT) regulations, a minimum of 3 feet of soil would cover the buried pipeline; additional cover may be required at waterbodies, ditches, road crossings, or other areas as necessary to maintain the integrity of the pipeline.

Before construction, Eastern Shore would contact the “Call Before You Dig” or “One Call” system to verify and mark all utilities along the project workspace areas. Where there is a question as to the location of utilities, such as water, cable, gas, and sewer lines, each utility would locate its facilities by field instrumentation and test pits.

Within 20 days of completion of backfilling the trench, or as soon as possible, all remaining trash, debris, surplus materials, and temporary structures would be removed from the construction right-of-way and disposed of in accordance with applicable federal, state, and local regulations. All disturbed areas would be final-graded and restored as closely as possible to preconstruction contours within the 20-day period. In residential areas, these restoration activities would be completed within 10 days of backfilling. Permanent erosion control measures would also be installed during final cleanup. Topsoil previously segregated from the trench material would be spread uniformly across the construction right-of-way, and the topsoil

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and subsoil in agricultural areas disturbed by construction would be tested for compaction. Additional information on soil compaction and revegetation is provided in section B.1.2.

In addition to the standard pipeline construction methods described above, Eastern Shore would use special construction techniques where warranted by site-specific conditions (for example, crossings of roads, utilities, wetlands, and waterbodies) as described below. Eastern Shore would minimize construction impacts by implementing the measures in the ESC Plan.

Road Crossings

Road crossings would be completed using open-cut or trenchless techniques using either boring or horizontal directional drill (HDD) methods, depending upon site-specific conditions. Section 4.1 contains a list of the proposed road crossings for each project along with the anticipated crossing technique (if known). At least one lane of traffic would typically be kept open when constructing an open-cut crossing of residential streets. However, detouring may be utilized in some areas. During the brief period when a road is completely cut, steel plates would be available onsite to cover the open area to permit travel by emergency vehicles. Traffic lanes and residential access would be maintained except for the temporary periods essential for installing the pipeline. Following pipeline installation at open-cut roadways, the trench would be backfilled and the roadbed would be restored.

Some roads would be crossed using either a bore or an HDD. Boring involves drilling a horizontal shaft below the roadways through which the pipe will pass. First, a vertical bore pit is excavated on one side of the roadway and a receiving pit excavated on the other. The bore pit is excavated to a depth equal to the depth of the bore hole and is graded such that the bore will follow the grade of the pipe. A boring machine is lowered to the bottom of the bore pit and placed on supports. The machine drills a horizontal shaft under the roadway using a cutting head mounted on an auger. After the pipe is installed the boring machine is removed and the pipe is tied-in to the pipeline.

An HDD allows for trenchless construction across an area by pre-drilling a hole well below the depth of a conventional pipeline lay and then pulling the pipeline through the pre-drilled borehole. An HDD is generally accomplished by setting up a drilling rig to drill a small-diameter pilot hole along a prescribed profile. Once the pilot hole is completed, it is enlarged using reaming tools to provide access for the pipe. The reaming tools are attached to the drill string at the exit point of the pilot hole and then rotated and drawn back to the drilling rig, thus progressively enlarging the pilot hole with each pass. During this process, drilling fluid consisting primarily of bentonite clay and water is continuously pumped into the hole to remove cuttings and maintain the integrity of the hole. Once the hole has been sufficiently enlarged, a prefabricated segment of pipe is attached behind the reaming tool on the exit side of the crossing and pulled back through the drill hole to the drill rig, completing the crossing.

Agricultural Land

About 52 percent (41.46 acres) of the land that would be crossed by the White Oak Project and 36 percent (99.7 acres) of the land crossed by the System Reliability Project is

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characterized as agricultural land. Eastern Shore would segregate topsoil in croplands and pasturelands by stripping up to 12 inches of topsoil from the full-width construction right-of-way unless otherwise requested from the landowner. Eastern Shore would also remove rock from the segregated topsoil. The size, density, and distribution of rock left in construction work areas would be similar to adjacent areas that were not disturbed by construction, unless otherwise approved in writing by the landowner. Equipment traffic would be strictly controlled within cropland to minimize rutting or compaction. Eastern Shore would also minimize soil compaction by using wide pad construction equipment and by using deep tillage implements (such as harrowing). Soil compaction would also be treated, as necessary, in conjunction with FERC's Plan.

No drain tiles were identified by landowners within the construction work areas. Any drain tiles damaged during construction would be restored to preconstruction condition.

Residential and Commercial Properties

Eastern Shore would make every effort to ensure that construction activities minimize impacts on residences, residential areas, and commercial properties, and that cleanup is quick and thorough. Eastern Shore would use specialized methods, such as stovepipe and/or drag section construction, in order to minimize the impacts of construction in residential and commercial areas. The duration of an open trench would be minimized to the contractor's working hours and to a distance of 100 feet on either side of a nearby residence or commercial property, or as otherwise negotiated with the landowner. Topsoil would be segregated by stripping up to 12 inches of topsoil over the entire workspace unless otherwise requested by the landowner.

Eastern Shore would notify landowners at least three business days prior to the start of construction, unless earlier notice is requested in the easement negotiations. Should any project-related work activity in the residential or commercial area disrupt ingress and egress to the affected areas, Eastern Shore would offer to either temporarily relocate the landowner to a motel and provide a meal allowance or provide alternative access to their property. Eastern Shore would attempt to leave any mature trees and landscaping intact within the construction work areas unless the trees and landscaping interfere with installation techniques or present unsafe working or operational conditions. Seed mixes for reclamation and revegetation would be used as specified by the landowner. Fences, mailboxes, and other structures that are removed would be restored. Sidewalks, driveways, and roads would be restored as soon as practicable. Following final cleanup, an Eastern Shore representative would contact landowners to ensure that conditions of all landowner agreements have been met. Further information on site-specific residential construction is detailed in section B.4.1 of this EA.

Waterbodies

Eastern Shore would adhere to the FERC's Procedures to limit water quality and aquatic resource impacts during and following construction. In accordance with FERC's Procedures, the duration of construction of open-cut crossings would be limited to 24 hours across minor waterbodies (10 feet wide or less at water's edge) and 48 hours across intermediate waterbodies

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(between 10 and 100 feet wide at water's edge). Construction activities would be scheduled so that the pipeline trench was excavated immediately prior to pipe-laying activities.

Eastern Shore would cross all waterbodies using a "dry-ditch" crossing method. A dry-ditch crossing involves isolating the construction work area from the stream flow by directing water through a flume pipe placed above the pipeline trench (flume crossing), by damming and pumping the water around the construction area (dam-and-pump crossing), or by HDD. The primary objectives of these methods are to reduce turbidity in the waterbody and minimize downstream sedimentation and related impacts on aquatic resources.

The flume crossing method involves temporarily directing the flow of water through one or more flume pipes placed over the area to be excavated. This method allows excavation of the pipe trench across the waterbody completely beneath the flume pipes without disrupting water flow in the stream. Stream flow is diverted through the flumes by two bulkheads, constructed using sand bags or plastic dams, to direct the stream flow through the flume pipes. Following completion of pipeline installation, backfilling of the trench, and restoration of stream banks, the bulkheads, and flume pipes would be removed. This crossing method generally minimizes the duration of downstream turbidity by allowing excavation of the pipeline trench under relatively dry conditions.

The dam-and-pump method involves the installation of temporary dams upstream and downstream of the waterbody crossing location. Temporary dams are typically constructed using sandbags, and appropriately sized pumps are used to dewater and transport the stream flow around the construction work area and trench. In accordance with our Procedures, Eastern Shore would install intake screens on the pump inlets to prevent entrapment of aquatic life, and energy-dissipating devices would be installed at the pump discharge point to minimize erosion and stream bed scour. Trench excavation and pipeline installation would then commence through the dewatered portion of the waterbody channel. Following completion of pipeline installation, backfilling of the trench, and restoration of stream banks, the temporary dams would be removed and water flow through the construction work area would be restored. This method is generally appropriate only for those waterbody crossings where pumps can adequately transfer the stream flow volume around the work area and there are no concerns about the passage of sensitive aquatic species.

To facilitate pipeline construction across waterbodies, ATWS would be needed adjacent to the waterbody to assemble and fabricate the length of pipe necessary to complete the crossing, and store spoil removed during trenching. Spoil removed during trenching would be stored away from the water's edge and would be located at least 50 feet away from the stream banks in cleared areas (except in actively cultivated or rotated agricultural lands and other disturbed areas). The size of the ATWS would vary based on site-specific conditions. However, the overall work area would 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.

In accordance with FERC's Procedures, construction equipment, vehicles, hazardous materials, chemicals, fuels, lubricating oils, and petroleum products would not be parked, stored,

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or serviced within 100 feet of any waterbodies. All equipment would be checked for leaks by a company inspector prior to beginning work in waterbodies.

As shown in table 11, the White Oak Project Daleville Loop would cross five waterbodies, and the Kemblesville Loop would cross seven. Eastern Shore has not identified any specific locations where it proposes to use HDD crossings for the White Oak Expansion Project; these locations would be determined by the contractor in planning construction. Further details regarding waterbody crossing impacts and mitigation for this project are discussed in section B.2.2.

The System Reliability Project Porter Road Loop would cross 2 waterbodies, and the Dover Loop would cross 11 (see table 12). Eastern Shore proposes to use the HDD method for all waterbody crossings for the System Reliability Project. Further details regarding waterbody crossing impacts and mitigation for this project are discussed in section B.2.2.

Blasting

No blasting is anticipated in association with the projects due to the nature of the soils in the project areas. If an area of shallow bedrock is encountered and blasting becomes necessary for either project, Eastern Shore would develop a Blasting Plan and comply with any required permits.

Wetlands

Crossing of wetlands would be completed in accordance with applicable state and federal permits and FERC's Procedures. Operation of construction equipment in wetlands would be limited to that needed to clear the right-of-way, excavate the trench, fabricate the pipe, install the pipe, backfill the trench, and restore the right-of-way. Eastern Shore would segregate the topsoil up to 12 inches in depth in unsaturated wetlands where hydrologic conditions permit. When wetland soils are inundated or saturated to the surface, the pipeline trench would be excavated across the wetland by equipment supported on wooden swamp mats to minimize the disturbance on wetland soils. Trees would be cut to grade on most of the right-of-way, but stumps would be removed directly over the trenchline or where safety concerns dictate otherwise. This would allow existing vegetation to recover more rapidly in the remainder of the right-of-way once the equipment mats and spoil piles have been removed.

In accordance with FERC's Procedures, construction equipment, vehicles, hazardous materials, chemicals, fuels, lubricating oils, and petroleum products would not be parked, stored, or serviced within 100 feet of any wetlands. All equipment would be checked for leaks by a company inspector prior to beginning work in wetlands.

Upon completion of construction through wetlands, the right-of-way would be restored and a 10-foot-wide strip centered on the pipelines would be maintained in an herbaceous state over the course of project operation.

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7. Operation and Maintenance

Each project would be designed, constructed, tested, operated, and maintained in accordance with the DOT *Minimum Federal Safety Standards* in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. Part 192 specifies material selection and qualification, minimum design requirements, and protection from internal, external, and atmospheric corrosion. Eastern Shore would operate and maintain the compressor stations associated with the projects in compliance with DOT regulations. Eastern Shore's standard procedures also include activities such as the calibration, maintenance, and inspection of equipment, as well as the monitoring of pressure, temperature, and vibration data, and traditional landscape maintenance such as mowing and the application of fertilizer.

The pipelines would be patrolled on a routine basis, which would provide information on possible leaks, construction activities, erosion, exposed pipe, population density, possible encroachment, and other potential problems that may affect the safety and operation of the pipelines. Maintenance activities would include regularly-scheduled gas leak surveys and measures necessary to repair any potential leaks. The latter may include repair or replacement of pipe segments. All fence posts, signs, marker posts, and decals would be painted or replaced to ensure that pipeline locations are visible. Other maintenance functions would include, as applicable (1) periodic seasonal mowing of the permanent right-of-way in accordance with the FERC's Plan and Procedures; (2) terrace repair and backfill replacement; and (3) periodic inspection of water crossings. During maintenance of the right-of-way, Eastern Shore would not use herbicides or pesticides within 100 feet of a wetland or waterbody unless approved by appropriate federal, state, and local agencies.

Cathodic protection facilities installed along the pipeline would be regularly monitored to maintain required pipe-to-soil potential in order to minimize corrosion of the pipeline. This would be achieved in accordance with the specifications set forth by Eastern Shore that meet or exceed DOT regulations.

8. Land Requirements

Eastern Shore would parallel and partially utilize its existing rights-of-way and/or other existing utility rights-of-way or public roadways wherever possible to reduce land disturbance. Where the new pipeline would be collocated, the pipeline centerline would be at a 10-foot offset from the existing Eastern Shore pipelines. Where applicable, portions of the pipeline construction right-of-way configuration would incorporate some of Eastern Shore's existing right-of-way, which is generally 35 feet wide. New disturbances would include the portion of the construction right-of-way located outside of areas previously disturbed by the construction of the existing Eastern Shore mainline or other infrastructure projects (for example, roads and electrical lines).

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White Oak Project

The White Oak Project would affect a total of 79.53 acres during construction and 5.28 acres during operation. Of this total, the compressor station upgrade would affect 10.83 acres during construction and 2.7 acres during operation. Land requirements for the construction and operation of the White Oak facilities are summarized in table 1 and described below.

Table 1. Land Requirements for the White Oak Project

Facility	Land Affected During Construction (acres)	Land Affected During Operation (acres)
Pipeline Facilities		
Daleville Loop		
Construction Workspace	36.92	2.45
Extra Workspace Areas	6.38	0
Access Roads	0.71	0
Pipe Storage/Contractor Yards[1]	0	0
Kemblesville Loop		
Construction Workspace	18.79	0.10
Extra Workspace Areas	5.31	0
Access Roads	0.59	0
Pipe Storage/Contractor Yards[1]	0	0
Total Pipeline	**68.70**	**0.10**
Aboveground Facilities		
Delaware City Compressor Station		
Construction Workspace	9.93	2.70
Access Roads	0.03	0.03
Total Aboveground Facilities	**10.83**	**2.73**
Project Total	**79.53**	**5.28**

Pipeline Rights-of-Way

About 4.49 miles (83.1 percent) of the Daleville and Kemblesville Loops would be collocated with existing utility rights-of-way and public roadways.

The typical construction workspace for the White Oak Project would be limited to a 100-foot-wide construction right-of-way, consisting of a 35-foot-wide permanent right-of-way with 65 feet of temporary workspace. These additional temporary workspaces would be used in agricultural, residential, and forested lands for staging areas.

Additional Temporary Workspaces

Eastern Shore would use three ATWS along the construction of the Daleville and Kemblesville Loops to provide adequate workspace. The total amount of ATWS equals 11.69 acres along the right-of-way. Locations, dimensions, and existing land use for these workspaces are provided in table 2.

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Pipe Storage/Contractor Yards

Eastern Shore has not identified any proposed pipe storage/contractor yards for use during construction of the White Oak Project. At this time, it is unclear where the pipe, contractor equipment, or contractor offices would be located. Eastern Shore states that the pipe storage/contractor yards would be located within the construction right-of-way; however, that seems problematic and unlikely. In the event Eastern Shore determines that a pipe storage and/or contractor yard is needed during construction, Eastern Shore would need to file that information as soon as it becomes available, for our review.

Table 2. Additional Temporary Work Space Areas for the White Oak Project

Project Facility	Milepost	Description	Dimensions[1] (feet)	Acreage	Land Use	Acreage of Forest to be Cleared
Daleville Loop	1.58	Staging	250 x 250	1.34	Agriculture	0
	2.57	Staging	400 x 250	2.29	Agriculture	0
	3.23	Staging	300 x 400	2.75	Agriculture; Road/Road right-of-way	0
Kemblesville Loop	0	Staging/Tie-in	Irregular	2.04	Agriculture	0
	1.00	Staging	Irregular	2.05	Agriculture	0
	1.98	Staging/Tie-in	Irregular	1.22	Agriculture; Residential; Forested Land	0.40
Project Total				**11.69**		**0.40**

[1] ATWS dimensions are approximate, in some cases, for work spaces with irregular shapes. Acreage column is based on actual work space areas.

Aboveground Facilities

Modifications at the Delaware City Compressor Station would occur on 0.9 acre within the Eastern Shore property boundary, on 7.1 acres that was purchased to accommodate the operation of the compressor upgrades, and an additional 3.7 acres that would be acquired as temporary workspace for construction.

Access Roads

Eastern Shore would gain access to the construction right-of-way via maintained public roads to the extent possible. When existing public roadways are used for access purposes, Eastern Shore or its contractor would notify the appropriate agency, when applicable, of its intent to haul oversized loads over the road. Public roadways would be kept clean of soil and sediment. In addition to public roads, Eastern Shore proposes to use one access road (partial existing roadway) on private lands during the pipeline construction.

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Eastern Shore would construct one new, permanent access road on the lands purchased by Eastern Shore for the expansion of the Delaware City Compressor Station. Locations, lengths, and use of the access roads are provided in table 3.

Table 3. Access Roads for the White Oak Project

Access Road ID	Milepost	Use	Existing Condition	Upgrade Requirements	Approximate Length (Feet)
Daleville Loop					
TAR-1	1.20	Temporary	Gravel / Grass	Partially Clear, Grade, Apply Geotextile and Stone	1,236
Kemblesville Loop					
TAR-2	0.33	Temporary	Asphalt	None	325
TAR-3	0.40	Temporary	Asphalt	None	700
Delaware City Compressor Station					
PAR-1	N/A	Permanent	Crop	Clear, Grade, Apply Geotextile and Stone	60
TAR = Temporary Access Road PAR = Permanent Access Road N/A = Not applicable					

System Reliability Project

The System Reliability Project would affect 275.10 acres during construction and 14.16 acres during operation. Of this total, the compressor station upgrade would affect 16.0 acres during construction and 2.4 acres during operation. Land requirements for the construction and operation of the System Reliability facilities are summarized in table 4.

Pipeline Rights-of-Way

About 4.2 miles (66 percent) of the pipeline would be collocated with existing utility rights-of-way and public roadways.

Eastern Shore proposes to construct the System Reliability Project's Dover and Porter Road Loops using a 75-foot-wide construction right-of-way (35-foot-wide permanent right-of-way with 40 feet of temporary workspace).

Additional Temporary Workspace

Eastern Shore would use 7 ATWS along the construction right-of-way for the Porter Road Loop, and 15 ATWS for the Dover Loop to provide adequate workspace for the System Reliability Project. The total amount of ATWS equals 26.32 acres along the right-of-way. Locations, dimensions, and existing land use for these workspaces are provided in table 5.

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Table 4. Land Requirements for the System Reliability Project

Facility	Land Affected During Construction (acres)	Land Affected During Operation (acres)
Pipeline Facilities		
Porter Road Loop		
Construction Workspace	64.95	0.08
Extra Workspace Areas	1.28	0
Access Roads	0	0
Pipe Storage/Contractor Yards	0	0
Dover Loop		
Construction Workspace	191.7	11.68
Extra Workspace Areas	25.04	0
Access Roads	2.07	2.07
Pipe Storage/Contractor Yards	0	0
Total Pipeline	**285.04**	**13.83**
Aboveground Facilities		
Bridgeville Compressor Station	18.4[1]	2.4
Access Roads	0.01	0.01
Glasgow Control Station	0.5	0
North Dover M&R Station	0.5	0
Dover Loop mainline valve	0.4	<0.1
Total Aboveground Facilities	**19.81**	**2.5**
Project Total	**304.85**	**16.33**

[1] Actual ground disturbnace would be less. See section A.4 for additional explanation of Eastern Shore's use of this acreage.

Pipe Storage/Contractor Yards

Eastern Shore has not identified any proposed pipe storage/contractor yards for use during construction of the System Reliability Project. At this time, it is unclear where the pipe, contractor equipment, or contractor offices would be located. Eastern Shore states that the pipe storage/contractor yards would be located within the construction right-of-way; however, that seems problematic and unlikely. In the event Eastern Shore determines that a pipe storage and/or contractor yard is needed during construction, Eastern Shore would need to file that information as soon as it becomes available, for our review.

Access Roads

Eastern Shore would gain access to the construction right-of-way via maintained public roads to the extent possible. When existing public roadways are used for access purposes, Eastern Shore or its contractor would notify the appropriate agency, when applicable, of its intent to haul oversized loads over the road. Public roadways would be kept clean of soil and sediment.

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Table 5. Additional Temporary Work Space Areas for the System Reliability Project

Project Facility	Milepost	Description	Dimensions[1] (feet)	Acreage	Land Use
Porter Road Loop	0	Staging /HDD Support	Irregular	1.58	Road/Road ROW; Industrial /Commercial
	0.07	Staging /HDD Support	Irregular	1.68	Open Space
	0.11	Staging	1,265 x 150	4.36	Open Space
	1.04	Staging /HDD Support	1,000 x 200	4.59	Agriculture
	2.32	Staging /HDD Support	Irregular	0.36	Open Space
	2.36	Staging / HDD Support	Irregular	0.17	Industrial /Commercial
	SE study corridor	Staging /HDD Support	Irregular	1.11	Agriculture
Dover Loop	0.16	Staging /HDD Support	Irregular	0.83	Open Space
	0.50	Staging /HDD Support	Irregular	0.60	Agriculture
	1.00	Staging /HDD Support	250 x 167	0.97	Agriculture
	1.00	Staging /HDD Support	180 x 220	0.91	Agriculture
	1.78	Staging	Irregular	3.44	Agriculture
	2.10	Staging /HDD Support	Irregular	0.99	Agriculture
	3.20	Staging /HDD Support	Irregular	5.17	Road/Road ROW; Agriculture; Open Space; Forest
	3.89	Staging /HDD Support	Irregular	1.21	Road/Road ROW; Commercial; Agricultural; Residential
	4.92	Staging /HDD Support	Irregular	6.03	Road/ROW; Agriculture
	5.82	Staging	Irregular	2.93	Agriculture
	6.20	Staging /HDD Support	100 x 100	0.23	Agriculture
	6.20	Staging /HDD Support	100 x 100	0.23	Agriculture
	6.87	Staging /HDD Support	Irregular	0.91	Road/Road ROW; Open Space
	6.94	Staging /HDD Support	Irregular	0.40	Open Space
	6.99	Staging /HDD Support	Irregular	0.19	Road/Road ROW
Project Total				**26.32**	

[1] ATWS dimensions are approximate, in some cases, for work spaces with irregular shapes. Acreage column is based on actual work space areas.
ROW = right-of-way; SE= southeast

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Eastern Shore would construct two permanent access roads for the System Reliability Project. One new permanent road would be a 12-foot gravel drive off of Hazlettville Road to provide access for routine maintenance of the new Dover Loop mainline valve assembly. The other permanent access road would be an extension of an existing 1,800-foot long private road abutting the Bridgeville Compressor Station property. The new gravel road would extend by 1,200 feet within the existing Bridgeville Compressor Station property. Locations, lengths, and use of the access roads are provided in table 6.

9. Permits and Approvals

A number of federal, state, and local regulatory agencies have permit or approval authority for portions of the White Oak and System Reliability Projects. Tables 7 and 8 provide a list of permits and consultations relevant to the projects; the applicable local, state, and federal agencies; as well as any responses that have been received to date. Eastern Shore would be responsible for obtaining all project-specific permits and approvals prior to construction and operation of each project, regardless of whether or not they appear in the tables.

10. Future Plans and Abandonment

Eastern Shore has not identified any plans for future expansion of this portion of its transmission system or for abandonment of the proposed facilities. Properly maintained, and assuming adequate gas supplies and markets, the White Oak and System Reliability Projects are expected to operate for 50 years or more. If and when Eastern Shore wishes to abandon any of its facilities, the abandonment would be subject to separate approvals and environmental review by the FERC.

Table 6. Access Roads for the System Reliability Project

Access Road ID	Milepost	Use	Existing Condition	Upgrade Requirements	Approximate Length (Feet)
Dover Loop Mainline Valve					
PAR-1	4.9	Permanent	Grass	Clear, Grade, Apply Geotextile and Stone	50
Bridgeville Compressor Station					
PAR-2	N/A	Permanent	Asphalt/ Crop/Dirt	Clear, Grade, Apply Geotextile and Stone where Necessary	3,000
PAR = Permanent Access Road N/A = Not applicable					

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Table 7. Notifications, Permits, Consultations, and Approvals for the White Oak Project

Agency	Permit/Approval	Status
Federal		
Federal Energy Regulatory Commission	Certificate of Public Convenience & Necessity	• Filed application on 11/21/14. • Amendment application filed on 11/18/15.
U.S. Army Corps of Engineers (COE)-Philadelphia District Regulatory Branch	Nationwide Permit 12 under Section 404 of the Clean Water Act	• Project Notification letter for the pipeline submitted on 9/25/14. • Joint Permit Application submitted to COE and Pennsylvania Department of Environmental Protection on 9/11/2015. • COE issued Preliminary Jurisdictional Determination (JD) for the Daleville and Kemblesville Loops on 11/30/15. • Permit pending. • Project Notification letter for the Delaware City Compressor Station sent on 9/25/14. • Preliminary JD Application submitted on 4/8/15; Preliminary JD received 9/9/15. • Permit pending.
U.S. Fish and Wildlife Service (FWS) Pennsylvania Ecological Services Field Office FWS Chesapeake Bay Ecological Services Field Office	• Section 7 Endangered Species Act • Migratory Bird Consultation under Migratory Bird Treaty Act 16 US Code 703-711 and Section 3 of Executive Order 13186, Bald & Golden Eagle Protection Act	• Pennsylvania Ecological Services Field Office concurrences received on 12/19/2014; 9/3/2015; 12/14/2015. • Chesapeake Bay Ecological Services Field Office concurrence received on 4/10/2015. • Consultation under Migratory Bird Treaty Act – ongoing.
National Park Service	Wild and Scenic Rivers Act of 1968	• Kemblesville Loop-consultation ongoing.
Pennsylvania State Historic Preservation Office (SHPO) Delaware SHPO	Consultation under Section 106 of the National Historic Preservation Act	Pennsylvania SHPO: • Daleville Phase I/II Archaeological Survey Report and Architectural Study submitted 7/15; • Concurrence received 9/10/15; • Kemblesville Phase I Archaeological Survey Report and Architectural Study submitted 8/15; • Architectural concurrence received 9/18/15; • Archaeological concurrence received 9/24/15. Delaware SHPO: • Phase I Cultural Resource Survey Report submitted 12/3/14; • Concurrence received 12/17/14; • Addendum Phase I Report submitted 7/13/15; • Concurrence received 7/30/15.
Natural Resources Conservation Service	Consultation regarding conservation easements crossed by the project	• NRCS letter filed on 3/7/16. • Correspondence from NRCS dated 4/4/16.

Proposed Action

Agency	Permit/Approval	Status
Delaware River Basin Commission	Approval under section 3.8 of the Delaware River Basin Compact	• Approval received on 3/16/16.
State		
Pennsylvania Fish and Boat Commission	State listed rare, candidate, threatened or endangered fish, reptiles, amphibians, and aquatic invertebrates consultation	• Delegated authority to FWS Service Pennsylvania Ecological Services Field Office for bog turtle impacts.
Pennsylvania Department of Conservation of Natural Resources	State listed rare, threatened or endangered plants and terrestrial invertebrates, natural communities, and geologic features consultation	• Concurrences received 3/25/15 and 9/23/015.
Delaware Department of Natural Resources and Environmental Control (DNREC) Division of Fish & Wildlife -Wildlife Species Conservation and Research Program	State listed rare, candidate, threatened or endangered species consultation.	• Concurrence received 10/17/2014.
DNREC Division of Water Resources	• Tidal Wetlands, Tidal and Nontidal Waterbodies • Wetlands Act 1973, 7 Delaware Code Chapter 66, Section 6607 • Subaqueous Lands Act 1986, 7 Delaware Code Section 7212	• Project Notification letter for Delaware City Compressor Station sent on 9/25/14. • Received JD on 5/8/15. • Review pending.
DNREC Division of Air Quality	Section 7 Delaware Administrative Code Section 1100 / Application to modify the Delaware City Compressor Station.	• Application submitted on 11/24/14. • Permit issued on 6/18/15.
DNREC Division of Soil and Water Conservation	Coastal Zone Management Act, 1972, Title 7, Chapter 70	• Consistency determination received on 10/16/15.
County, Local, Municipal, Other Affected Parties		
Chester County Conservation District	• Review and approval of ESC Plan • Erosion and Sediment Control General Permit	• Plan found to be adequate on 3/11/16. • Permit package for Daleville Loop sent on 9/11/15. • Permit package for Kemblesville Loop anticipated in 12/2015; however, status is currently unknown.
DNREC Division of Watershed Stewardship	• National Pollutant Discharge Elimination System General Stormwater Permit	• Application for compressor station submitted on 10/26/15.
New Castle County Land Use Department	• Erosion and Sediment Control Plan Review	• Review package for compressor station sent on 8/24/15.

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Table 8. Notifications, Permits, Consultations, and Approvals for the System Reliability Project

Agency	Permit/Approval	Status
Federal		
Federal Energy Regulatory Commission	Certificate of Public Convenience & Necessity	• Filed application on 5/22/15.
U.S. Army Corps of Engineers (COE)- Philadelphia District Regulatory Branch	Nationwide Permit 12 under Section 404 of the Clean Water Act	• COE issued Preliminary Jurisdictional Determination (JD) for the Porter Road Loop and Dover Loop on 2/25/16. • Porter Road and Dover Loops Permit pending. • Bridgeville Compressor- Per email dated 8/28/15, no permit is required.
U.S. Fish and Wildlife Service Chesapeake Bay Ecological Services Field Office	• Section 7 Endangered Species Act • Migratory Bird Consultation under Migratory Bird Treaty Act 16 US Code 703-711 and Section 3 of Executive Order 13186, Bald & Golden Eagle Protection Act	• Porter Road Loop- Per letter dated 8/12/14, "Except for occasional transient individuals, no federally listed endangered species are known to exist within the project area." • Dover Loop- Per letter dated 12/11/14, "Except for occasional transient individuals, no federally endangered species are known to exist within the project area." • Bridgeville Compressor- Per letter dated 7/30/14, "Except for occasional transient individuals, no federally listed endangered species are known to exist within the project area." • Consultation under Migratory Bird Treaty Act – ongoing.
Delaware State Historic Preservation Office	• Consultation under Section 106 of the National Historic Preservation Act	• Porter Road Loop-Phase I report submitted on 3/16/15. • Porter Road Loop concurrence received • Dover Loop-Phase I report submitted concurrent with FERC application. • Dover Loop concurrence received • Bridgeville Compressor Station - Phase I report submitted on 3/16/15. • Bridgeville Compressor Station concurrence received
State		
Delaware Department of Natural Resources and Environmental Control (DNREC) Division of Fish & Wildlife -Wildlife Species Conservation and Research Program	State listed rare, candidate, threatened or endangered species consultation.	• Porter Road Loop- Received letter dated 7/25/14 indicating that there are no records of state-rare or federally listed plants, animals or natural communities at this project site. • Dover Loop- Received letter dated 1/2/15, and 3/24/15 indicating that there are no records of state-rare or federally listed plants, animals or natural communities at this project site. • Bridgeville Compressor- Received letter dated 7/25/14 indicating that there are no records of state-rare or federally listed plants, animals or natural communities at this project site.
DNREC Division of Water Resources	• Tidal Wetlands, Tidal and Non-tidal Waterbodies	• Porter Road Loop- JD issued on 10/19/15.

Proposed Action

Agency	Permit/Approval	Status
	• Wetlands Act 1973, 7 Delaware Code Chapter 66, Section 6607 • Subaqueous Lands Act 1986, 7 Delaware Code Section 7212	• Dover Loop- JD issued on 12/8/15. • Bridgeville Compressor-JD issued on 8/28/15.
DNREC Division of Air Quality	Section 7 Delaware Administrative Code Section 1100 / Application to modify the Bridgeville Compressor Station.	• Bridgeville Compressor Station- permit issued on 1/26/16.
DNREC Division of Soil and Water Conservation	Coastal Zone Management Act, 1972, Title 7, Chapter 70	• Porter Road Loop-concurrence issued on 12/8/15. • Dover Loop- Anticipate approval in March 2016. • Bridgeville Compressor-concurrence issued on 12/8/15.
County, Local, Municipal, Other Affected Parties		
DNREC Division of Watershed Stewardship	ESC Plan Review and Approval for pipeline construction	• Porter Road Loop- Received approval on 12/17/15. • Dover Loop- Anticipate approval in March 2016.
DNREC Division of Watershed Stewardship	National Pollutant Discharge Elimination System General Stormwater Permit	• Porter Road Loop- Received permit on 10/14/14. • Dover Loop-Anticipate approval in March 2016. • Bridgeville Compressor- Anticipate approval in March 2016.
Sussex Conservation District	Sediment and Stormwater Plan Review and Approval for Site Plan	• Bridgeville Compressor-Anticipate approval in March 2016.
Sussex County Planning and Zoning	Site Plan Review and Approval	• Bridgeville Compressor-Anticipate approval in March 2016.

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B. ENVIRONMENTAL ANALYSIS

When considering the environmental consequences of constructing and operating the proposed White Oak and System Reliability Projects, we describe the duration and significance of any potential impacts according to the following four levels: temporary, short-term, long-term, and permanent. Temporary impacts generally occur during construction, with the resources returning to pre-construction conditions almost immediately. Short-term impacts could continue for approximately 3 years following construction. Long-term impacts would require more than 3 years to recover, but eventually would recover to pre-construction conditions. Permanent impacts would occur as a result of activities that modify resources to the extent that they are not expected to return to pre-construction conditions during the life of the project, such as with the construction of an aboveground facility.

In order to fulfill our NEPA obligations and make the most efficient use of the combined EA format, certain resources evaluated below are described/discussed together for the two projects. For example, geologic and soils baselines are similar for both projects given their relative proximity to each other. However, where applicable, impacts and other discussions are separated by project in order to evaluate and discuss project-specific impacts, conclusions, and mitigation measures.

1. Geology and Soils

1.1. Geology

The pipeline portions of the White Oak Project are underlain by the Piedmont Physiographic Province, and the Delaware City Compressor Station is underlain by the Atlantic Coastal Plain Physiographic Province (Coastal Plain) (U.S. Geological Survey [USGS], 2015). The System Reliability Project is also within the Coastal Plain.

The Piedmont in southeast Pennsylvania is characterized by a low rolling plain predominantly underlain by sedimentary and igneous rocks from the Triassic through Jurassic age (240 to 140 million years ago), and bands of metamorphic bedrock. Local relief is typically less than 300 feet, with some maximum local elevations of about 600 feet (Pennsylvania Department of Conservation and Natural Resources, 2015).

The boundary of the Coastal Plain occurs along the Fall Line where bedrock of the Piedmont meets the unconsolidated Cretaceous-age Coastal Plain sediments. The Coastal Plain is predominantly underlain by Lower Cretaceous to Miocene age (90 to 100 million years ago) unconsolidated sediments, including sands and clays. The Coastal Plain in the project area consists of a seaward dipping wedge of sediments. The Coastal Plain comprises terraced lowlands to hills, ranging in elevation from sea level to 400 feet.

Surficial geology underlying the project area in southeast Pennsylvania consists of the Peters Creek Schist (muscovite, chlorite, and quartz schists interbedded with quartzite) and the Wissahickon formation (biotite-plagioclase-quartz gneiss). Surficial geology underlying the Delaware City Compressor Station and the Porter Road Loop consists of the Columbia

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Formation (fine- to coarse-grained feldspathic quartz sand with varying amounts of gravel). Surficial geology underlying the Dover Loop consists of the Columbia Formation, the Lynch Heights Formation (medium to fine sand with discontinuous beds of coarse sand, gravel, silt, fine to very fine sand, and organic-rich clayey silt to silty sand), and Swamp Deposits (organic-rich, silty and clayey, fine to coarse quartz sand with interbeds of medium to coarse quartz sand). The Bridgeville Compressor Station is underlain by the Beaverdam Formation (very coarse sand with pebbles to silty clay) (Ramsey, 2005; Ramsey 2007; Ramsey 2010; and Berg et al., 1980).

Mineral Resources

Extraction of mineral resources within the area of the projects is limited to non-fuel resources such as sand and gravel, limestone, iron, chrome, and lead. There is no known active mineral resource extraction within 1,000 feet of the projects' areas (USGS, 1992; USGS, 1993; USGS, 2011; USGS 2013a-c; and USGS, 2014b-c).

Geologic Hazards

Geologic hazards are natural physical conditions that can result in damage to land or structures, and injury to the public. Potential geologic or other natural hazards for the project may include seismic hazards, landslides, flash flooding, and dissolution of soluble bedrock, such as limestone or gypsum, resulting in collapse or subsidence of the ground surface.

No quaternary faults exist in the vicinity of the project area according to the USGS Quaternary Fault and Fold database of the United States (USGS, 2006).

White Oak Project

The USGS earthquake hazard program (USGS, 2014a) mapping shows that seismicity in terms of peak ground acceleration within the project area is between 12 to 14 percent gravity (for the pipeline portions) and between 8 to 10 percent gravity (for the Delaware City Compressor Station) for the 2-percent probability of return period in 50 years. These values represent light to moderate ground shaking with little to no associated damage, and low potential for soil liquefaction to occur.

System Reliability Project

The USGS earthquake hazard program (USGS, 2014a) mapping shows that seismicity in terms of peak ground acceleration within the project area is between 8 to 10 percent gravity (for the Porter Road Loop), between 6 to 8 percent gravity (for the Dover Loop), and between 4 to 6 percent gravity (for the Bridgeville Compressor Station) for the 2-percent probability of return period in 50 years. These values represent light to moderate ground shaking with little to no associated damage, and low potential for soil liquefaction to occur.

There are no recent faults that cross or are present in the immediate vicinity of the projects, and the near-flat terrain renders the project area negligible for slope instability and landslides.

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Ground subsidence is a lowering of the land surface elevation that results from changes that take place underground. Common causes of land subsidence include dissolution of limestone in areas of karst terrain, collapse of underground mines, and the pumping of water, oil, and gas from underground reservoirs. Underground mining and pumping of oil or gas do not take place in the vicinity of project facilities. Karst terrain is not present or not likely to occur within the project areas (Kochanov and Reese, 2003).

Based on the lack of significant collapse hazards, underground mines, and pumping of oil and gas in and around the project area, impacts on the project facilities or adjacent land due to ground subsidence and karst terrain are not anticipated.

The majority of the projects areas are not within the 100-year flood boundary; the exception is small portions of the pipeline facilities (Federal Emergency Management Agency, 2003a-f, 2005, 2006a-b, 2007, and 2014). Facilities within the 100-year floodplain are subject to flooding more frequently than other areas. Eastern Shore would cross waterbodies in accordance with the FERC's Procedures, and work within the 100-year floodplain would take place during periods when significant precipitation is not forecasted. As such, the potential for flooding to occur and significantly impact construction or operation of the projects areas is low.

Blasting

According to a review of the NRCS Soil Survey Geographic Database (NRCS, 2016), the majority of the project does not have areas of shallow bedrock, and as such the necessity for blasting is not expected. If an area of shallow bedrock is encountered and blasting becomes necessary for either project, Eastern Shore would adhere to blasting requirements in our Plan and Procedures. Our Plan requires the development of specific blasting procedures in coordination with the appropriate agencies that address pre- and post-blast inspections; procedures to notify the public; and the development of mitigation measures for building foundations, groundwater wells, and springs. The Plan also requires the use of appropriate methods (e.g., blasting mats) to prevent damage to nearby structures and to prevent debris from entering sensitive environmental resource areas. Our Procedures address blasting in waterbodies.

Given the geologic conditions within the White Oak Project and System Reliability Project areas, we do not anticipate that project facilities would be compromised due to seismicity, ground rupture, soil liquefaction, subsidence, flash flooding, or landslides, and that the proposed facilities would result in no significant impact on geologic resources.

1.2. Soils

Information on soils crossed by the White Oak Project and System Reliability Project was compiled from the NRCS Web Soil Survey (NRCS, 2016).

White Oak Project

Slopes on the Daleville Loop ranges from 0 to 15 percent. On the Kemblesville Loop slopes typically range from 0 to 25 percent, but for about 0.17 mile slopes range from 25 to 35

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percent and for 0.07 mile slopes range from 35 to 60 percent. The Delaware City Compressor Station site ranges in slope from 0 to 10 percent. Soils crossed by the loops are predominantly silt loam and loam. Soils at the Delaware City Compressor Station are silt loam and sandy loam.

Erosion potential is severe where slopes are 8 percent and higher. About 0.45 mile of the Daleville Loop has a severe erosion hazard and about 1.76 miles of the Kemblesville Loop has a severe erosion hazard. The eastern portion of the Delaware City Compressor Station site has a severe erosion hazard. Revegetation potential of the soils affected by the project is fair and compaction potential is slight to moderate. For the majority of the White Oak Project, Eastern Shore is unlikely to encounter bedrock within 60 inches of the soil surface.

System Reliability Project

The slopes range from 0 to 5 percent on the Porter Road Loop and from 0 to 10 percent on the Dover Loop. Slopes at the Bridgeville Compressor Station are 0 to 2 percent and are characterized by sandy loam. Soils on the Porter Road and Dover Loops are loam and sandy loam. Soils for the System Reliability Project in Delaware have a slight erosion hazard, a fair revegetation potential, a slight compaction potential, and bedrock is unlikely within 60 inches of the soil surface.

Soils Impacts and Mitigation

Potential soil impacts caused by the projects are soil erosion and sedimentation, soil compaction, and topsoil mixing. During the construction period, short-term soil erosion may be experienced while soils are in a disturbed state and exposed to wind and precipitation. When soils are saturated, operation of heavy construction equipment may result in rutting and compaction that could impede revegetation and crop growth. Grading, trenching, and backfilling activities could promote mixing of the topsoil and subsoil, resulting in the loss of soil productivity.

Eastern Shore would utilize the appropriate methods as outlined in the FERC Plan and would implement the applicable county ESC Plan for the White Oak Project and System Reliability Project. The FERC Plan and ESC Plans would reduce the potential for adverse impacts to soils as a result of construction and would help facilitate revegetation to permanently stabilize disturbed areas. While temporary increases in erosion would not be eliminated, these measures would reduce the potential for serious erosion and sedimentation. The exposed soil surface within the compressor stations would be graveled after construction.

Should weather conditions become dry enough that dust becomes a concern; steps would be taken to minimize the effects, such as periodic wetting.

The best management practices for mitigation of the effects of stormwater runoff include the installation of silt fences uphill from resource areas. Bare soils and/or stockpiles exposed during cut and fill operations may be temporarily seeded or mulched to avoid erosion. Additionally, hay/straw bales would be used to protect catch basins, culverts, and storm drain inlets until construction and final restoration are completed. After construction is complete, all

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temporary erosion and sedimentation control devices (silt fences, bales, matting, etc.) would be removed from the construction right-of-way when an acceptable stand of vegetation is established.

Eastern Shore would also install temporary slope breakers to direct sheet flow off the right-of-way as directed in the FERC Plan. Eastern Shore would install trench breakers to control the flow of water along the trench line. Exposed soils would also be mulched as required by the FERC Plan and approved ESC Plans.

Eastern Shore would implement topsoil segregation methods to prevent the mixing of topsoil and subsoil. Areas designated for topsoil segregation would involve temporary stripping of up to 12 inches of topsoil within the full-width construction right-of-way; the topsoil and subsoil from the trench would be temporarily stockpiled in separate windrows on the construction right-of-way.

Eastern Shore would implement topsoil segregation methods to prevent the mixing of topsoil and subsoil. Areas designated for topsoil segregation would involve temporary stripping of up to 12 inches of topsoil along the construction right-of-way; the topsoil and subsoil from the trench would be temporarily stockpiled in separate windrows on the construction right-of-way. For the White Oak Project, Eastern Shore would use full-width topsoil segregation methods along the construction right-of-way for the Daleville and Kemblesville Loops. Eastern Shore would segregate topsoil from the ditch plus spoil side for the entire System Reliability Project Porter Road Loop. Eastern Shore would also segregate topsoil from the ditch plus spoil side in locations where the proposed Dover Loop parallels road and railroad rights-of-way. Eastern Shore would use full-width topsoil segregation methods for the remaining locations along the Dover Loop.

The segregated topsoil would be returned following backfilling of the trench and grading of the right-of-way, ensuring preservation of topsoil along the proposed pipeline loops. The right-of-way would be decompacted if compaction testing determines that the right-of-way is compacted. Any drain tiles damaged during construction would be repaired to preconstruction condition or landowner specifications. The areas disturbed by the projects currently in agriculture would be allowed to return to active cropland after construction of the loops are completed.

Permanent erosion control measures would be installed following the completion of construction. The rights-of-way would be prepared for seeding. Following surface preparation, the rights-of-way would be permanently seeded with an appropriate seed mix.

The Delaware City Compressor Station site is currently zoned heavy industrial, and does contain some areas designated as prime farmland soils. The permanently impacted site for the compressor station expansion is less than 5 acres; therefore, no significant areas of prime farmlands would be permanently affected by the White Oak Project. The permanent disturbance for the additional compression proposed at the Bridgeville Compressor Station is within the existing facility.

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Eastern Shore's use of the FERC Plan and implementation of approved ESC Plans would minimize erosion during construction and restoration of the areas disturbed by construction for the projects. Therefore, the impacts on soils would be minor and not significant.

2. Water Resources

2.1. Groundwater

The White Oak Project area is located in the Piedmont and the Coastal Plain. The boundary between the Piedmont and the Coastal Plain is called the "Fall Line" because of the common falls and rapids occurring where streams cross the consolidated rocks of the Piedmont and the semi-consolidated to unconsolidated sediments of the Coastal Plain. The System Reliability Project is entirely within the Coastal Plain.

The White Oak Project Daleville and Kemblesville Loops are located in Chester County, Pennsylvania, which is underlain by the crystalline rock aquifers within the Piedmont. The Piedmont is characterized by varied topography, ranging from lowlands to peaks and ridges of moderate altitude and relief. The Piedmont is underlain by dense, almost impermeable bedrock that yields water primarily from secondary porosity and permeability provided by fractures. The Coastal Plain contains more permeable bedrock formations.

The Chester County, Pennsylvania public water supply comes from the Octoraro Reservoir located in Nottingham, Pennsylvania. Water from this reservoir is blended with water from the Susquehanna River and then distributed to the densely populated areas of southern Chester County (Chester County Water Authority, 2014).

The U.S. Environmental Protection Agency (EPA) defines a sole or principal aquifer as one that supplies at least 50 percent of the drinking water consumed in the areas overlying the aquifer. No aquifers within either the White Oak or System Reliability Project areas are designated as sole source aquifers (EPA, 2011).

The White Oak Delaware City Compressor Station project area and the entire System Reliability project area are located in the Coastal Plain.

The Surficial Aquifer is the uppermost aquifer in the Northern Atlantic Coastal Plain Aquifer System and underlies the project areas. The water is primarily contained under unconfined conditions, but clay beds may create locally confined conditions. This aquifer is located close to the surface and is relatively thin, averaging less than 50 feet in thickness. Due to its shallow depth and exposure at the surface, this aquifer is particularly susceptible to contamination.

The Chesapeake Aquifer is located below the Surficial Aquifer and consists of permeable beds from the Oligocene to the Pliocene. On the Delmarva Peninsula, the regional Chesapeake Aquifer comprises six local sand aquifers, which consist of layers of medium to coarse, silty sand, and locally contain gravel or shell fragments. The sands are separated by confining units of silty sand and clay. Where the Surficial and Chesapeake aquifers are in direct contact, they

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form a composite aquifer that contains water under unconfined conditions. The Chesapeake aquifer generally dips gently and thickens oceanward, where its thickness exceeds 600 feet near the coast (Trapp and Horn, 1997). Total freshwater withdrawals from the Chesapeake Aquifer were about 195 million gallons per day in 1985, with the majority of withdrawals occurring in New Jersey, although the Delmarva Peninsula also drew large amounts (Trapp and Horn, 1997).

The Castle Hayne-Aquia Aquifer, the Severn-Magothy Aquifer, and the Potomac Aquifer are located at depths deeper than the proposed excavation at the Delaware City Compressor Station and are not expected to be impacted.

Public and Private Water Supply Wells and Surface Water Intakes

Environmental Data Resources, Inc. (EDR) conducted database well searches in Delaware and Pennsylvania for both projects. According to the Pennsylvania Department of Environmental Protection (PADEP) there are no public water systems in the Pennsylvania Wellhead Protection Program within Chester County (PADEP, 2000). Wellhead Protection Areas are designed to protect a public of community water supply well from contamination to maintain groundwater quality.

According to the DNREC, about 80 percent of freshwater used in Delaware comes from surface water sources and the remaining 20 percent is obtained from groundwater sources. The major types of freshwater usage in Delaware are thermoelectric power, public supply, industrial, irrigation, domestic, commercial, and livestock watering. Delaware's groundwater quality is generally high, though local issues exist in some areas. Natural water issues include, but are not limited to the presence of iron, manganese, and chloride, while anthropogenic issues may be associated with leaking storage tanks and runoff from fertilizer application.

White Oak Project

The EDR report indicated that no public wells are present within 0.5 mile of the Daleville Loop, and one public well exists within 0.5 mile of the Kemblesville Loop. No public wells were identified within 150 feet of the proposed pipeline facilities. Likewise, no private or public water supply wells were identified within 150 feet of the Delaware City Compressor Station construction area.

The EDR well search report and Eastern Shore’s field surveys identified 8 private wells that may be within 150 feet of the Daleville Loop construction work area and 13 private wells that may be within 150 feet of the Kemblesville Loop construction work area. Table 9 identifies the private water supply wells located within 150 feet of the project area.

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Table 9. Private Water Supply Wells within 150 feet of the White Oak Project

Project Component	Milepost	Direction from Construction Work Areas
Daleville Loop	1.11	East
	1.23	East
	1.73	West
	2.97	Within Construction Work Area
	3.02	East
	3.05	East
	3.09	East
	3.26	Within Construction Work Area
Kemblesville Loop	0.04	West
	0.12	Within Construction Work Area
	0.37	East
	1.36	East
	1.38	East
	1.39	East
	1.44	Within Construction Work Area
	1.47	West
	1.56	Within Construction Work Area
	1.63	West
	1.67	East
	1.76	Within Construction Work Area
	1.77	Within Construction Work Area

Eastern Shore used Delaware Environmental Navigator to identify Wellhead Water Resource Protection Areas[6] in and near the project area. The Delaware Environmental Navigator did not identify Wellhead Water Resource Protection Areas in the vicinity of the Delaware City Compressor Station; however, it did identify a Recharge Water Resource Protection Area on the western portion of the Delaware City Compressor Station Project area. New Castle County's Land Use Code restricts development within this area to a 20 percent impervious surface / 80 percent pervious surface ratio and construction activities to disturbing no more than 50 percent of the land within this area. Through discussions with the County and the adjoining property owners, Eastern Shore purchased about 7.1 acres of land from the adjacent landowner in order to

[6] Wellhead Water Resource Protection Areas, which are the designated protection areas around a public or community water supply well, are designed to protect the wells from contamination and maintain groundwater quality.

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keep the proposed compressor station expansion construction within the code restrictions for this area.

System Reliability Project

The EDR report indicated that no public wells are known within 0.5 mile of the proposed Porter Loop, and one public well is present within 150 feet of the Dover Loop (near MP 7.38). No other public wells were identified within 0.5 mile of the Dover Loop.

The EDR well search report and Eastern Shore's field surveys identified 6 private wells that may be within 150 feet of the Porter Road Loop and 10 private wells that may be within 150 feet of the proposed Dover Loop. Table 10 identifies the private water supply wells located within 150 feet of the proposed System Reliability Project pipelines.

Table 10. Private Water Supply Wells within 150 feet of the System Reliability Project

Project Component	Milepost	Direction from Construction Work Areas
Porter Road Loop	0.01	Northeast
	0.04	West
	0.20	North
	1.10	Southeast
	1.16	Within Study Corridor
	1.86	Southeast
Dover Loop	0.80	West
	1.30	Within Study Corridor
	2.00	Northwest
	2.25	West
	2.85	East
	3.85	East
	5.00	West
	5.89	East
	7.38	East
	Southwest area	North
	Southwest area	South
Bridgeville Compressor Station	Southwest area	West

Groundwater Impacts and Mitigation Measures

Clearing and grading of the projects' pipeline rights-of-way and compressor station sites would remove vegetation, resulting in potential increase for erosion and affecting groundwater recharge rate. Shallow aquifers could sustain minor impacts from temporary changes in overland

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water flow and recharge caused by the clearing and grading of the right-of-way and compressor station site, as well as near-surface soil compaction caused by heavy construction vehicles. Vegetation would only be cleared where necessary and would be reestablished upon completion of construction. In addition, erosion control measures in the FERC Plan and Eastern Shore's ESC Plans would minimize erosion during and after construction.

Trench dewatering activities for the pipelines and compressor station could also encounter shallow surficial aquifers, which are susceptible to contamination. These activities could cause minor fluctuations in shallow groundwater levels, but would typically be completed within a few days and would occur within a confined space. Further, surficial aquifers generally exhibit relatively rapid recharge and groundwater movement. As a result, impacts would be localized and temporary. Additionally, Eastern Shore's ESC Plans and Stormwater Pollution Prevention (SWPP) Plans would ensure that any discharge of trench water would be into a well-vegetated upland area or properly constructed dewatering structure to minimize erosion and allow the water to infiltrate into the ground.

Inadvertent spills of fuels, lubricants, and other hazardous substances during construction and operation activities could potentially affect groundwater quality. If not cleaned up, soils contaminated by such spills or leaks could continue to leach and add contaminants to groundwater long after a spill has occurred. Eastern Shore would implement its SPCC Plan, which includes hazardous materials management, preventative measures to avoid spills, and mitigation measures to be implemented in the event of a spill. The Eastern Shore SPCC Plan prohibits refueling within 100 feet of any known potable water wells.

Blasting is not anticipated in association with construction of the looping pipelines or the compressor stations; therefore, no impacts on groundwater from blasting are expected. If blasting does become necessary for either project, Eastern Shore would adhere to blasting requirements in our Plan and Procedures. Our Plan requires the development of specific blasting procedures in coordination with the appropriate agencies that address pre- and post-blast inspections; procedures to notify the public; and the development of mitigation measures for building foundations, groundwater wells, and springs. The Plan also requires the use of appropriate methods (for example, blasting mats) to prevent damage to nearby structures and to prevent debris from entering sensitive environmental resource areas. Our Procedures address blasting in waterbodies.

Although pipeline construction activities could affect groundwater resources, potential impacts would be minor and temporary. Eastern Shore would implement its ESC Plan, SPCC Plan, and SWPP Plan, as well as adhere to FERC's Plan and Procedures to minimize potential impacts on groundwater resources; therefore, we do not expect significant impacts on groundwater resources resulting from construction and operation of the Eastern Shore projects.

2.2. Surface Water

Watersheds are classified by regions that drain into the same river system, which can be defined by topography. Rainfall drains from land into tributaries, which in turn drain into

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streams, rivers, and eventually the ocean. Many smaller watersheds (also known as sub-basins) are contained within larger watersheds.

White Oak Project

The Daleville Loop lies within two river watersheds, the Brandywine Creek watershed and the Elk Creek watershed. The Kemblesville Loop lies within two river watersheds, the White Clay Creek watershed and the Elk Creek watershed. The Brandywine and White Clay Creek watersheds are sub-basins of the Delaware Bay watershed, while the Elk Creek watershed is a sub-basin of the Chesapeake Bay watershed. Both watersheds eventually drain into the Atlantic Ocean. As shown in table 11, the Daleville Loop would cross five waterbodies at five individual crossing locations; the Kemblesville Loop would cross seven waterbodies at seven individual crossing locations.

Table 11. Waterbodies Crossed by the White Oak Project

Milepost	Waterbody Width (Feet)	Waterbody Name	Waterbody Class[1]	Crossing Method[2]
2.15	4	Unnamed tributary of Doe Run	Minor	Dry-ditch open-cut
2.12	3	Unnamed tributary of Doe Run	Minor	Dry-ditch open-cut
1.32	2	Unnamed tributary of Doe Run	Minor	Dry-ditch open-cut
1.29	6	Unnamed tributary of Doe Run	Minor	Dry-ditch open-cut
0.94	10	Doe Run	Minor	Dry-ditch open-cut
0.38	8	Unnamed Tributary of W. Branch White Clay Creek[3]	Minor	Dry-ditch open-cut; or HDD
0.49	16	Unnamed Tributary of West Branch White Clay Creek[3]	Intermediate	Dry-ditch open-cut; or HDD
0.65	14	Unnamed Tributary of West Branch White Clay Creek	Intermediate	Dry-ditch open-cut
1.36	9	Unnamed Tributary of Big Elk Creek	Minor	Dry-ditch open-cut
1.50	8	Unnamed Tributary of Big Elk Creek	Minor	Dry-ditch open-cut
1.49	6	Unnamed Tributary of Big Elk Creek	Minor	Dry-ditch open-cut
1.84	8	Unnamed Tributary of Big Elk Creek	Minor	Dry-ditch open-cut

The Daleville Loop would cross Doe Run, which is a tributary to the West Branch of Brandywine Creek, which in turn is a tributary to Brandywine Creek. Brandywine Creek is a source of potable water for the City of Wilmington, which has surface water intake on Brandywine Creek.

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The Kemblesville Loop would cross an unnamed tributary of the West Branch of White Clay Creek, which is a tributary to White Clay Creek. White Clay Creek is a source water for both the City of Newark and United Water Delaware, both of which have surface water intakes on White Clay Creek.

The Chester County Water Authority's 2013 Annual Report indicates that the Chester County Water Authority obtains water from two sources, the Octoraro Reservoir on Octoraro Creek and the Conowingo Pool of the Susquehanna River. Neither of these sources are downstream of either pipeline loop; therefore, we are not aware of any public potable water intakes within 3 miles downstream of the loops (Thomas, 2014).

None of the waterbodies proposed to be crossed by the White Oak Project are listed as impaired. All crossing activities would be in accordance with the May 2013 version of FERC's Procedures.

The Delaware City Compressor Station lies within the Dragon Run Creek watershed, which is a sub-basin of the Delaware Bay watershed. One surface waterbody, an unnamed tributary of Dragon Run, is within the eastern portion of the Delaware City Compressor Station property; however, the project would not cross or otherwise impact this waterbody. There are no public potable water supply intakes located along Dragon Run Creek or its tributaries.

Sensitive Waterbody Crossings

According to the PADEP and the Chester County Water Resources Authority, Doe Run, and its larger subwatershed, the Buck Run watershed, are listed as "Trout Stocking-Migratory Fishes." The Elk Creek watershed, at the southern terminus of the proposed Daleville and Kemblesville Loops, is designated with a Special Protection use of "High Quality" and the aquatic life designation use is Trout Stocking-Migratory Fishes. Portions of the White Clay Creek watershed are listed as "Exceptional Value"; however, the Middle Branch White Clay Creek subwatershed is listed as Trout Stocking-Migratory Fishes.

National Wild and Scenic Rivers

National Wild and Scenic Rivers are protected by Section 7(a) of the Wild and Scenic Rivers Act. Pursuant to Section 7(a), *"No department or agency of the United States shall recommend authorization The Wild & Scenic Rivers Act of any water resources project that would have a direct and adverse effect on the values for which such river was established."* In evaluating the potential impacts on a National Wild and Scenic River from a proposed project, the NPS considers the following factors – free flow, water quality, and "Outstandingly Remarkable Values" (ORVs). ORVs constitute those values for which the river was designated into the Wild and Scenic Rivers System. Coordination with the NPS regarding the White Oak Project indicated that ORVs potentially pertinent for the White Clay Creek include federally listed species, a federal species of conservation concern, and state listed plant species. Crossing of the waterbodies would require U.S. Army Corps of Engineers (COE) Section 404 permits, which would trigger NPS review of the permits under Section 7 of the Wild and Scenic Rivers

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Act. Under this statute, the NPS would determine if such crossings would have a direct and adverse impact on free flow and water quality, as well as any direct and adverse impacts to any ORVs that led to the designation into the Wild and Scenic Rivers System.

The Kemblesville Loop would cross two streams that are tributaries to the West Branch of White Clay Creek, at mileposts (MP) 0.38 and 0.49. The two tributaries and the West Branch itself are federally designated as part of the White Clay Creek National Wild and Scenic River (Public Law 106-357). The NPS Northeast Region administers the White Clay Creek National Wild and Scenic River.

System Reliability Project

The Porter Road Loop lies within two river watersheds, the Christina River subwatershed and the Red Lion Creek subwatershed; both of these are within the Delaware Bay watershed. The Dover Loop lies within the St. Jones River subwatershed, which is also within the Delaware Bay system. The Porter Road Loop would cross 2 waterbodies at 2 individual crossing locations, and would have a workspace near a third waterbody; the Dover Loop would cross 11 waterbodies at 12 individual crossing locations. The Bridgeville Compressor Station lies within the Nanticoke River watershed, which is a sub-basin of the Chesapeake Bay watershed. No surface waterbodies are within the Bridgeville Compressor Station property.

As shown in table 12, for the System Reliability Project, Eastern Shore would cross 13 waterbodies at 14 locations using the HDD method, which avoids or minimizes direct impacts on waterbodies.

The Porter Road Loop would cross the Christina River, which is a classified as a public water supply source. Eastern Shore's search of the DNREC's Delaware Environmental Navigator website indicated that public potable water intakes are not located within 3 miles downstream of the Porter Road Loop pipeline waterbody crossings. The database search also indicated that the St. Jones River (proposed to be crossed by the Dover Loop) is not classified as a public water supply source. Six of the waterbodies proposed to be crossed by the pipelines are listed as impaired on the Delaware Clean Water Act Section 303(d) list. All crossing activities would be in accordance with the May 2013 version of FERC's Procedures.

Sensitive Waterbody Crossings

According to the Delaware Administrative Code Stream Basins and Designated Uses, the Christina River, Red Lion Creek, and St. Jones River watersheds are not listed as waters of exceptional recreational or ecological significance. Portions of the Nanticoke River watershed are listed as waters of exceptional recreational or ecological significance; however, the System Reliability Project would not affect any waterbodies in this watershed.

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Table 12. Waterbodies Crossed Using the HDD method by the System Reliability Project

Milepost	Waterbody Width (Feet)	Waterbody Name	Waterbody Class[1]
0.86	23	Belltown Run	Intermediate
1.26	14	Unnamed tributary of Belltown Run	Intermediate
0.11	32	Unnamed tributary of Fork Branch	Intermediate
0.38	37	Fork Branch	Intermediate
0.48 and 0.56	12	Unnamed tributary of Fork Branch	Intermediate
0.73	18	Unnamed tributary of Fork Branch	Intermediate
2.45	25	Maidstone Branch	Intermediate
1.90	3	Unnamed tributary of Cahoon Branch	Minor
3.31	28	Cahoon Branch	Intermediate
3.36-3.40	10	Unnamed tributary of Cahoon Branch	Minor
3.03	5	Unnamed tributary of Cahoon Branch	Minor
5.53	19	Puncheon Run	Intermediate
6.94	28	Isaac Branch	Intermediate

[1] Minor waterbodies are less than or equal to 10 feet wide at the water's edge at the time of crossing; intermediate waterbodies are greater than 10 feet wide but less than or equal to 100 feet wide at the water's edge at the time of crossing.

National Wild and Scenic Rivers

The System Reliability Project would not affect any waterbodies within the Wild and Scenic Rivers System.

Water Resources Impacts and Mitigation Measures

Construction activities such as clearing and grading, trench dewatering, and backfilling have the potential to temporarily impact water bodies, such as temporary increase in sedimentation and turbidity, particularly within or near flowing surface waters. To minimize these impacts, Eastern Shore proposes to use a dry-ditch crossing method at all waterbody crossings for both projects.

Clearing and grading of vegetation cover could increase erosion into waterbodies. Compaction of soils by heavy equipment near waterbodies may accelerate erosion and the

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transportation of sediment carried by stormwater runoff. To minimize erosion, Eastern Shore would implement its ESC Plans, which include installing and maintaining erosion controls, locating all ATWS at least 50 feet from the waterbody banks, limiting vegetation clearing of the approaches to waterbodies, and stabilizing and restoring the construction work areas in a timely manner. If an ATWS cannot be set back 50 feet from a waterbody, Eastern Shore would file the appropriate variance request with the FERC for review and approval.

Eastern Shore's SPCC Plan contains measures to prevent and, if necessary, control any inadvertent spill of hazardous materials such as fuels, lubricants, or solvents that could affect water quality. Hazardous materials, chemicals, lubricating oils, and fuels used during construction would be stored in upland areas at least 100 feet from waterbodies. No equipment would be parked and/or refueled within 100 feet of waterbodies without the coordination of the EI and implementation of additional precautions such as continual monitoring of fuel transfer and use of secondary containment structures.

Eastern Shore's mitigation measures to protect surface waters include:

- expediting construction in the waterbody, thereby reducing disturbance to the streambed and adjacent soils and the quantity of suspended sediments;
- utilizing HDD when practicable to cross waterbodies;
- if dry crossing methods are used, storing spoil removed during trenching away from the water's edge and protected by sediment containment structures;
- constructing the waterbody crossing as perpendicular to the axis of the channel when engineering and routing conditions allow;
- maintaining ambient downstream flow rates;
- removing construction materials and related structures from each waterbody promptly after construction;
- restoring the waterbody to its original configuration and contour to the extent possible;
- stabilizing the banks of the waterbody and adjacent areas using erosion control measures and vegetation cover as soon as possible after construction; and
- inspecting the crossing point periodically during and after construction and repairing areas as needed.

All surface waterbodies crossed by each project would be restored to pre-construction conditions to ensure that no surface flow capacity is lost. Eastern Shore would follow its ESC Plans, SWPP Plan, and SPCC Plan, as well as the FERC Procedures during construction and revegetation for each project to ensure that impacts on surface waters would be short-term and not significant.

White Oak Project

On February 20, 2015, the NPS filed a letter in response to the White Oak NOI requesting that, among other concerns, the EA consider alternatives that reduce or eliminate the need for excavation along or in the White Clay Creek National Wild and Scenic River. The alternative that the NPS noted in its letter was the Kemblesville Loop Alternative 2 which would follow Eastern Shore's existing right-of-way and would result in less overall disturbance. On

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November 18, 2015, Eastern Shore amended its application to include the Kemblesville Loop Alternative 2 as its currently proposed pipeline, which is what we are evaluating in this EA.

On August 7, 2015, the NPS also submitted comments in response to the Supplemental NOI, regarding the originally proposed Kemblesville Loop and the then-Kemblesville Loop Alternative 2 impacts associated with excavation along or in the White Clay Creek National Wild and Scenic River. In its August letter, the NPS stated that under Section 7 the NPS will determine if these crossing will have a "direct and adverse" impact on free flow and water quality for any of the involved tributaries, as well as any direct and adverse impacts to any "outstandingly remarkable" resources that led to the Wild and Scenic Designation of White Clay Creek and its tributaries.

The NPS' preliminary review indicated that there would be no "direct or adverse" impacts from the crossings of the White Clay Creek along either route. The streams involved are very narrow and in existing disturbed locations. The use of a dry-ditch crossing method (either flume, dam-and-pump, or HDD), along with proper BMPs should insure minor impacts. Additionally none of the proposed crossings of the White Clay Creek are in the vicinity of any outstandingly remarkable resources (NPS, 2015).

To ensure that the Section 7(a) of the Wild and Scenic Rivers Act is properly completed, **we recommend that:**

- **Prior to construction of the White Oak Project, Eastern Shore should complete its consultation with the NPS and the COE and file with the Secretary, for review and written approval of the Director of the Office of Energy Projects (OEP), its final construction and restoration plan for the crossings of the tributaries to the West Branch of White Clay Creek.**

Because Eastern Shore has not identified specific HDD locations along the Kemblesville or Daleville Loops, **we further recommend that:**

- **Prior to construction of the White Oak Project, Eastern Shore shall file with the Secretary, for review and written approval of the Director of OEP, site-specific HDD crossing plans where this method is determined to be feasible and appropriate, and an HDD Inadvertent Surface Release Contingency Plan. The crossing plans shall detail the crossing and operational procedures as well as the responsibilities for the prevention, containment, and cleanup of any releases associated with the HDD(s).**

System Reliability Project

Eastern Shore would implement the general mitigation measures described above for the System Reliability Project. **We recommend that:**

- **Prior to construction of the System Reliability Project, Eastern Shore shall file with the Secretary, for review and written approval of the Director of**

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OEP, site-specific HDD crossing plans where this method is determined to be feasible and appropriate, and an HDD Inadvertent Surface Release Contingency Plan. The crossing plans shall detail the crossing and operational procedures as well as the responsibilities for the prevention, containment, and cleanup of any releases associated with the HDD(s).

Hydrostatic Testing

In accordance with DOT regulations, Eastern Shore would conduct hydrostatic testing of the pipelines before placing them into service to ensure that they are capable of operating at the design pressure. The water used for this hydrostatic testing would come from a municipal source.The water in the pipe would be pressurized and held for a minimum of 8 hours. If any leaks are detected Eastern Shore would repair the segments and retest. Upon completion of the hydrostatic test, water would be discharged to a vegetated, upland area using energy dissipation and filtration devices (for example, certified weed-free hay/straw bales and silt fence) to reduce the velocity of the discharged water and provide containment, thereby reducing the potential for erosion where the water is discharged and the release of silt-laden materials into wetlands, waterbodies, or other sensitive resources.

White Oak Project

Hydrostatic test water for the White Oak Project would be obtained from a municipal source (the Chester County Water Authority) and brought to the construction sites via tanker trucks. Eastern Shore estimates that approximately 197,000 gallons of water would be used for hydrostatic testing of the Daleville Loop, and approximately 125,000 gallons of water would be used for hydrostatic testing of the Kemblesville Loop. A minor amount of water may also be used to hydrostatically test facilities at the Delaware City Compressor Station, which would also obtained from a municipal source.

System Reliability Project

Hydrostatic test water for the System Reliability Project would be obtained from a municipal source and brought to the construction sites via tanker trucks. Eastern Shore estimates that about149,000 gallons of water would be used for hydrostatic testing of the Porter Road Loop, and about 454,000 gallons of water would be used for testing the Dover Loop. A minor amount of water may also be used to hydrostatically test facilities at the Bridgeville Compressor Station, which would also be obtained from a municipal source.

Impacts from the withdrawal and discharge of test water would be minimized by implementing measures in the FERC Procedures and following the requirements specified in the National Pollutant Discharge Elimination System General Permit for Discharge from Hydrostatic Testing of Tanks and Pipelines issued by the PADEP for the White Oak Project and the DNREC for the System Reliability Project. Impacts from the withdrawal and discharge of hydrostatic test water would short-term and not significant.

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2.3. Wetlands

The COE defines wetlands as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of wetland vegetation typically adapted for life in saturated soil conditions" (Environmental Laboratory, 1987). We define wetlands as any area that is not actively cultivated or rotated cropland and that satisfies the requirements of the current federal methodology for identifying and delineating wetlands.

Eastern Shore conducted surveys in accordance with the 1987 Wetland Delineation Manual and the COE Regional Supplement to the COE Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region, Version 2.0 (Environmental Laboratory, 2010); and the COE Regional Supplement to the COE Wetland Delineation Manual: Eastern Mountains and Piedmont Region, Version 2.0 (Environmental Laboratory, 2012). Wetlands can be classified based on the National Wetlands Inventory classification system (Cowardin et al., 1979).

Wetland classifications include palustrine emergent (PEM) wetlands, which are freshwater wetlands characterized by herbaceous hydrophytic vegetation and typically occur along stream banks and in wet meadows. Palustrine scrub-shrub (PSS) wetlands are freshwater wetlands that are dominated by woody vegetation (such as shrubs and young trees) that is less than 15 feet tall. Palustrine forested (PFO) wetlands are freshwater wetlands that are dominated by woody vegetation that is at least 20 feet tall. PEM and PFO wetlands were found at both Eastern Shore project locations; PSS wetlands were only found in the System Reliability Project area.

Emergent Wetlands

PEM wetlands are at several locations within the project construction areas. Wetlands in both Eastern Shore project areas had woolgrass, soft rush, and sensitive fern as dominant species. Reed canary grass, jewelweed, Joe-Pye Weed, rice cutgrass, and skunk cabbage were found only in the White Oak Project area. Fox sedge, shallow sedge, pointed broom sedge, broadleaf cattail, and common reed was only observed in the System Reliability Project area.

Scrub-shrub Wetlands

PSS wetlands were not identified in the White Oak Project area. One small PSS wetand (impact of about 0.43 acre) would be crossed by the System Reliability Project. Species observed within this PSS wetland in include common reed, broadleaf cattail, black willow, and red maple.

Forested Wetlands

PFO wetlands are at several locations within the project construction areas. Dominant species in both Eastern Shore project areas include red maple, green ash, and black gum. The understory consists of northern spicebush, southern arrowwood, common greenbrier, Japanese honeysuckle, sensitive fern, and skunk cabbage. In addition, PFO wetlands in the System

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Reliability Project area had sweetgum, black willow, willow oak, pin oak, and sweet pepper bush; these species were not present in the White Oak Project PFO wetlands.

White Oak Project

Eastern Shore performed delineations of wetlands in the project areas during July, August, and September 2014 and January and June 2015. During field delineations of the Daleville and Kemblesville Loops, Eastern Shore observed nine wetlands that would be impacted by construction of the pipelines. No wetland areas are present within the Delaware City Compressor Station site. Table 13 summarizes the wetland crossings impacted by the White Oak Project, including wetland classification, crossing lengths, and permanent and temporary wetland impacts.

Construction of the Daleville and Kembelsville Loops would impact 1.24 acres and 0.42 acres of total wetlands, respectively, totaling 1.66 acres (0.83 acres of PFO wetland and 0.83 acres of PEM wetland). Operation of the Daleville Loop would impact 0.01 acre of PEM wetland, which would be associated with the permanent easement. Operation of the Kemblesville Loop would not permanently impact wetlands.

Table 13. Wetlands Affected by the White Oak Project

Milepost	National Wetlands Inventory Classification	Length of Crossing (feet)[1]	Wetlands Affected During Construction (acres)	Wetlands Affected During Operation (acres)
Daleville Loop				
2.87	PEM	0	0.09	0
2.13	PEM	12.69	0.01	0
0.97-1.38	PEM	675.73	0.35	0.01
	PFO	0	0.76	0
0.92	PEM	0	0.03	0
Total PFO			**0.76**	**0**
Total PEM			**0.48**	**0.01**
Kemblesville Loop				
0.48	PEM	36.21	0.02	0
	PFO	19.09	0.01	0
0.67	PFO	0	0.01	0
1.20-1.30	PEM	277.09	0.30	0
1.35	PEM	3.86	<0.01	0
1.84	PEM	60.74	0.03	0
	PFO	0	0.05	0
Total PFO			**0.07**	**0**
Total PEM			**0.35**	**0**

[1] Wetland crossing length was calculated using actual linear footage crossed by the pipeline centerline. Crossing lengths of zero indicate that the pipeline centerline does not cross this wetland.

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System Reliability Project

Eastern Shore performed delineations of wetlands in the System Reliability Project area from July 2014 to March 2015. During field delineations of the Porter Road and Dover Loops, Eastern Shore observed 38 wetlands that would be impacted by construction of the pipelines. No wetlands areas are present within the Bridgeville Compressor Station site. Table 14 summarizes the wetland crossings impacted by the System Reliability Project, including wetland classification, crossing lengths, and permanent and temporary wetland impacts.

Table 14. Wetlands Affected by the System Reliability Project

Milepost	National Wetlands Inventory Classification	Length of Crossing (feet)[1]	Wetlands Affected During Construction (acres)	Wetlands Affected During Operation (acres)
Porter Road Loop				
0.06-0.11	PEM	0	1.05	0
0.28-0.29	PEM	0	0.05	0
0.36-0.38	PFO	0	0.07	0
0.44-0.48	PFO	0	0.13	0
0.78-0.81	PFO	0	0.002	0
0.82-0.84	PFO	0	0.07	0
	PEM	0	0.01	0
0.84-0.90	PFO	0	0.26	0
	PEM	0	0.18	0
1.24-1.26	PFO	111.87	0.18	0
1.25-1.28	PFO	0	0.20	0
1.33	PFO	0	0.01	0
1.46-1.50	PFO	0	0.14	0
1.57-1.64	PFO	0	0.29	0
	PEM	0	0.10	0
1.85	PFO	0	0.003	0
2.38-2.51	PSS	0	0.43	0
	PEM	0	0.43	0
N/A6	PFO	0	0.05	0
N/A6	PFO	0	0.11	0
Total PFO			1.52	0
Total PSS			0.43	0
Total PEM			1.82	0
Dover Loop				
0.10-0.13	PEM	0	0.03	0
	PFO	0	0.01	0
0.27-0.32	PEM	122.64	0.33	0
0.16-0.20	PEM	0	0.28	0
0.32-0.42	PFO	528.21	1.93	0
0.70-0.77	PFO	0	0.48	0
1.89	PFO	0	0.20	0

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Milepost	National Wetlands Inventory Classification	Length of Crossing (feet)[1]	Wetlands Affected During Construction (acres)	Wetlands Affected During Operation (acres)
1.54-1.59	PFO	0	0.26	0
1.69-1.72	PFO	0	0.08	0
2.22-2.27	PEM	0	0.15	0
	PFO	0	0.22	0
2.43-2.45	PFO	0	0.02	0
2.49-2.51	PFO	0	0.07	0
2.45-2.47	PFO	0	0.05	0
2.46-2.50	PFO	0	0.16	0
2.65-3.03	PFO	0	0.05	0
2.78-2.79	PFO	0	0	0
2.76-2.77	PFO	0	0.32	0
2.74-2.94	PFO	516.23	2.09	0
3.18-3.32	PFO	341.29	1.25	0
3.28-3.36	PFO	115.73	0.76	0
3.49	PFO	0	0.07	0
5.50-5.53	PEM	86.78	0.32	0
6.96-6.99	PFO	0	0.05	0
Total PFO			8.07	0.86
Total PEM			1.11	0.08

[1] Wetland crossing length was calculated using actual linear footage crossed by the pipeline centerline. Crossing lengths of zero indicate that the pipeline centerline does not cross this wetland.
Note: Access was denied to multiple properties within the Dover Loop Project area, from approximately mileposts 3.38-3.81. Additional wetlands may be present in these areas.

Construction of the Porter Road and Dover Loops would impact 3.77 acres and 9.18 acres of wetlands, respectively; totaling 12.95 acres (9.59 acres of PFO wetland, 0.43 acre of PSS wetland, and 2.93 acres of PEM wetland). Operation of the Porter Road Loop would not impact wetlands. Operation of the Dover Loop would impact 0.94 acre of wetland (0.08 acre of PEM wetland and 0.86 acre of PFO wetland), which would be associated with the permanent easement.

Construction and Operation Impacts and Mitigation Measures

Impacts on wetlands from construction of the White Oak Project and System Reliability Project pipelines would primarily result from the potential alteration of wetland value from vegetation clearing. Construction could result in temporary impacts on wetlands from the loss of herbaceous and scrub/shrub vegetation, potentially altering wildlife habitat; soil disturbance from excavation, trenching, grading, and compaction; increased sedimentation and turbidity; and hydrologic profile changes. Construction activities could also impact water quality within the affected wetlands as a result of increased sedimentation or inadvertent spills of fuel or chemicals. The use of timber mats or other temporary surface material to provide a stable work area within wetlands could also result in the compaction of wetland soils.

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Eastern Shore would install and maintain erosion control measures in accordance with the FERC Procedures and Eastern Shore's project- and county-specific ESC Plan to avoid or minimize impacts on wetlands. Eastern Shore would also minimize wetland impacts by implementing the construction and mitigation measures outlined in the FERC Procedures and adhering to applicable permit requirements. General construction and mitigation measures from our Procedures include:

- limiting construction right-of-way width in wetlands to 75 feet;
- limiting construction equipment in wetlands to that needed to clear the right-of-way, excavate the trench, fabricate the pipe, install the pipe, backfill the trench, and restore the right-of-way;
- minimizing the length of time that topsoil is segregated and the trench is open;
- installing trench breakers at the wetland boundaries and/or seal the trench bottom as necessary to maintain the original wetland hydrology; and
- prohibiting the use of lime, fertilizer, or mulch during restoration of wetlands.

In saturated wetlands where soils are unstable, temporary timber riprap, prefabricated equipment mats, or terra mats would be installed adjacent to the pipeline trench to create a stable travel working surface through the wetland. Construction would proceed as in unsaturated wetlands, except topsoil would not be segregated due to the saturated conditions. Any ATWS would not be located within 50 feet of any wetland unless site-specific conditions dictate otherwise and approved by FERC.

After construction, the wetlands would be restored and revegetated. Revegetation would be deemed successful if the cover of the herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent wetland areas that were not disturbed by construction.

In PEM wetlands, the herbaceous vegetation would regenerate quickly (typically within 1 to 3 years). There would be no permanent impact on emergent wetland vegetation in the maintained pipeline right-of-way because these areas naturally consist of, and would remain, as open and herbaceous communities. In PSS wetlands, the herbaceous and woody vegetation would regenerate within 3 – 10 years.

Areas of PFO wetlands would be allowed to revegetate; however, woody vegetation may take several years to decades to regenerate fully. A small amount of PFO wetland (about 0.86 acre) on the System Reliability Project would be permanently converted to PEM or PSS wetland because the trees would not be allowed to regrow within the permanent right-of-way. This represents a conversion of wetland type, but not a net loss of wetland habitat. In the long term, the affected PFO wetlands would be expected to continue to provide important ecological functions such as sediment retention, nutrient removal, flood attenuation, groundwater recharge/discharge, and wildlife habitat.

Eastern Shore would conduct all crossing of wetlands in compliance with COE Section 404 permits terms and conditions, including any required mitigation for temporary impacts on PFO wetlands.

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Based on the above discussion, we conclude that impacts on wetlands resulting from construction and operation of the White Oak and System Reliability Projects would be short-term and not significant.

3. Vegetation, Fisheries, and Wildlife

3.1. Vegetation

The White Oak Project's Daleville and Kemblesville Loops are in the Piedmont Upland Ecoregion, and the Delaware City Compressor Station is within the Delmarva Uplands Ecoregion. The System Reliability Project is entirely within the Delmarva Uplands Ecoregion.

The Piedmont Uplands Ecoregion is characterized as containing rounded hills, low ridges, relative high relief, and narrow valleys, and is underlain by metamorphic rock. Irregular plains and narrow valleys typically have elevations that often range from approximately 450 feet to 1,000 feet in elevation (Woods et al., 1999). The Delmarva Uplands Ecoregion is characterized as nearly level to gently rolling uplands of the Delmarva Peninsula, with elevations ranging from approximately 20 feet to less than 100 feet. Sandy ridges, swales, low paleodunes, and the central ridge of the peninsula are found within this ecoregion (Woods et al., 1999).

Both Eastern Shore projects cross several distinct upland communities and cover types, including agriculture, upland forest, open space and utility corridors, residential land, road/road right-of-way, and wetlands. The Delaware City Compressor Station site contains three vegetation communities/cover types -- agriculture, open space (including utility corridors), and road/road right-of-way. The Bridgeville Compressor Station site contains four vegetation communities/cover types – agriculture, forest, industrial/commercial/ and road/road-right-of-way. Descriptions of the upland vegetation communities crossed by the projects are described below. Wetland vegetation was described in section 2.3, above.

Agricultural Land

Land utilized for the agricultural production of row crops is present to some extent throughout the areas of both projects. Common crops include wheat and soybean, and the production of hay.

Upland Forest

Upland forest habitats are present throughout the area of both projects. Dominant forest species include white oak, northern red oak, tuliptree, American holly, sweetgum, red maple, chestnut oak, American elm, sassafras, southern arrowwood, multiflora rose, hay-scented fern, and Japanese honeysuckle.

Open Space and Utility Corridors

Upland open spaces and utility corridors within the project construction areas consist of maintained herbaceous, mowed turf grass areas and fallow fields supporting upland herbaceous

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plant communities. These communities are dominated by Bermuda grass, white clover, red clover, tall fescue, common dandelion, and Canada goldenrod. Knotroot bristle grass was a dominant species in the System Reliability Project area, but not in the White Oak Project area.

Industrial/Commercial

In the System Reliability Project, species included Bermuda grass, knotroot bristle grass, tall fescue, common dandelion, Canada goldenrod broom sedge, white clover, red clover, and English plaintain, in addition to maintained turf grass near buildings. The White Oak Project area did not have vegetated areas within commercial or industrial use areas.

Road/Road Rights-of-Way

Road/road rights-of way in the pipeline and compressor station areas consist of impervious or semi-impervious surfaces with mowed and maintained vegetated areas. Both Eastern Shore project areas had mowed and maintained vegetated areas that were dominated by Bermuda grass, common dandelion, Canada goldenrod, white clover, red clover, and English plantain. The System Reliability Project also had tall rescue and knotroot bristle grass as dominant species; these species were not dominant in the White Oak Project area.

Residential

Portions of the pipelines cross vegetation communities in residential areas. These communities typically comprise maintained turf grasses, ornamental plantings, and transitional vegetation bordering forested and wetland communities. Dominant species include multiflora rose, Bradford pear, common greenbrier, Japanese honeysuckle, northern red oak, and red maple. Maintained turf grasses are also found on residential lots throughout the pipeline project areas.

White Oak Project

Construction of the Daleville and Kemblesville Loops would temporarily impact 68.70 acres of vegetation communities. Table 15 provides a summary of vegetation communities affected by the pipelines. Agricultural land would be the most affected community, with 31.53 acres impacted (about 40 percent of total lands impacted by the pipelines). About 7.13 acres of upland forest would be impacted by construction of the loops. Where forested areas would be impacted by construction, the pipelines would primarily parallel Eastern Shore's existing right-of-way, minimizing forest fragmentation where there is a permanent conversion of forests to maintained herbaceous cover. Eastern Shore's consultation with the DCNR indicated that there are no DCNR-designated old growth forests in the vicinity of the Daleville and Kemblesville Loops.

Expansion of the Delaware City Compressor Station would take place on newly acquired land adjacent to Eastern Shore's existing compressor station property. Construction of the new compression facilities would temporarily impact 10.83 acres; operations would permanently impact 2.73 acres. Agricultural land would be most affected by construction and operational activities with 9.03 acres and 2.73 acres impacted, respectively.

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Table 15. Community/Habitat Type Affected by Construction and Operation of the White Oak Project

Community/Habitat Type/Name	Area Affected	
	Construction (Temporary Acres Impacted)	Operation (Permanent Acres Impacted)
Daleville Loop		
Agriculture	25.70	1.34
Upland Forest	5.41	0.79
Open Space and Utility Corridor	8.10	0.08
Residential	2.44	0.23
Road / Road ROW	1.12	0
PFO Wetland	0.76	0
PEM Wetland	0.48	0.01
Daleville Loop subtotal	**44.01**	**2.45**
Kemblesville Loop		
Agriculture	5.83	0.06
Upland Forest	1.72	0.04
Open Space and Utility Corridor	10.11	0
Residential	5.49	0
Road / Road ROW	1.12	0
PFO Wetland	0.07	0
PEM Wetland	0.35	0
Kemblesville Loop subtotal	**24.69**	**0.10**
Pipeline subtotal	**68.70**	**2.55**
Delaware City Compressor Station		
Agriculture	9.03	2.73
Open Space and Utility Corridor	0.60	0
Road / Road ROW	0.30	0
Aboveground Facility subtotal	**10.83**	**2.73**
Project Total	**79.53**	**5.28**

While the majority of the land impacted is currently used for agriculture, it is zoned as heavy industrial (see discussion in section B.4). No tree removal would be required for the Delaware City Compressor Station expansion. Table 15 also provides a summary of vegetation communities affected by the compressor station expansion.

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System Reliability Project

Construction of the Porter Road and Dover Loops would temporarily impact 264.27 acres of vegetation communities. Table 16 provides a summary of vegetation communities affected by the pipelines. Agricultural land (89.61 acres) would be most affected by construction activities. About 16.73 acres of upland forest would be impacted by construction of the loops. Where forested areas would be impacted by construction, the pipelines would primarily parallel Eastern Shore's existing right-of-way, minimizing forest fragmentation where there is a permanent conversion of forests to maintained herbaceous cover. Eastern Shore's consultation with the DCNR indicated that there are no DCNR-designated old growth forests in the vicinity of the Porter Road and Dover Loops.

The Bridgeville Compressor Station expansion would occur on newly acquired land adjacent to Eastern Shore's existing compressor station property. Construction of the compressor station expansion would temporarily impact 18.45 acres[7]; operations would permanently impact 2.40 acres. Agricultural land would be most affected by construction and operational activities with 10.17 acres and 2.40 acres impacted, respectively. While all of the vegetation that would be impacted is currently used for agriculture, it has already been purchased for industrial use by Eastern Shore (see discussion in section B.4). No tree removal would be required for the compressor station expansion and installation of the new facilities. Table 16 also provides a summary of vegetation communities affected by the expansion of the Bridgeville Compressor Station.

Construction and Operation Impacts and Mitigation Measures

Following construction of the pipelines, all of the areas cleared or otherwise disturbed for construction would be allowed to revert to pre-construction vegetation cover types. Eastern Shore would implement measures to revegetate these areas as outlined in the project- and county-specific ESC Plans.

During operations, maintenance of the permanent pipeline rights-of-way, including tree removal, would be necessary to allow for visibility and access to the pipeline for required patrols and surveys. The permanent rights-of-way would be periodically and seasonally mowed, but not more frequently than every three years, in accordance with the vegetation maintenance restrictions outlined in the FERC Plan and Procedures. Areas that become part of the 35-foot permanent rights-of-way would be maintained as herbaceous cover.

Following construction at the compressor stations, areas cleared or otherwise disturbed during construction and not needed for operation of the aboveground facilities would be stabilized and restored to pre-construction conditions.

[7] See section A.4 for additional explanation of Eastern Shore's use of this acreage.

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Table 16. Community/Habitat Type Affected by Construction and Operation of the System Reliability Project

Community/Habitat Type/Name	Area Affected	
	Construction (Temporary Acres Impacted)	Operation (Permanent Acres Impacted)
Porter Road Loop		
Agriculture	5.80	0
Upland Forest	2.01	0
Open Space and Utility Corridor	7.96	0
Residential	15.85	0.08
Road / Road ROW	28.35	0
PFO Wetland	1.52	0
PSS Wetland	0.20	0
PEM Wetland	1.88	0
Porter Road Loop subtotal	**64.95**	**0.08**
Dover Loop		
Agriculture	83.81	8.53
Upland Forest	14.72	1.09
Open Space and Utility Corridor	12.10	0.76
Residential	25.40	0
Road / Road ROW	43.68	0
PFO Wetland	7.88	0.88
PSS Wetland	0	0
PEM Wetland	0.96	0.08
Dover Loop subtotal	**199.32**	**11.68**
Pipeline subtotal	**264.27**	**11.76**
Bridgeville Compressor Station		
Agriculture	10.17	2.40
Forested	0.15	0
Industrial/Commercial	5.84	0
Road / Road ROW	2.29	0
Aboveground facility subtotal	**18.45**[1]	**2.40**
Project total	**282.72**	**14.16**

[1] See section A.4 for additional explanation of Eastern Shore's use of this acreage.

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Impacts on forests would be long term or permanent, as it would take years to decades for mature trees to reestablish in the construction work areas; and 0.83 acre of forested lands would be permanently converted to a maintained herbaceous state for pipeline operation.

Fragmentation of forested areas can result in changes in vegetation (for example, invasion of shrubs along the edge); however, forests within the pipeline project areas have been previously fragmented from other pipeline projects and are part of existing permanent rights-of-way. To the greatest extent practicable, Eastern Shore has co-located the proposed pipelines to minimize additional forest fragmentation.

Impacts on agricultural lands and developed lands are discussed in detail in section B.4. Impacts on wetlands are discussed in section B.2.3. Impacts on forests would be long term; a total 1.92 acre of forested lands would be permanently converted to a maintained herbaceous state for both Eastern Shore projects (0.83 acre for the White Oak Project and 1.09 acres for the System Reliability Project) impacted during construction could take decades, with more than 50 years for hardwoods, such as oaks, to reach maturity.

For both Eastern Shore projects, following construction of the pipelines, all of the areas cleared or otherwise disturbed for construction would be allowed to revert to pre-construction vegetation cover types. Eastern Shore would implement measures to revegetate these areas as outlined in the FERC Plan and Procedures and Eastern Shore's ESC Plan. In addition, Eastern Shore is consulting with the DNREC for seeding mixes to use during restoration of project components in Delaware.

In conclusion, construction and operation of both of the Eastern Shore projects would result in short- and long-term impacts on vegetation. These impacts are expected to be minor due to the majority of areas impacted are agricultural lands, and areas of forested impacted would be collocated with disturbed rights-of-way to the extent practicable. Additionally, with the implementation of restoration methods outlined in the FERC Plan and Procedures and Eastern Shore's ESC Plan and SPCC Plan, impacts on vegetation would not be significant.

3.2. Fisheries

All of the waterbodies that Eastern Shore proposes to cross for construction of the White Oak Project and the System Reliability Project are freshwater. No waterbodies are within either of the compressor station project areas. A list of waterbodies crossed by the pipelines and the proposed method of crossing are provided in section B.2.2.

None of these waterbodies in the White Oak Project are designated as warmwater or coldwater fisheries (Pennsylvania Fish and Boat Commission, 2014 and Pennsylvania Code Title 25, Chapter 93 Water Quality Standards). All waterbodies in the System Reliability Project area are classified as warmwater fisheries.

Recreational fishing may occur in the perennial streams crossed by the Eastern Shore projects. Game fish species potentially occurring in both of the Eastern Shore project areas include largemouth and smallmouth bass, and white crappie. In addition, black crappie, rock

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bass, white bass, walleye, hybrid striped bass, and trout were identified in the White Oak Project area as common game fish. (Pennsylvania Fish and Boat Commission, 2016). Bluegill, American eel, yellow perch, white perch, chain pickerel, channel catfish, bullhead catfish, and sunfish were also identified as common game fish in the System Reliability Project area.

White Oak Project

Construction of the White Oak Project pipeline facilities would require 12 waterbody crossings at 12 individual crossings. Eight of these waterbodies are classified as intermittent, three as perennial, and one as ephemeral. All waterbodies are proposed to be crossed using a dry-ditch crossing method or HDD. In accordance with the FERC Procedures, Eastern Shore would not use any ATWS within 50 feet of a waterbody. Should Eastern Shore determine that an ATWS cannot be set back 50 feet from a waterbody; it would file a variance request with the FERC for our review and approval.

System Reliability Project

Construction of the System Reliability Project pipeline facilities would require crossing 13 waterbody crossings at 14 individual crossings. Eight of these waterbodies are classified as intermittent, and five are perennial. All waterbodies for this project are proposed to be crossed using the HDD method.

Construction and Operation Impacts and Mitigation Measures

Habitat alterations could lead to temporary loss of habitat and changes in behavior in fish. Alterations of water quality could also increase stress, injury, and/or mortality among fish and other aquatic species. Some minor alteration to aquatic habitat could occur if there was an inadvertent release of drilling mud underneath the stream bed.

To minimize impacts on waterbodies and aquatic habitat and species, Eastern Shore would adhere to appropriate measures as outlined in the FERC Procedures, including maintaining a 25-foot-wide riparian strip adjacent to waterbodies, limiting vegetation maintenance immediately adjacent to waterbodies to a 10-foot-wide corridor centered over the pipeline, and limiting construction to seasonal timing windows, depending on fisheries type and/or state recommendations. Eastern Shore would also implement its ESC Plan during all phases of construction to avoid or reduce impacts from erosion and sedimentation, which would provide protection to fisheries resources.

In-stream blasting could affect fisheries resources; however Eastern Shore does anticipate the need for blasting. If in-stream blasting is required, Eastern Shore would obtain the required permits and prepare a Blasting Plan for FERC's review and approval. The plan would outline general requirements, restrictions, and safety measures that Eastern Shore would implement and follow in addition to the measures identified in the FERC Procedures.

Eastern Shore would perform hydrostatic testing using water withdrawals from a municipal source and would avoid impacts on aquatic species. Upon completion of the

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hydrostatic test, water would be discharged to a vegetated, upland area and would not impact aquatic habitat or fisheries. Hydrostatic testing is discussed in detail in section B.2.2.

Impacts on fisheries and aquatic resources from construction and operation of the pipelines would be temporary, and Eastern Shore would limit impacts on aquatic resources by using HDD and dry-ditch crossing methods, and by implementing the measures listed above. Therefore, we conclude that impacts on fisheries would not be significant.

3.3. Wildlife

Both Eastern Shore projects would cross upland and wetland habitats that support a diversity of wildlife species. Wildlife species are directly dependent on the existing plant communities and are attracted to an area if suitable cover and/or habitat are present.

As discussed in the vegetation section, the project would cross several distinct upland and wetland vegetation cover types including agriculture, upland forest, open space and utility corridors, residential, road/road right-of-way, and several wetland types. Each of these vegetation communities provides nesting, cover, and foraging habitat for a variety of wildlife species. Areas of existing commercial and industrial land use may contain wildlife, but species in these areas are typically opportunistic and highly adaptive and mobile. Table 17 identifies the terrestrial wildlife species common to these habitats by habitat cover type.

There are no National Wildlife Refuges, state wildlife management areas, or other wildlife preserves in either of the Eastern Shore project areas.

White Oak Project

The White Oak Project would impact 7.13 acres of upland forest; 0.83 acre would be permanently maintained as herbaceous cover and not be allowed to revert to forested land. Overall, the amount of permanent forest clearing would be minor when compared to existing forest resources in the project area.

The majority of the White Oak Project is collocated and/or adjacent with Eastern Shore's existing, maintained right-of-way, Norfolk Southern Railroad's right-of-way, and various utility and road rights-of-way, which would reduce fragmentation effects.

Habitat impacts resulting from the addition of the new compression facilities have been minimized by using the existing Delaware Compressor Station site previously disturbed adjacent areas as much as feasible, agricultural fields, and existing roads for most access to the construction right-of-way. About 2.7 acres of agricultural field would be permanently converted to commercial/industrial or developed land use by compressor or meter stations modifications. This land may provide some habitat for wildlife; however, the disturbed nature of agricultural lands (used for row crops) adjacent to an existing compressor station do not make it high value habitat.

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Table 17. Common Wildlife Species in the Eastern Shore Project Areas

Vegetation Cover Type	Species
Agriculture	red-tailed hawk, American kestrel, European starling, mourning dove, eastern meadowlark, Canada goose, snow goose, northern raccoon, meadow vole, woodchuck, garter snake, eastern hognose snake
Upland forest	black-capped chickadee, wild turkey, Cooper's hawk, northern flicker, northern short-tailed shrew, red fox, northern raccoon, striped skunk, eastern chipmunk, woodland vole, white-footed mouse
Industrial/Commercial[3]	Carolina wren, common grackle, eastern kingbird, Virginia opossum, northern raccoon, black rat snake
Open space/utility corridors	ring-billed gull, turkey vulture, red-tailed hawk, short-eared owl, mourning dove, red fox, eastern cottontail, striped skunk, meadow vole, milk snake, common garter snake
Residential	field sparrow, northern mockingbird, northern short-tailed shrew, striped skunk, northern raccoon, eastern chipmunk, woodchuck, white-footed mouse
Road/right-of-way	Carolina wren, American robin, song sparrow, common grackle, eastern kingbird, Virginia opossum, northern raccoon, black ratsnake
PFO wetland	wood duck, American woodcock, song sparrow, black-capped chickadee, striped skunk, northern raccoon, eastern newt, spotted salamander, spring peeper, green frog, painted turtle, spotted turtle, smooth earth snake
PEM wetland	American black duck, mallard, Canada goose, song sparrow, red-winged blackbird, osprey, striped skunk, marsh rice rat, muskrat dusky salamander, eastern newt, green frog, spotted turtle, ribbon snake
PSS wetland	red-winged blackbird, American woodcock, swamp sparrow, common yellow-throat warbler, masked shrew, meadow-jumping mouse, eastern cottontail, Virginia opossum, raccoon, white-tailed deer, eastern American toad, gray tree frog, red-spotted newt, common garter snake, ribbon snake

1 The industrial/commercial vegetation type was only present in the System Reliability Project area, not in the White Oak Project area.

In an October 17, 2014 letter, the DNREC Division of Fish and Wildlife identified that measures should be taken to minimize attracting problem waterfowl, such as Canada geese and mute swans, which can become a nuisance in stormwater retention basins. The DNREC also recommended planting a mix of wildflowers and only mowing in March or November of each year; but if more frequent, leaving a 15 to 30-foot buffer around the water's edge. This would dissuade geese and swans from inhabiting the area and provide additional benefits such as attracting bees, butterflies, and other pollinators. Eastern Shore has indicated that although new stormwater management facilities are proposed for the Delaware City Compressor Station, these facilities would not be designed to retain water and Eastern Shore believes that for this reason, they would not attract problem waterfowl. We agree, and do not believe that the requested mowing or planting restrictions would be applicable; however, the replanting of native species, where feasible, would be preferable. Eastern Shore would re-seed property with seed mixes recommended by PADEP and DNREC and according to state requirements, as well as in accordance with landowner requests.

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System Reliability Project

The System Reliability Project would impact 16.88 acres of upland forest; 1.09 acres would be permanently maintained as herbaceous cover and not allowed to revert to forested land. Overall, the amount of permanent forest clearing would be minor when compared to existing forest resources in the project area.

Habitat impacts resulting from the addition of compression would be minimized by using the existing Bridgeville Compressor Station site, previously disturbed adjacent areas as much as feasible, agricultural fields, and existing roads for most access to the construction right-of-way. About 2.4 acres of agricultural field would be permanently converted to commercial/industrial or developed land use by compressor or meter stations modifications. This land may provide some habitat for wildlife, however, the disturbed nature of agricultural lands (used for row crops) adjacent to an existing compressor station do not make it high value habitat.

Wildlife Construction and Operation Impacts and Mitigation

Potential impacts on wildlife from the projects include the temporary displacement of wildlife on the right-of-way. It is expected that most wildlife, such as birds and large mammals, would temporarily relocate to adjacent available habitat as construction activities approach. Construction could result in the mortality of less mobile animals such as rodents, reptiles, amphibians, and invertebrates, which may be unable to escape the immediate construction area. Displacement impacts would be minor and short term as wildlife would be expected to return and colonize post-construction habitats.

Project construction would require clearing of vegetation from the right-of-way, temporarily decreasing the amount of wildlife habitat and reducing protective cover and foraging habitat in the immediate project vicinity. Depending on the season, construction could also disrupt bird courting or nesting, including destruction of nests, eggs, and chicks within the construction area. However, this would be a short-term impact (except along the permanently maintained pipeline right-of-way) as all habitats would be allowed to reestablish in temporary construction workspace and ATWS, thus remaining available for wildlife habitat.

Edge effects can result in interactions between birds that nest in the interior of forests and species that inhabit surrounding landscape, typically lowering the reproductive success of the interior species. Other evidence suggests that certain mammals, amphibians, reptiles, and plants are also adversely affected by forest fragmentation. Species that require large tracts of unbroken forest land may be forced to seek suitable habitat elsewhere. The loss of forest habitat, expansion of existing corridors, and the creation of open early successional and induced edge habitats could decrease the quality of habitat for forest interior wildlife species in a corridor much wider than the actual cleared right-of-way.

During operation, previously forested habitat (including PFO wetlands) would not be allowed to reestablish within the permanent right-of-way. The principal impact would be a shift from those species favoring forest habitat to those using either edge habitat or areas that are more open. It is not likely that the relatively small widening of existing permanently cleared right-of-

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way would impede the movement of most forest interior species. The impact of the permanent conversion of forested habitat to non-forested habitat would be minimized by installing the majority of the project adjacent to the existing rights-of-way, which are maintained in an herbaceous state.

In conclusion, construction and operation of each of the projects would result in short- and long-term impacts on wildlife and wildlife habitat. These impacts are expected to be minor given the mobile nature of most wildlife in the area, the availability of similar habitat adjacent and near the project, and the compatible nature of the restored right-of-way with species occurring in the area. These impacts would be minimized by either collocating or placing the project adjacent to existing rights-of-way and implementing the restoration methods outlined in the FERC Plan and Procedures and Eastern Shore's ESC Plans and SPCC Plan.

Migratory Birds

Migratory birds are species that nest in the United States during the summer and make short or long-distance migrations for the non-breeding season. Neotropical migrants migrate south to the tropical regions of Mexico, Central and South America, and the Caribbean for the non-breeding season. Migratory birds are protected under the Migratory Bird Treaty Act. The Act prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, or nests unless authorized under a FWS permit. Bald and Golden Eagles are additionally protected under the Bald and Golden Eagle Protection Act.

Executive Order 13186 directs federal agencies to identify where unintentional take is likely to have a measurable negative effect on migratory bird populations and to avoid or minimize adverse impacts on migratory birds through enhanced collaboration with the FWS. The executive order states that emphasis should be placed on species of concern, priority habitats, and key risk factors and that particular focus should be given to addressing population-level impacts.

Consultation with the FWS indicated that there are no federally listed threatened or endangered migratory birds in the general area of the two projects. Birds of conservation concern within the region include but are not limited to, the bald eagle, black rail, loggerhead shrike, brown-headed nuthatch, peregrine falcon, blue-winged warbler, cerulean warbler, Kentucky warbler, short-eared owl, red-headed woodpecker, sedge wren, wood thrush, rusty blackbird, and whip-poor-will.

The loss, conversion, modification, and fragmentation of wildlife habitat and vegetation resulting from construction and operation of the projects could impact migratory birds. Birds could experience mortality, injury, or stress due to habitat changes and the removal or disturbance of nests and other foraging and breeding habitat, as well as from avoidance and displacement behaviors caused by construction noise, traffic, and general project-related disturbances. The greatest potential to impact migratory birds would be the avoidance of the construction area by birds due to the increased activity level and noise generation. Construction could occur during a portion of the nesting season, which could result in the mortality of eggs and young birds that have not yet fledged.

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Removal of habitat in the temporary construction corridor adjacent to existing rights-of-way would result in a temporary loss of habitat. The majority of both projects would be constructed immediately adjacent to existing right-of-way; this minimizes fragmentation effects. Impacts on migratory birds are not anticipated at the expansion of the Delaware City Compressor Station (for the White Oak Project) or the Bridgeville Compressor Station (for the System Reliability Project) because of the existing agricultural and industrial land use that currently exist; although there would be permanent conversion of land to an aboveground facility, this habitat is not high quality for migratory birds.

In a December 19, 2014 letter, the FWS Pennsylvania Field Office indicated that the Daleville Loop is in the vicinity of the Important Bird Area (IBA) known as Laurels, King Ranch, and Stroud. IBAs are designated by the Pennsylvania Ornithological Technical Committee. According to the Committee, IBAs are the most critical regions in the Commonwealth for conserving bird diversity and abundance, and are the primary focus of Audubon Pennsylvania's conservation efforts. The Daleville Loop is approximately 1.5 miles west of this IBA; therefore, we do not anticipate any direct impact on this IBA.

Eastern Shore has proposed a construction schedule for both projects that may overlap with the migratory bird breeding season. Because of this, there is the possibility that individual birds or nests could experience mortality. However, both projects primarily cross cleared agricultural areas or parallel existing railroad and utility corridors (including Eastern Shore's existing pipeline), and the restored rights-of-way would continue to function as habitat after restoration. Because the localized and minor nature of each project's impacts would preclude any long-term or permanent effects to bird populations as a whole, and because we do not anticipate any impacts on sensitive bird species or IBAs (or other key habitats), we conclude that there would be no significant impacts on migratory birds and no long-term impact on regional breeding bird populations for either the White Oak Project or the System Reliability Project.

3.4. Special Status Species

Fisheries

In correspondence dated February 6, 2015 and February 25, 2015, the NOAA's National Marine Fisheries Service indicted that no essential fish habitat has been designated within either project area and that no federally listed or proposed threatened or endangered species under NOAA's jurisdiction are expected to occur in the vicinity of either project, and that no further consultation with that agency is required.

State-Listed Species

Eastern Shore searched natural resource databases and consulted with state natural resource agencies to determine if state-listed species could be present in either of the Eastern Shore project areas.

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White Oak Project

The Pennsylvania Natural Diversity Index database search indicated that state-listed species could be present near both the Daleville and Kemblesville Loops. The DCNR requested surveys for Elliott's bluestem, twining screwstem, stiff cowbane, and rice button aster along the proposed Daleville Loop; surveys for five-angled dodder, Nuttall's ticktrefoil, downy lobelia, ivy buttercup, and whip-poor-will flower along the proposed Kemblesville Loop; and surveys for white fringetree and crippled crane-fly orchid along both Loops. Eastern Shore conducted surveys for the Daleville Loop in November and December of 2014, and for the Kemblesville Loop in August 2015; none of these species were found within the proposed limits of disturbance.

In follow-up letters dated March 25, 2015 and September 23, 2015, the DCNR stated that because no state-listed species were observed during the surveys, no impact is likely on state-listed plants and no further coordination would be necessary. We agree and conclude that the White Oak Project would not have a significant impact on state-listed species[8].

System Reliability Project

In letters dated July 25, 2014, January 2, 2015, and March 24, 2015, the DNREC Division of Fish and Wildlife stated that there were no records of state-rare or federally listed plants, animals, or natural communities at the proposed locations of the Bridgeville Compressor Station expansion, or the Porter Road and Dover Loops. Therefore, we conclude that the System Reliability Project would not have any impacts on state-listed species.

Federally Listed Species

Federal agencies are required under Section 7 of the Endangered Species Act (ESA), as amended, to ensure that any actions authorized, funded, or carried out by the agency do not jeopardize the continued existence of a federally listed endangered or threatened species, or result in the destruction or adverse modification of the designated critical habitat of a federally listed species. As the lead federal agency potentially authorizing the projects, the FERC is required to consult with the FWS to determine whether federally listed endangered or threatened species or designated critical habitat are found near the projects, and to evaluate each proposed action's potential effects on those species or critical habitats.

For actions involving major construction activities with the potential to affect listed species or designated critical habitat, the lead federal agency must report its findings to the FWS in a Biological Assessment for those species that may be affected. If it is determined that the action is likely to adversely affect a listed species, the federal agency must submit a request for

[8] The PFBC identified the bog turtle as possibly present in the White Oak Project area, but since the bog turtle is also federally listed, it stated that it deferred to the FWS for its authority under the ESA for consultation purposes. The bog turtle is addressed further in the federally listed species section of this EA.

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formal consultation to comply with Section 7 of the ESA. In response, the FWS would issue a Biological Opinion as to whether the federal action would jeopardize the continued existence of a listed species, or result in the destruction or adverse modification of designated critical habitat.

Eastern Shore, acting as the FERC's non-federal representative for the purpose of complying with Section 7(a)(2) of the ESA, initiated informal consultation with the FWS for federally listed threatened or endangered species potentially occurring in or near both Eastern Shore project areas. Our discussion of potential impacts on federally listed species and effects determinations are presented below.

White Oak Project

On February 19, 2015, Eastern Shore contacted the FWS Chesapeake Bay Field Office requesting information on the presence of species which are federally listed or proposed for listing as endangered or threatened within the proposed Delaware City Compressor Station. On April 10, 2015, the FWS responded that "except for occasional transient individuals, no proposed or federally listed endangered or threatened species are known to exist within the project impact area." We concur, and no further Section 7 consultation is needed for the Delaware City Compressor Station.

In letters dated December 19, 2014 and August 17, 2015, the FWS Pennsylvania Field Office identified the federally threatened bog turtle and northern long-eared bat as potentially occurring within the White Oak Project area. Eastern Shore also conducted a search of the Information for Planning and Conservation database for Delaware which also identified the bog turtle as potentially within the project area[9]. These two species are discussed below.

Bog Turtle

The federally threatened bog turtle is the smallest native North American freshwater turtle, with average sizes (adult carapace length) ranging from 3.2 to 3.9 inches. Bog turtles live in shallow, spring-fed marshes; sphagnum bogs; and swamps, marshy meadows, and pastures with soft, muddy bottoms, slow-flowing water, and open canopies. The biggest threat to bog turtle has been destruction/fragmentation of habitat.

Eastern Shore conducted Phase I surveys for bog turtle habitat along the Daleville Loop and Kemblesville Alternative 2 in August 2014 and July 2015, respectively. Six wetlands were surveyed along the Daleville Loop and nine were surveyed along the Kemblesville Loop. One wetland did contain marginal habitat along the Daleville Loop so a field visit was arranged with both the PAFBC and the FWS Pennsylvania Field Office. It was determined that the wetlands along both loops did not meet the criteria for suitable bog turtle habitat. Based on these survey

[9] In an October 17, 2014 letter, the DNREC Wildlife Species Conservation and Research Program indicated that a Phase 1 bog turtle survey conducted in 2013 at the Delaware City Compressor Station did not find any suitable habitat; therefore, the DNREC "has no concerns about adverse impacts to bog turtles from the project."

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results, the FWS Pennsylvania Field Office concluded in a December 19, 2014 letter for the Daleville Loop and in a September 3, 2015 letter for the Kemblesville Loop, that the project would "not affect the bog turtle." We agree. No further Section 7 consultation is required for this species.

Northern Long-eared Bat

The northern long-eared bat (NLEB), also known as the northern myotis or northern long-eared myotis, is federally listed as threatened by the FWS effective May 4, 2015 (FWS, 2015a). The bat medium sized with a body length of 3 to 3.7 inches and a wingspan of 9 to 10 inches. They spend winter hibernating in caves and mines with constant temperatures, high humidity, and no air currents. During the summer, they roost singly or in colonies underneath bark, in cavities, and crevices of live or dead trees. Males and non-reproductive females may roost in cooler places such as caves or mines. The bats rarely roost in human structures.

NLEB exhibit delayed fertilization. After copulating, females store sperm during hibernation until spring. In spring, the females ovulate and the stored sperm fertilizes the egg. Pregnant bats migrate to summer areas and roost in small maternal colonies where they give birth to a single pup in May or early June to late July. NLEB feeds on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while flying through understory of forested areas or by gleaning from vegetation.

NLEB have been negatively impacted by white-nose syndrome, impacts on hibernacula, loss or degradation of summer habitat (for example, from highway construction or commercial development), clearing or standing dead trees, and wind farm operation (FWS, 2015a). Critical habitat has not yet been designated for the species.

In letters dated August 17, 2015 and August 6, 2015 regarding the Daleville Loop and the Kemblesville Loop, respectively, the FWS indicated that "although the FWS' records did not identify any known NLEB hibernacula within 0.25 mile of the Project, any clearing of trees over 3 inches in diameter at breast height should only occur between the dates of November 15 and March 31. Shagbark hickory, dead and dying trees, and large diameter tree (12 inches diameter at breast height or greater) should be preserved where possible to serve as roost trees."

On November 10, 2015, Eastern Shore submitted an updated consultation letter indicating there are no known NLEB hibernacula within 0.25 mile of the Project area; only 7.96 acres of tree clearing would occur; and Eastern Shore planned to clear trees any time of the year and that this would result in the project being *not likely to adversely affect* the NLEB. On December 14, 2015, the FWS Pennsylvania Field Office concurred with this determination. We also agree with this conclusion. Therefore, consultation is complete for the NLEB.

System Reliability Project

In letters dated July 30, 2014, August 12, 2014, and December 11, 2014, the FWS Chesapeake Bay Field Office stated that there were no known federally listed species, other than occasional transient individuals, in the System Reliability Project area and that no further Section

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7 consultation with the FWS was required. As such, we consider ESA consultation complete for the System Reliability Project.

4. Land Use, Recreation, and Visual Resources

When considering the environmental consequences of constructing and operating the proposed White Oak and System Reliability Projects, we describe the duration and significance of any potential impacts according to the following four levels: temporary, short term, long term, and permanent.

Temporary impacts generally occur during construction, with the resources returning to preconstruction conditions almost immediately. Short-term impacts could continue for approximately 3 years following construction. Long-term impacts could continue for more than 3 years, but the resources eventually would recover. Permanent impacts could occur as a result of activities that modify resources to the extent that they may not return to preconstruction conditions during the life of the project, such as with the construction of an aboveground facility.

The White Oak and System Reliability Projects would require land for the construction and operation of the pipeline facilities, including permanent right-of-way, ATWS (including staging areas), and access roads. We received comments during the scoping period regarding land use concerns for the pipeline facilities. These concerns are addressed in the following section.

The White Oak Project would affect 79.53 acres during construction, and 5.33 acres would be permanently maintained for the pipeline rights-of-way and aboveground facilities. The System Reliability Project would affect 304.9 acres during construction, and 16.3 acres would be permanently maintained for the pipeline rights-of-way and aboveground facilities.

The operational rights-of-way width for the Eastern Shore projects would be incorporated into the existing 35-foot wide permanent rights-of-way. Following construction, the areas disturbed by construction would be restored to their original condition and use to the greatest extent practicable. However, the Delaware City Compressor Station expansion would involve acquisition and conversion of land to industrial use.

4.1. Land Use

Eastern Shore would parallel and partially utilize its existing rights-of-way wherever possible. Some additional permanent right-of-way would need to be acquired from individual property owners, and additional temporary work space would be necessary for staging areas. Following construction, the new pipeline loops would be maintained within Eastern Shore's existing 35-foot-wide right-of-way in certain locations. The Eastern Shore projects would cross seven general land use types: existing Eastern Shore rights-of-way, agriculture, upland forests, open space, wetlands, road rights-of-way, and residential lands.

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White Oak Project

About 78 percent of the total miles of pipeline associated with the White Oak Project would be collocated with Eastern Shore's existing rights-of-way. Table 18 provides a summary of affected land use categories, and table 19 summarizes the locations where the Daleville and Kemblesville Loops would be located within or adjacent to existing rights-of-way.

We received some comments from homeowners along the proposed Daleville and Kemblesville Loops regarding the potential effect of the new pipelines on property values. Landowners typically have the following concerns regarding potential impacts on property values: devaluation of property if encumbered by a pipeline easement; being the responsible party for property taxes within a pipeline easement; paying potential landowner insurance premiums for project-related effects; and negative economic effects resulting from changes in land use. Eastern Shore would acquire easements for both the temporary (construction) and permanent rights-of-way where applicable. The majority of the proposed loops would be installed within Eastern Shore's existing right-of-way and would not require additional pipeline easements. Eastern Shore would compensate the landowners for any new easements, the temporary loss of land use, and any damages. In addition, affected landowners who believe that their property values have been negatively impacted could appeal to the local tax agency for reappraisal and potential reduction of taxes.

Land values would be determined by appraisals that take into account objective characteristics of the property such as size, location, and any improvements. The value of a tract of land would be related to many tract-specific variables, including the current value of the land, the utilities and services available or accessible, the current land use, and the values of the adjacent properties. The valuations generally do not consider subjective aspects such as the potential effect of a pipeline. That is not to say that the presence of a pipeline, and the restrictions associated with a pipeline easement, could not influence a potential buyer's decision to purchase a property. If a buyer is looking for a property for a specific use, which the presence of the pipeline renders infeasible, then the buyer may decide to purchase another property more suitable to their objectives. For example, a buyer wanting to develop the land for a commercial property with sub-surface structures may not find the property suitable, but a farmer looking for land for grazing or additional cropland could find it suitable for their needs. This would be similar to other buyer-specific preferences that not all homes have, such as close proximity to shopping, relative seclusion, or access to high-quality school districts.

System Reliability Project

About 3 percent of the total miles of pipeline associated with the System Reliability Project would be collocated with existing rights-of-way. Table 20 provides a summary of affected land use categories, and table 21 summarizes the locations where the Porter Road and Dover Loops would be located within or adjacent to existing rights-of-way.

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Agriculture

Impacts resulting from construction through agricultural lands would be primarily limited to the growing season when construction occurs. All cropland used for additional temporary workspaces would revert to prior uses. Cropland and pasture use would be permitted within the permanent right-of-way in accordance with applicable easement agreements. Landowners would be compensated for crop losses and other damages caused by construction activities. Eastern Shore would reimburse landowners for damages as a result of construction.

White Oak Project

Based on the total land use impacted by the White Oak Project, about 52 percent of land crossed is characterized as agricultural land use. The land impacted by the Delaware City Compressor Station upgrade is characterized as agricultural land although it is zoned as heavy industrial.

The NRCS submitted a letter to FERC on February 22, 2016, notifying staff that Eastern Shore potentially crosses several conservation easements along the project. Further consultation with the NRCS confirmed that the Daleville Loop crosses one conservation easement at MP 0 (parcel 26-L) that is subject to an agricultural conservation easement under the Farm and Ranch Lands Preservation Program (NRCS, 2016). The original right-of-way through this property was established in 1958 with a second right-of-way installed in 2004. In its April 4 letter, the NRCS determined that work would be allowed to take place within the existing right-of-way without compromising the provisions of the conservation easement. The NRCS also stated that "[it] will not approve, and has historically not approved, any equipment staging area(s) or other work occurring within a temporary workspace." Eastern Shore has proposed temporary extra workspace on this parcel. We agree that protection of this parcel according to the NRCS' requirements regarding its conservation easement is warranted. Therefore, we recommend that:

- **Prior to construction of the White Oak Project Daleville Loop, Eastern Shore should file with the Secretary for the review and written approval of the Director of OEP, a revised construction workspace configuration that avoids use of temporary workspaces on parcel 26-L (near MP 0).**

Table 18. Land Uses Crossed by the White Oak Project

Project Component	Eastern Shore ROW		Agriculture		Forested		Open Space / Utility Corridor		Wetland		Road / Road ROW		Residential		Totals	
	Cons	Oper	Cons	Oper	Cons	Oper	Cons	Oper	Cons	Oper	Cons	Oper	Cons	Oper	Cons	Oper
Daleville Loop	7.73	0	25.7	1.34	5.41	0.79	0.37	0.08	1.24	0.01	1.12	0	2.44	0.23	44.01	2.45
Kemblesville Loop	7.54	0	5.83	0.06	1.72	0.04	2.57	0	0.42	0	1.12	0	5.49	0	24.69	0.1
Delaware City Compressor Station	0.9	0	9.93	2.73	0	0	0	0	0	0	0	0	0	0	10.83	2.73
Total	**16.17**	**0**	**41.46**	**4.13**	**7.13**	**0.83**	**2.94**	**0.08**	**1.66**	**0.01**	**2.24**	**0**	**7.93**	**0.23**	**79.53**	**5.28**

ROW = right-of-way
Cons = construction
Oper = operation

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Table 19. Existing Rights-of-Way Proposed to Be Used by the White Oak Project

Project Facility	Mileposts	Length Adjacent / Within Existing Right-of-Way (in miles)	Type of Right-of-Way
Daleville Loop	0.00-0.64 0.65-1.39 1.83-2.31 2.66-2.68 2.88-2.97 2.98-3.12 3.13-3.28	2.26	Eastern Shore
	0.64-0.65 1.49-1.63 2.68-2.69 2.97-2.98 3.12-3.13	0.18	Public Roadway
Total		**2.44**	
Kemblesville Loop	0.00-0.10 0.11-0.69 0.71-0.85 0.86-0.95 0.96-1.47 1.48-1.57 1.59-1.63 1.64-1.97 1.98-2.05	1.95	Eastern Shore
	0.10-0.11 0.69-0.71 0.85-0.86 0.95-0.96 1.47-1.48 1.57-1.59 1.63-1.64 1.97-1.98	0.10	Public Roadway
Total		**2.05**	

System Reliability Project

About 35 percent (99.7 acres) of the total land use affected by the System Reliability Project construction is agricultural. The agricultural land impacted by the Bridgeville Compressor Station upgrade is characterized as agricultural land although it is zoned as heavy industrial.

Based on the temporary nature of the proposed construction- and operation-related activities and Eastern Shore's proposed mitigation measures, impacts on agricultural land use by either project would not be significant.

Table 20. Land Uses Crossed by the System Reliability Project

Project Component	Eastern Shore ROW		Agriculture		Forested		Open Space/Utility Corridor		Industrial /Commercial		Wetland		Road / Road ROW		Residential		Totals	
	Cons	Oper	Cons	Oper	Cons	Oper	Cons	Oper	Cons	Oper	Cons	Oper	Cons	Oper	Cons	Oper	Cons	Oper
Porter Road Loop	1.10	0.00	5.80	0	2.01	0	6.86	0	0.78	0.00	3.6	0	28.4	0	15.9	0.08	64.95	0.08
Dover Loop	0.43	0.00	83.80	8.53	13.29	1.09	11.1	0.76	8.05	0.31	2.35	0.96	41.2	0	24.1	0	191.70	11.68
Bridgeville Compressor Station	0	0	10.17	2.40	0.15	0	0	0	5.84	0	0	0	2.29	0	0	0	18.45[1]	2.40
Total	**1.53**	**0.00**	**99.7**	**10.93**	**15.45**	**1.09**	**17.9**	**0.76**	**14.67**	**0.31**	**5.95**	**0.96**	**71.89**	**0**	**39.9**	**0.08**	**275.10**	**14.16**

[1] See section A.4 for additional explanation of Eastern Shore's use of this acreage.
ROW=right-of-way
Cons=construction
Oper=operation

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Table 21. Existing Rights-of-Way Proposed to Be Used by the System Reliability Project

Project Facility	Mileposts	Length Adjacent / Within Existing ROW (in miles)	Type of Right-of-Way
Porter Road Loop	0.00 – 0.03	0.03	Eastern Shore Pipeline
	0.03 – 0.19	0.16	U.S. Route 301
	0.19 – 2.31	2.12	County Road 400
	2.33 – 2.51	0.18	County Road 356
Total		2.49	
Dover Loop	0.00 – 0.20	0.20	County Road 155
	0.51 – 1.00	0.69	McKee Road
	1.01 – 2.05	1.04	County Road 100
	2.07 – 2.73	0.66	County Road 104
	3.14 – 3.15	0.01	County Road 158
	3.81 – 3.90	0.09	State Route 8
	4.93 – 4.95	0.02	County Road 73
	5.79 – 6.90	1.11	State Route 15
	6.92 – 7.28	0.36	Norfolk Southern Railroad
	7.36 – 7.37	0.01	West Camden Wyoming Avenue
	7.55 – 7.56	0.01	State Route 15
Total		4.20	

Upland Forest

Pipeline construction would result in long-term to permanent impacts on forest from the removal of trees and shrubs from the construction workspace. To minimize the impacts on upland forest, Eastern Shore has collocated the pipeline facilities with existing rights-of-way and previously disturbed land to the greatest extent practicable. Land within the 35-foot-wide permanent right-of-way would be permanently converted from upland forest to right-of-way maintained in a non-forested condition; however, trees would be allowed to regenerate outside of the permanent right-of-way. Forest areas would be reseeded in accordance with FERC's Plan and Procedures, agency requirements associated with applicable permits, and landowner agreements. The rate of forest reestablishment in the non-maintained corridor would depend upon the type of vegetation, length of growing season, and natural fertility of the soils.

White Oak Project

Overall, about 8.9 percent of impacts from construction of the White Oak Project would be on land characterized as forest and woodland. Expansion of the Delaware City Compressor Station would not impact upland forest. The area where the Daleville Loop does not follow Eastern Shore's existing easement, from approximate milepost (MP) 1.68 to MP 1.84, does cross

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about 0.16 mile of forested land. The forested land crossed by the Kemblesville Loop is adjacent to residential development.

System Reliability Project

Overall, about 6 percent (15.45 acres) of impacts from construction of the System Reliability Project would be on land characterized as forest and woodland. Expansion of the Bridgeville Compressor Station would not impact upland forest.

Based on the collocation of the pipelines with existing rights-of-way and previously disturbed land; and Eastern Shore's proposed installation and restoration measures, we conclude that impacts on forested land would be adequately minimized.

Open Space

Almost 3 acres of open space (or 3.7 percent of the total project disturbance) would be impacted by construction of the White Oak Project. About 18 acres of open space (7 percent of the total project disturbance) would be affected by construction of the System Reliability Project.

The waterbodies crossed by the projects would be within the permanent right-of-way; because the amount of open water crossed would be minimal, it is included in the open land classification. The use of open land would be temporarily impacted during grading, trenching, backfilling, and restoration. However, the unavailability of open lands for use during construction would be short-term and the associated impacts would be relatively minor. Further, Eastern Shore's use of its ESC Plan and FERC's Procedures would minimize impacts on open water crossed by the pipeline loops.

Following construction of the projects, affected open land would be revegetated with the use of appropriate seed mix. Depending on the vegetation cover type, affected open land would likely return to preconstruction conditions within 1 to 5 years. During operation of the projects, vegetation maintenance would result in periodic impacts on open land.

Based on the temporary nature of the proposed construction- and operation-related activities and Eastern Shore's proposed mitigation measures, the projects' impacts on open land would not be significant.

Wetlands

White Oak Project

About 1.66 acres of wetlands (or 2.1 percent of the total project disturbance) of wetlands would be impacted by construction of the White Oak Project. This acreage is associated with the construction of the Daleville and Kemblesville Loops; the Delaware City Compressor Station upgrade would not impact wetlands.

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System Reliability Project

About 12.44 acres of wetlands (or 4.8 percent of the total project disturbance) would be affected by System Reliability Project pipeline construction; the Bridgeville Compressor Station upgrade would not affect any wetlands.

Any construction-related impacts on wetlands would be short-term. Through implementation of Eastern Shore's ESC Plan and FERC's Procedures, wetlands would be restored following construction and impacts on wetland resources would be minimal.

Road Rights-of-Way

Road crossings would be completed using open-cut or trenchless techniques (in other words, either boring or HDD), depending upon site-specific conditions. Table 22 provides a list of roadways crossed by the White Oak Project and Eastern Shore's proposed crossing technique. Table 23 provides a list of roadways crossed by the System Reliability Project; however, Eastern Shore has not identified the proposed crossing techniques for these roads.

Eastern Shore is required to obtain applicable permits from state and local authorities for work planned within road rights-of-way. Paved public roads would be bored and thus not impacted during construction. Some roads would be crossed using the open-cut construction method. This technique would require temporary road closures and detours. Construction disturbance at each open-cut road crossing would typically be completed in 24 hours. Eastern Shore would coordinate with state and local DOT representatives, as appropriate, to establish detours to accommodate local traffic. Where the project crosses roads that provide access to private residences, and no alternative entrances exist, Eastern Shore would implement measures to maintain passage for landowners. Eastern Shore would attempt to avoid peak traffic time periods during construction that would temporarily close roads. A more detailed discussion of road crossing techniques is presented in section A.6.

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Table 22. Public Roadway Crossings for the White Oak Project

Milepost	Roadway	Classification	Surface Treatment	Jurisdiction	Crossing Method
Daleville Loop					
0.64	Gum Tree Road (S.R. 3043)	Minor Collector	Asphalt	State	Bore
1.66	Gap Newport Pike (S.R. 41)	Major Arterial	Asphalt	State	HDD
2.68	Daleville Road (S.R. 3099)	Minor Collector	Asphalt	State	Bore
2.98	Fernwood Road (T367)	Local Distributor	Asphalt	Londonderry Township	Open-cut
3.13	Street Road (S.R. 926)	Minor Collector	Asphalt	State	Bore
Kemblesville Loop					
0.01	Hess Mill Road (T313)	Local	Asphalt	Franklin Township	Open-cut
0.11	Wingate Drive (T627)	Local	Asphalt	Franklin Township	Open-cut
0.70	Newark Road (S.R. 896)	Minor Arterial	Asphalt	State	Bore
0.85	Den Road (T390)	Local	Asphalt	Franklin Township	HDD
0.96	Chesterville Road (S.R. 841)	Minor Collector	Asphalt	State	HDD
1.48	Peacedale Road (T307)	Local	Asphalt	Franklin Township	Open-cut
1.58	Kathleen Drive (T601)	Local	Asphalt	Franklin Township	Open-cut
1.63	Franklin Road (T320)	Local	Asphalt	Franklin Township	HDD
1.98	Walker Road (T303)	Local	Asphalt	Franklin Township	Open-cut

Note: Crossings are proposed to be installed via the open-cut, HDD, or bore method. The methods for each road crossing would be finalized during the detailed road permitting process with applicable jurisdictional agencies (for example, the Pennsylvania Department of Transportation, Chester County).

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Table 23. Public Roadway Crossings for the System Reliability Project

Milepost	Roadway	Classification	Surface Treatment	Jurisdiction	Crossing Method
Porter Road Loop					
0.13	Summit Bridge Rd (U.S. 301/ S.R. 896)	Principal Arterial	Concrete	State	Undetermined
0.35	Jayson Dr.	Local	Asphalt	State	Undetermined
0.55	Benjamin Blvd	Local	Asphalt	State	Undetermined
0.97	Woodside Lane	Local	Asphalt	State	Undetermined
1.41	Del Laws Rd	Local	Asphalt	State	Undetermined
1.61	Emelia Dr.	Local	Asphalt	State	Undetermined
1.93	North Hickory Dr.	Local	Asphalt	State	Undetermined
2.35	Wrangle Hill Rd (S.R. 72)	Minor Arterial	Asphalt	State	Undetermined
2.39	Porter Road (C.R. 400)	Major Collector	Asphalt	State	Undetermined
Dover Loop					
1.00	McKee Rd (C.R. 156)	Local	Asphalt	State	Undetermined
1.49	Carlisle Dr.	Local	Asphalt	State	Undetermined
2.05	West Dennys Rd (C.R. 100)	Major Collector	Asphalt	State	Undetermined
2.62	Baltray Rd	Local	Asphalt	State	Undetermined
2.73	Kenton Rd (C.R. 104)	Minor Arterial	Asphalt	State	Undetermined
3.14	Chestnut Grove Rd (C.R. 158)	Local	Asphalt	State	Undetermined
3.82	Forrest Ave. (S.R. 8)	Minor Arterial	Asphalt	State	Undetermined
3.90	Dover High Dr.	Local	Asphalt	State	Undetermined
4.93	Hazlettville Rd (C.R. 73)	Major Collector	Asphalt	State	Undetermined
6.20	Wyoming Mill Rd (S.R. 15)	Major Collector	Asphalt	State	Undetermined
7.08	Front St	Local	Asphalt	State	Undetermined
7.36	West Camden Wyoming Ave.	Local	Asphalt	State	Undetermined
7.60	Southern Blvd (S.R. 15)	Major Collector	Asphalt	State	Undetermined

Note: Crossings are proposed to be installed via the open-cut, HDD, or bore method. The methods for each road crossing would be finalized during the detailed road permitting process with applicable jurisdictional agencies (for example, the Delaware Department of Transportation, New Castle/Kent County).

Residential Land

Residential land is described as existing residential areas that include single and multiple family dwellings in subdivisions, as well as in certain rural areas. Since installation of Eastern Shore's original mainline pipeline, residential development has occurred around the pipeline route. Temporary construction impacts on residential areas may include inconveniences caused by some increased construction-related traffic on local roads; noise and dust generated by construction equipment; the presence of onsite construction personnel; trenching through roads or driveways; ground disturbance of lawns; removal of trees, landscaped shrubs, or other vegetative screening between residences and adjacent rights-of-way; and removal of aboveground structures such as sheds from within the existing right-of-way. These impacts

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would be greatest where construction equipment is operating near homes but would diminish quickly once construction activities move away.

Eastern Shore would coordinate with residents prior to any work and would notify homeowners and business owners within three business days of the start of construction by certified letter. Typical construction activities would be limited to daylight hours with the exception of pipe pull-back for HDD operations and hydrostatic testing. Roads crossed by the bore or HDD method would be conducted during the daytime hours as well. Section B.6.2 provides further details on noise impacts due to construction activities.

Eastern Shore has developed site-specific residential construction drawings and a Residential Construction Plan that would be implemented to minimize impacts on residences within 50 feet of the construction right-of-way. Eastern Shore would ensure that emergency vehicles and typical local traffic would not be hindered or otherwise impacted by construction activities. Eastern Shore would use specialized methods, such as stovepipe and/or drag section construction, in order to minimize the impacts of construction in residential and commercial areas. Further, Eastern Shore would not excavate the pipeline trench until the pipeline is ready for installation in an area near a residence. Eastern Shore would minimize the duration of an open trench to the contractor's working hours and to a distance of 100 feet on either side of a nearby residence or commercial property, or as otherwise negotiated with the landowner, to minimize the hazard of open trenches when construction activities are not in progress. Eastern Shore would use temporary fencing for a distance of 100 feet on either side of residences to secure work areas, or steel plates would be used to cover any open trenches near residences if trenches are to be left open overnight. Eastern Shore would also avoid removal of mature trees and landscaping unless necessary for site operation of construction equipment, or as specified in the relevant landowner agreement. Eastern Shore would use appropriate methods to minimize fugitive dust associated with construction activities near residences or businesses.

White Oak Project

The Daleville Loop would impact 2.44 acres of residential lands while the Kemblesville Loop would impact 5.49 acres of this land use type. The Delaware City Compressor Station would not impact residential lands.

There are 10 structures within 50 feet of the Daleville Loop construction workspace; 4 of which are within 25 feet of the workspace. Similarly, there are 15 structures within 50 feet of the Kemblesville Loop construction workspace; 12 of which are within 25 feet of the workspace. Residences and other structures within about 50 feet of the construction workspace are listed in appendix 7.[10] Eastern Shore's residential construction plans for residences and other structures within about 50 feet of the construction workspaces are also shown in appendix 7.

System Reliability Project

[10] Two residences are located within 51 feet of the proposed construction workspaces and are included in the residential construction plans.

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The Porter Road Loop would affect 15.9 acres of residential lands while the Dover Loop would affect 24.1 acres of this land use type. Expansion of the Bridgeville Compressor Station would not impact residential lands.

There are 63 structures within 50 feet of the Porter Road Loop construction workspace; 12 of which are within 25 feet of the workspace. Similarly, there are 84 structures within 50 feet of the Dover Loop construction workspace; 51 of which are within 25 feet of the workspace. Residences and other structures within 50 feet of the construction workspace are listed in appendix 8. Eastern Shore's residential construction plans for residences and other structures within 50 feet of the construction workspaces are also shown in appendix 8. Eastern Shore may refine its construction design further in order to reduce impacts on nearby residences. In this case, Eastern Shore would be required to submit any revisions to FERC for review and approval including landowner concurrence with the site-specific residential construction plans for any residences within 10 feet of the construction workspaces for either project, as specified in our recommendation below.

Several residents along Eastern Shore's proposed loops were concerned and opposed to the addition of another pipeline to Eastern Shore's existing easements along their properties. For the White Oak Project, Eastern Shore would install the Daleville Loop within the existing permanent right-of-way with the exception of near the crossing of Faggs Manor Road, where the route deviates because of very limited space for the new pipeline. Similarly, the Kemblesville Loop would be installed within the existing permanent right-of-way for almost the entire pipeline route. Regarding the System Reliability Project, the Porter Road and Dover Loops would also be installed within existing permanent rights-of-way wherever feasible. The location of the new pipeline centerlines would in fact be within 200 feet of some residences and as close as 2 feet from a residence, as shown in appendices 7 and 8.

We encourage the owners of each of these residences to provide us comments on the plan for their individual property. In addition, because of the increased potential for construction activities to disrupt these residents within 10 feet of construction activities and to ensure that a property owner has adequate input to a construction activity occurring so close to his or her residence, **we recommend that:**

- **prior to construction of the respective project, Eastern Shore should file with the Secretary evidence of landowner concurrence with the site-specific residential construction plan for any residence within 10 feet of the proposed construction workspaces for both the White Oak and System Reliability Projects.**

Based on landowner comments received to date, as well as proximity of construction work areas to the residential structures listed in appendices 7 and 8, **we further recommend that:**

- **Eastern Shore should develop and implement project-specific environmental complaint resolution procedures. The procedures should provide**

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landowners with clear and simple directions for identifying and resolving their environmental mitigation problems/concerns during construction of the respective projects (either White Oak or System Reliability), and during restoration of the rights-of-way. Prior to construction of each project, Eastern Shore should mail the complaint procedures to each landowner whose property would be crossed.

a. **In its letter to affected landowners, Eastern Shore should:**

(1) provide a local contact that the landowners should call first with their concerns; the letter should indicate how soon a landowner should expect a response;
(2) instruct the landowners that if they are not satisfied with the response, they should call Eastern Shore's Hotline (the letter should indicate how soon to expect a response); and
(3) instruct the landowners that if they are still not satisfied with the response from Eastern Shore's Hotline, they should contact the Commission's Landowner Helpline at 877-337-2237 or at LandownerHelp@ferc.gov.

b. In addition, Eastern Shore should include in its weekly status report for each project a copy of a table that contains the following information for each problem/concern:

(1) the identity of the caller and date of the call;
(2) the location by milepost and identification number from the authorized alignment sheet(s) of the affected property;
(3) a description of the problem/concern; and
(4) an explanation of how and when the problem was resolved, will be resolved, or why it has not been resolved.

Following completion of major construction, all affected residential properties (including lawns and landscaping that do not conflict with Eastern Shore's operation policies) would be restored in accordance with Eastern Shore's ESC Plan and any agreements between Eastern Shore and the landowner. After cleanup, an Eastern Shore representative would contact landowners to ensure that conditions of all landowner agreements have been met.

Given the measures outlined above in conjunction with the site-specific plans and our recommendations, we conclude impacts on residences from construction of the White Oak and System Reliability Projects would generally be short-term and minor. Depending on the specific vegetation affected and its ability to be restored to pre-construction conditions, some residences may experience long-term impacts associated with visual changes in the landscape. Compensation would be negotiated between individual landowners and Eastern Shore during the easement process.

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4.2. Recreation and Public Interest Areas

Recreation Areas

There are no known designated or proposed candidate national or state wild and scenic rivers, national trails, wilderness areas, natural or scenic areas, or registered national landmarks within 0.25 mile of the Eastern Shore projects.

The Kemblesville Loop crosses two tributaries of the West Branch of White Clay Creek. The two tributaries and the West Branch are federally designated as part of the White Clay Creek National Wild and Scenic River. Section B.2.2 describes the associated impacts and recommended mitigation for the crossings of the White Clay Creek National Wild and Scenic River.

Public Interest Areas

No locations designated or defined as public interest areas would be affected by the White Oak Project or the System Reliability Project.

4.3. Visual Resources

In general, the installation of new pipeline along an existing right-of-way is preferable to clearing and creating an entirely new right-of-way as the impacts are confined to a known, existing corridor. Impacts resulting from construction activities near residential communities would be short-term, as the each of the projects' loops would be completed in six months and active construction at any one location would likely be considerably less. The majority of the temporary visual and aesthetic impacts associated with the projects would be limited to the period of active construction within an area, in which the landscape would be characterized by areas of cleared or flattened vegetation, trench and foundation excavation, grading, and spoil storage. Equipment and vehicles would move around each project area, construction materials would be transported to the sites, and facility structures would be installed. Aesthetic impacts would include elevated noise and dust associated with the use of construction equipment; further details on construction-related air quality and noise is discussed in section B.6. These construction-related visual and aesthetic impacts would decrease with distance from areas of active construction.

The pipeline loops would involve construction along the majority of Eastern Shore's existing pipeline rights-of-way. For the majority of the routes, the loops would not increase the width of the permanent right-of-way within the existing corridor.

White Oak Project

Although the Kemblesville Loop would cross two tributaries of the West Branch of the White Clay Creek National Wild and Scenic River, the crossings are within an existing pipeline right-of-way; therefore, no additional visual impacts would result. The proposed modifications

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to the Delaware City Compressor Station would not appreciably affect visual resources as the activities would be adjacent to the existing facility boundaries.

System Reliability Project

The proposed waterbody crossings for the System Reliability Project would occur within an existing pipeline right-of-way; therefore, no additional visual impacts would result. The proposed modifications to the Bridgeville Compressor Station would not appreciably affect visual resources because the construction would be next to the existing facility boundaries.

The contours and vegetation along the pipeline rights-of-way would be restored to near pre-construction conditions following backfilling, with the exception of previously forested sections which would be maintained as herbaceous or scrub land. The visual impact of new right-of-way would decrease over time as vegetation becomes reestablished. Permanent visual changes would involve cleared permanent pipeline right-of-way in wooded areas, the installation of pipeline markers, and the permanent aboveground facilities within the compressor station locations.

4.4. Coastal Zone Management Area

Eastern Shore initiated consultation with the Delaware Coastal Zone Management Program for both of the projects.

White Oak Project

On October 16, 2015, Eastern Shore received a letter from the Delaware Coastal Zone Management Program stating that "…the Delaware Coastal Zone Management Program concurs with your consistency determination for the construction of a new compressor and controller buildings…" The Daleville and Kemblesville Loops do not fall within a designated coastal zone management area.

System Reliability Project

On December 8, 2015, Eastern Shore received a letter from the Delaware Coastal Zone Management Program regarding its consistency determinations for the Porter Road Loop and the Bridgeville Compressor Station expansion. Eastern Shore states that it anticipates a coastal zone consistency determination from the Delaware Coastal Zone Management Program for the Dover Loop. Eastern Shore would be required to confirm receipt of this determination prior to construction.

4.5. Hazardous sites

In order to identify nearby areas of potential soil and/or groundwater contamination, Eastern Shore's contractor, EDR, conducted a regulatory database search for the White Oak Project construction areas (EDR, 2014a-d and EDR, 2015a-b).

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White Oak Project

Daleville Loop

According to the EDR report, the existing Daleville Compressor Station at the terminus of the Daleville Loop and one additional facility within 0.25 mile of the construction area were identified as generators and/or transporters of hazardous waste. However, no violations and no releases have been reported at these facilities. Two facilities were identified on the voluntary cleanup program database as "completed sites," meaning that all remediation and/or cleanup required by PADEP has been completed.

Kemblesville Loop

According to the EDR report, two leaking petroleum tank sites were identified within 0.5 mile of the construction area. One of these facilities is listed on the voluntary cleanup program as a "completed site" and the other does not have information regarding the cleanup status.

Delaware City Compressor Station

One National Priority List site was identified within 0.25 mile of the construction area. Historical monitoring data suggests that the plume of known groundwater contamination has migrated east and south towards the Delaware City Compressor Station construction area. As such, potentially impacted soil and/or groundwater may be encountered during construction activities. The remaining identified facilities are not likely to have impacted the White Oak Project construction area due to the distance and/or presumed groundwater flow direction.

System Reliability Project

Porter Road Loop

According to the EDR report, several facilities were identified within the construction area, including: generators and/or transporters of hazardous waste and spills sites (records of releases of contaminants or pollutants). As such, potentially impacted soil and/or groundwater may be encountered during construction activities. Several facilities were also identified within 0.25 mile of the construction area, including: leaking petroleum tank sites, generators and/or transporters of hazardous waste, and historical auto stations. No violations have been reported for the generators/transporters and the leaking petroleum tank sites are listed as closed and inactive. The remaining identified facilities are not likely to have impacted the Project construction area due to the distance and/or presumed groundwater flow direction.

Dover Loop

According to the EDR report, several facilities were identified within the construction area, including two leaking petroleum tank sites. Both sites are listed as closed and inactive. As such, potentially impacted soil and/or groundwater may be encountered during construction activities. Several facilities were also identified within 0.25 mile of the construction area,

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including: leaking petroleum tank sites, state hazardous waste sites, and historical auto stations. The leaking petroleum tank sites are listed as closed and inactive. The remaining identified facilities are not likely to have impacted the Project construction area due to the distance and/or presumed groundwater flow direction.

Bridgeville Compressor Station

According to the EDR report, two leaking petroleum tank sites were identified within 0.5 mile of the construction area. One facility is adjacent to the west of the construction area. Both facilities are listed as closed and inactive.

Eastern Shore has not prepared an Unanticipated Discovery of Contamination Plan for either the White Oak Project or the System Reliability Project. Based on the proximity and historical monitoring data for the National Priority List site near the Delaware City Compressor Station and the facilities identified within the construction areas for the Porter Road and Dover Loops, we believe that Eastern Shore could encounter unanticipated contaminated soils and/or groundwater during construction at these locations. To ensure that Eastern Shore is prepared to handle and dispose of any unanticipated contaminated media encountered during construction, **we recommend that:**

- **prior to construction of either project, Eastern Shore should file with the Secretary, for review and written approval of the Director of OEP, an Unanticipated Discovery of Contamination Plan applicable to both the White Oak Project and System Reliability Project. The plan should include identifying hazardous materials, testing, and disposing of the contaminated media according to appropriate state and federal regulations.**

Inadvertent spills or leaks of fuels, lubricants, or coolant from construction equipment could adversely affect soils and/or groundwater during construction. The impacts of such releases are typically minor because of the low frequency and small volumes of spills and leaks. Eastern Shore would implement the measures in its SPCC to prevent spills of any material that may contaminate soils or groundwater, and to ensure that inadvertent spills are contained, cleaned up, and disposed of in an appropriate manner.

5. Cultural Resources

Section 106 of the National Historic Preservation Act, as amended, requires the FERC to take into account the effect of its undertakings on properties listed, or eligible for listing, on the National Register of Historic Places (NRHP), and to afford the Advisory Council on Historic Preservation an opportunity to comment. Eastern Shore, as a non-federal party, is assisting the FERC in meeting our obligations under Section 106 and its implementing regulations at 36 CFR 800.

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White Oak Project

Eastern Shore completed cultural resources surveys for the Daleville Loop, and provided a *Phase IA/IB and Phase II Archaeological Survey* report and an *Architectural Identification Study* to the FERC and the Pennsylvania State Historic Preservation Office (SHPO). The Phase IA/IB survey included a generally 200-foot-wide corridor for the pipeline, as well as staging areas. The survey included visual inspection and excavation of 775 subsurface shovel test units. As a result of this survey, seven archaeological sites were identified, five historic (36CH0830, 36CH0831, 36CH0832, 36CH0833, and 36CH0948) and two prehistoric (36CH0817 and 36CH0949). No further work was recommended for six of the sites, with Phase II testing recommended for site 36CH0949. Phase II testing was completed on this site, and as a result, it was recommended as not eligible for the NRHP and no further work was recommended. In a letter dated September 10, 2015, the Pennsylvania SHPO agreed with the report's recommendations. We agree also.

The architectural study area for the Daleville Loop extended 0.25 mile on either side of the right-of-way, or consisted of the viewshed, taking into consideration topography, elevation, and vegetation cover. The study also involved review of the SHPO on-line cultural resource database (CRGIS). Two previously recorded architectural resources and 13 newly recorded architectural resources were identified in the study area. All of the resources were houses, some with associated barns and/or out-buildings. Eleven of the resources were recommended as not eligible for the NRHP, with no further work recommended. One resource was obscured and insufficient information was available to make an NRHP recommendation. The remaining resource was recommended as potentially eligible and would require further survey to determine its eligibility. Both these properties would be avoided by construction. In its September 10, 2015 letter, the SHPO indicated that the project would "have no effect on above-ground properties." We agree.

Eastern Shore completed cultural resources surveys for the Kemblesville Loop, and provided a *Phase I Archaeological Survey* report and an *Architectural Identification Study* to the FERC and the Pennsylvania SHPO. The Phase I survey included a 100- to 200-foot-wide corridor for the pipeline, as well as access roads and staging areas. The survey included visual inspection and excavation of 296 subsurface shovel test units. While no archaeological sites were located as a result of the Phase I survey, four historic artifacts were recovered from four shovel test units, and six historic artifacts were recovered from the surface. However, these were not considered sites, and no further work was recommended. In a letter dated September 24, 2015, the SHPO agreed with the recommendation that no further archaeological work was necessary. We agree also.

The architectural study area for the Kemblesville Loop extended 0.25 mile on either side of the right-of-way, or consisted of the viewshed, taking into consideration topography, elevation, and vegetative cover. The study also involved review of the SHPO CRGIS. Ten previously recorded architectural resources (Richard Wigfall Barn; Governor Thomas McKean Birthplace/Haines Farm; Franklin School; Wherry Farm; Nowland Farm; Susan Fury Farm; Amos Kimble Farm; 142123 [demolished]; George G. Evans Farm; and Horatio Grant Farm) and two newly recorded architectural resources (both dwellings) were identified in the study area. Of

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these, only the Governor Thomas McKean Birthplace/Haines Farm and George G. Evans Farm were recommended as potentially eligible for the NRHP. Both properties would be avoided by construction. In a letter dated September 18, 2015, the SHPO indicated that following review of the architectural study, the project would have "no effect on historic properties," as no permanent above-ground facilities were planned, "no clear-cutting of existing vegetation is occurring on National Register-eligible or listed sites where setting and/or the woodlots would be considered character-defining features, and all vegetation will be allowed to regenerate following completion of the project." We agree with the SHPO.

We received comments from landowners, the Franklin Township Historical Commission, the Franklin Township Historical Architectural Review Board, and the NPS regarding concerns about potential impacts of the Kemblesville Loop on the Kemblesville Village Historic District, which is eligible for the NRHP. This historic district was located in proximity to a route of the Kemblesville Loop no longer under consideration. The currently proposed route avoids the district. We also received comments from the Franklin Township Historical Commission regarding the current Kemblesville Loop and its potential impacts on previously recorded (CRGIS) historic properties whose boundaries are within 2000 feet of the pipeline corridor. As noted above, the SHPO reviewed the survey report and concurred that no historic properties would be affected and we agree.

Eastern Shore completed cultural resources surveys for the Delaware City Compressor Station, and provided a *Phase I Cultural Resource Survey* report and an *Addendum Phase I Cultural Resource Survey* report to the FERC and the Delaware SHPO. The surveys covered both archaeological and architectural resources, and included visual inspection and subsurface shovel testing (255 shovel test units for the Phase I survey, and 23 shovel test units for the addendum survey). The Phase I survey covered approximately 15.8 acres, and the addendum survey covered approximately 3 acres of extra workspace. As a result of the Phase I survey, one historic field scatter was identified and recommended as not eligible for the NRHP. In a letter dated December 17, 2014, the Delaware SHPO concurred with this recommendation. No cultural resources were identified as a result of the addendum survey. In a letter dated July 30, 2015, the SHPO concurred that no archaeological sites or historic properties were present. We agree.

We concur with the SHPOs and find that no historic properties would be affected by the White Oak Project.

Eastern Shore contacted the Delaware Tribe of Indians of Oklahoma (Delaware Tribe), Delaware Nation, Seneca Nation of Indians, and Stockbridge-Munsee Community Band of Mohican Indians regarding the project. The Delaware Tribe responded and expressed concerns about the project, requested to continue as a consulting party on the project, and requested copies of the survey reports, which Eastern Shore provided. The Delaware Tribe also requested to be informed of inadvertent discoveries during construction. In a letter dated April 12, 2015, the Delaware Tribe agreed with Eastern Shore's findings and the SHPO's concurrence, and indicated it wished to remain in consultation. No other responses have been received. We sent our NOI to these same tribes. The Delaware Nation indicated that the location of the project did not endanger cultural or religious sites of interest to the Delaware Nation, but requested to be

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contacted in the event of an inadvertent discovery during construction. No other responses to our NOI from tribes have been received.

Eastern Shore provided a plan to address the unanticipated discovery of historic properties and human remains during construction. We requested revisions to the plan. Eastern Shore provided a revised plan which we find acceptable.

System Reliability Project

Eastern Shore completed cultural resources surveys for the Porter Road Loop and provided the *Phase I Cultural Resource Survey* report to the FERC and the Delaware SHPO. The archaeological survey included a generally 200-foot-wide corridor for the pipeline, as well as staging areas; a total of 55 acres. As a result of this survey, nine archaeological sites were identified, dating to nineteenth to twentieth century use. None of the sites were recommended eligible for the NRHP, and no further work was recommended. The architectural study area consisted of the viewshed; taking into consideration where impacts to a resources' setting and association could occur. Two previously recorded architectural resources and 31 newly recorded architectural resources were identified in the study area. Thirty-one of these resources were residences dating to the mid-twentieth century and were recommended ineligible for the NRHP. The remaining resources were the Stewart House and agricultural complex, originally constructed about 1850 and recommended eligible for listing in the NRHP; and the W. B. Calhoun House constructed approximately 1930 and recommended ineligible for the NRHP. In a letter dated April 8, 2015, the Delaware SHPO stated there was not enough information provided to assess NRHP eligibility for the W. B. Calhoun House; however, the Porter Road Loop would have no adverse effects to historic properties. We agree also.

Eastern Shore completed cultural resources surveys for the Bridgeville Compressor Upgrade and provided the *Phase I Cultural Resource Survey* report to the FERC and the Delaware SHPO. The archaeological survey included the compressor station expansion area and access roads; a total of 15 acres. As a result of this survey, archaeological material was recovered consisting of historic period ceramics and architectural debris. Although material was encountered, none of the locations met a definition of an archaeological site, and no further work was recommended. The architectural study area consisted of the viewshed; taking into consideration where impacts to a resources' setting and association could occur. One resource constructed in the mid-twentieth century was recorded and recommended ineligible for the NRHP. In a letter dated April 8, 2015, for the Bridgeville Compressor Station portion of the project, the Delaware SHPO agreed with the report's recommendations and stated there would be no effects to historic properties. We agree also.

Eastern Shore conducted cultural resources surveys for the Dover Loop and provided the *Phase I Cultural Resource Survey* report to the FERC and the Delaware SHPO. The archaeological survey included a generally 150- to 200-foot-wide corridor for the pipeline, as well as staging areas; a total of 194 acres. As a result of this survey, ten archaeological sites were identified, which contained material dating from unknown prehistoric use to historic period (nineteenth through twentieth century) debris. None of the sites were recommended eligible for the NRHP, and no further work was recommended. The architectural study area consisted of the

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viewshed; taking into consideration where impacts to a resources' setting and association could occur. There were 87 architectural resources and one historic district, Wyoming Historic District, identified in the study area. Thirty-one of the historic resources were recommended ineligible for the NRHP. Fifty-four of the architectural resources are within the Wyoming Historic District. In the project area, the District architecture dates from 1730 through the early twentieth century. Forty-nine of the resources in the District are contributing elements to the historic property, while five of the resources are non-contributing elements. In a filing dated, March 3, 2016, Eastern Shore stated that no aboveground elements would be placed within the District, the pipeline would be installed below surface, and the landscape restored to reflect pre-existing nearby surface conditions.

There were two remaining historic resources recommended for further studies to assess NRHP eligibility; a farm on West Denneys Road (K-07759), built circa 1900, and the James F. Allee farm complex (K-07102), built circa 1840 with additional buildings erected until about 1950. Eastern Shore would provide avoidance plans or conduct evaluation studies for K-07759 and K-07102. In letters dated October 8, 2015 and December 2, 2015, the Delaware SHPO indicated, that with no new above ground elements introduced within the Wyoming Historic District, that the Dover Loop would have no adverse effects to historic properties.

Eastern Shore was not granted access to survey 13.4 acres within the Dover Loop project area. Eastern Shore would complete the cultural resources survey once survey permission is obtained, and would submit an addendum report to the FERC and Delaware SHPO for review and comment.

Eastern Shore sent project information to the following federally recognized Indian tribes: the Delaware Tribe and the Delaware Nation. The Delaware Tribe responded and requested to participate as a consulting party on the project, and requested copies of the survey reports; which Eastern Shore provided. The Delaware Nation indicated that the location of the project did not endanger cultural or religious sites of interest to the Nation, but requested to be contacted in the event of an unanticipated discovery during construction. No other responses have been filed.

Additionally Eastern Shore contacted the following groups. These were Lenape Indian Tribe of Delaware, Nanticoke Lenni-Lenape Indian Nation, Nanticoke Indian Tribe, Archaeological Society of Delaware, Delaware Historical Society, and Preservation Delaware, Inc. The Lenape Indian Tribe of Delaware responded requesting to participate as a consulting party. The Delaware Historical Society responded declining to participate as a consulting party to the Bridgeville Compressor Station component of the project.

Eastern Shore provided a plan to address the unanticipated discovery of historic properties and human remains during construction. We requested revisions to the plan. Eastern Shore provided a revised plan which we find acceptable.

Compliance with Section 106 of the NHPA has not been completed for the System Reliability Project. To ensure that the FERC's responsibilities under the NHPA and its implementing regulations are met we recommend that:

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- **Eastern Shore <u>should not begin construction</u> of the System Reliability Project facilities and/or use of any staging, storage, or temporary work areas and improved access roads <u>until</u>:**

  a. Eastern Shore files with the Secretary:

  i. remaining cultural resources survey report(s) and addendum(s);
  ii. site evaluation report(s) and avoidance/treatment plan(s), as required; and
  iii. comments on the cultural resources reports, addendums and plans from the Delaware SHPO;

  b. the Advisory Council on Historic Preservation is afforded an opportunity to comment if historic properties would be adversely affected; and

  c. the FERC staff reviews and the Director of OEP approves the cultural resources reports and plans, and notifies Eastern Shore in writing that treatment plans/mitigation measures (including archaeological data recovery) may be implemented and/or construction may proceed.

  All materials filed with the Commission containing <u>location, character, and ownership</u> information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: <u>"CONTAINS PRIVILEGED INFORMATION - DO NOT RELEASE."</u>

6. Air Quality and Noise

6.1. Air Quality

Both the White Oak and System Reliability Projects would result in temporary and permanent impacts on regional air quality through the short-term construction activities associated with each project and long-term operation of the modified Delaware City and Bridgeville Compressor Stations.

The EPA has established National Ambient Air Quality Standards (NAAQS) for seven air contaminants designated "criteria pollutants," which are nitrogen dioxide, carbon monoxide (CO), ozone (O_3), sulfur dioxide (SO_2), lead, particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM_{10}), and particulate matter with an aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$). The NAAQS were established under the Clean Air Act of 1970, as amended in 1977 and 1990 (CAA), to protect human health (primary standards) and public welfare (secondary standards).

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The DNREC has adopted Delaware Ambient Air Quality Standards, which are similar to the NAAQS, but include standards for total suspended particulate matter, hydrocarbons, and hydrogen sulfide. The PADEP has adopted the NAAQS.

The EPA and state agencies established air quality control regions (AQCRs) within the states for the development of the State Implementation Plans to describe how the NAAQS would be achieved and maintained. The AQCRs are intra- and interstate regions, such as metropolitan areas, where improvement of the air quality in one portion of the AQCR requires emission reductions throughout the AQCR. Each AQCR, or portion thereof, is designated based on compliance with the NAAQS. AQCR designations fall under one of three categories: "attainment" (areas in compliance with the NAAQS); "non-attainment" (areas not in compliance with the NAAQS); or "unclassifiable."

Each state is required to implement and enforce air quality control regulations, known as State Implementation Plans, to ensure that air quality in the state meets the NAAQS. Each state affected by the projects has established an agency to administer its respective State Implementation Plan, as follows: the PADEP and the DNREC.

White Oak Project

The White Oak Project is located in the Metropolitan Philadelphia Interstate (including Chester County, Pennsylvania and New Castle County, Delaware) AQCR. Chester County and New Castle County are designated non-attainment for the 24-hour and annual $PM_{2.5}$ standard and marginal non-attainment for the 8-hour O_3 standard. Chester and New Castle Counties are designated as attainment or unclassified for all other criteria pollutants. Table 24 shows the estimated construction emissions (in tons) resulting from the White Oak Project construction.

Table 24. Construction Emissions for the White Oak Project

Source and Year	Emissions (tons per year)							
	CO	NO_x	SO_2	VOC	PM_{10}	$PM_{2.5}$	CO_2	CO_2e
Delaware City Compressor Station								
Construction Equipment	2.04	1.53	0.003	1.0	0.12	0.11	435	439
Fugitive Dust	---	---	---	---	0.52	0.06	---	---
Compressor Station subtotal	2.04	1.53	0.00	0.97	0.64	0.18	435	439
Pipeline								
Construction Equipment	11.60	24.80	0.05	1.80	1.14	1.13	3,428	3,460
Fugitive Dust	---	---	---	---	51.23	7.68	---	---
Pipeline subtotal	11.60	24.80	0.05	1.80	52.37	8.81	3,428	3,460
Project Total	**13.64**	**26.33**	**0.05**	**2.77**	**53.01**	**8.99**	**3,863**	**3,899**
De minimis[1] Levels for Metropolitan Philadelphia Interstate AQCR		100[1]		100[1]		100[1]		

[1] *De minimis* emissions rate for general conformity, see 40 CFR 93.153.

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System Reliability Project

The System Reliability Project is located in the Southern Delaware Intrastate AQCR (including Sussex and Kent Counties) and the Metropolitan Philadelphia Interstate AQCR (including New Castle County). Sussex and Kent Counties are designated as attainment or unclassified for all of the criteria pollutants (only Seaford in Sussex County, Delaware, is designated marginal non-attainment for the 8-hour O_3 standard). Table 25 shows the estimated construction emissions (in tons) resulting from the System Reliability Project construction.

Table 25. Construction Emissions for the System Reliability Project

Source and Year	Emissions (tons per year)							
	CO	NO_x	SO_2	VOC	PM_{10}	$PM_{2.5}$	CO_2	CO_2e
Bridgeville Compressor Station								
Construction Equipment	2.04	1.53	0.003	0.97	0.12	0.11	435	439
Fugitive Dust	---	---	---	---	0.52	0.06	---	---
Compressor Station subtotal	2.04	1.53	0.003	0.97	0.64	0.18	435	439
Porter Road Loop								
Construction Equipment	5.80	12.40	0.02	0.90	0.57	0.57	1,714	1,730
Fugitive Dust	---	---	---	---	6.44	0.72	---	---
Dover Loop								
Construction Equipment	17.40	37.20	0.06	2.70	1.71	1.70	5,142	5,190
Fugitive Dust	---	---	---	---	19.32	2.15	---	---
Pipeline subtotal	23.20	49.6	0.08	3.60	28.04	5.14	6,856	6,920
Project Total	**25.24**	**51.13**	**0.08**	**4.57**	**28.68**	**5.32**	**7,291**	**7,359**
De minimis[1] Levels for Metropolitan Philadelphia Interstate AQCR		100[1]		100[1]		100[1]		

[1] *De minimis* emissions rate for general conformity, see 40 CFR 93.153.

Construction Emissions Impact and Mitigation

Emissions associated with construction activities generally include: 1) exhaust emissions from construction equipment, 2) fugitive dust emissions associated with construction vehicle movement on unpaved surfaces, and 3) fugitive dust associated with grading, trenching, backfilling, and other earth-moving activities. The exhaust emissions would depend on the equipment used and the horsepower-hours of operation. Fugitive dust emission levels would vary in relation to moisture content, composition, and volume of soils disrupted during construction.

Eastern Shore would require its contractors to incorporate dust mitigation measures into their operating programs. Various methods would be used to mitigate fugitive dust emissions, including minimizing the extent of the areas disturbed, minimizing the duration of the disturbance, application of dust suppressants, rinsing construction vehicles before they leave the work site, covering loads, and prohibiting excessive vehicle speeds on unpaved roads. Disturbed areas would also be re-vegetated as appropriate. At any construction areas within 25 feet of a

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residence, Eastern Shore would require its contractors to wet excavation areas, unpaved work areas, and stockpiles of dusty materials.

While the measures described above would help control fugitive dust, we conclude that more detail is necessary given that the White Oak Project and the System Reliability Project include components in $PM_{2.5}$ non-attainment areas, and because the projects cross many roads and would be constructed in highly residential areas. Specifically, more information regarding other mitigation measures for dust abatement in addition to spraying of water (for example., reducing vehicle speeds where appropriate for travel on unpaved roads, using palliative in high erosion areas to control dust in residential areas and near road crossings, and training of project personnel) is necessary. In addition, Eastern Shore has not provided any information about accountability or individuals with authority regarding fugitive dust mitigation. Therefore, **we recommend that:**

- **Prior to construction of either the White Oak Project or System Reliability Project, Eastern Shore should file with the Secretary, for review and approval by the Director of OEP, a Fugitive Dust Control Plan. The plan shall specify the precautions that Eastern Shore would take to minimize fugitive dust emissions from the Daleville, Kemblesville, Porter Road, and Dover Loops construction activities, including additional mitigation measures to control fugitive dust emissions of particulate matter with an aerodynamic diameter less than or equal to 2.5 microns. The plan should clearly explain how Eastern Shore would implement measures, such as:**

  a. **watering the construction workspace and access roads;**

  b. **providing measures to limit track-out onto the roads;**

  c. **identifying the speed limit that Eastern Shore would enforce on unsurfaced roads;**

  d. **covering open-bodied haul trucks, as appropriate;**

  e. **clarifying that the EI has the authority to determine if/when water or a palliative needs to be used for dust control; and**

  f. **clarifying the individuals with the authority to stop work if the contractor does not comply with dust control measures.**

Once construction activities for the projects are completed, fugitive dust and construction equipment emissions would return to current levels. Emissions associated with the construction-related activities would be temporary in nature and are not expected to cause, or significantly contribute to, a violation of any applicable ambient air quality standard.

On December 7, 2009, the EPA added greenhouse gases (GHG) to the definition of pollutant, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The GHGs that would be produced by the project are CO_2, CH_4, and N_2O, but only during operation of construction equipment; hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride would not be emitted.

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Emissions of GHGs are quantified in terms of carbon dioxide equivalents (CO_2e) by multiplying emissions of each GHG by its respective global warming potential (GWP). The GWP is a ratio relative to CO_2 regarding each GHG's ability to absorb solar radiation and its residence time in the atmosphere. Accordingly, CO_2 has a GWP of 1 while CH_4 has a GWP of 25 and N_2O a GWP of 298. To obtain the CO_2e quantity, the mass of the particular chemical is multiplied by the corresponding GWP, the product of which is the CO_2e for that chemical. The CO_2e value for each of the GHG chemicals is summed to obtain the total CO_2e GHG emissions. There are currently no federal regulations limiting the emissions of CO_2. Also, CO_2e reporting requirements for stationary sources do not apply to construction emissions. However, in compliance with EPA's definition of air pollution to include GHGs, we have provided estimates of GHG emissions for the construction activities as shown in tables 26 and 27 below. The EPA did not establish NAAQS for any listed GHGs as their impact is on a global basis and not a local/regional basis.

Operation Impacts and Mitigation

White Oak Project

Long-term operational emissions associated with the White Oak Project would result from the modifications at the Delaware City Compressor Station.

The Delaware City Compressor Station currently consists of four Caterpillar G3516 SITA reciprocating internal-combustion engines each rated at 1,085 hp, one Onan 100-DGDB diesel generator (maximum 68 hours per year, including a maximum of 13 hours of standby operation), two natural gas Reznor FE-50 space heaters, and two natural gas Reznor FE-75 space heaters. The proposed addition of two 1,775-hp Caterpillar G3606 TALE reciprocating internal-combustion engine compressor units could result in an increase in the total potential-to-emit (PTE) emissions for nitrogen oxides (NO_x), volatile organic compounds (VOC), CO, $PM_{10}/PM_{2.5}$, and SO_2. The Delaware City Compressor Station currently operates as a synthetic minor source under permit APC-1996/0895 Amendment 4.

A summary of the existing total criteria pollutant and revised total criteria pollutant emissions, GHG emissions, and hazardous air pollutants (HAP), after modifications at the Delaware City Compressor Station is shown in table 26.

The Daleville and Kemblesville Loops and the modified Delaware Compressor Station would result in minor amount of fugitive emissions from the operation and maintenance. Though it is not possible to fully determine the amount of future maintenance required, it is estimated that fugitive releases from the pipeline loops could generate about 0.1 ton per year (tpy) of methane. The existing Delaware City Compressor Station could emit about 70.9 tpy of fugitive methane and Units 5 and 6 could emit 261.8 tpy of fugitive methane. Vented methane emissions as a result of compressor station startup and shutdown are estimated to be 1.72 tpy, while unit and station blowdown events are estimated to be 2.41 tpy and 9.55 tpy, respectively. The frequency of blowdown events is based on maintenance activities and does not include emergency blowdowns as this frequency cannot be predicted.

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Table 26. Existing and Estimated Potential to Emit Gases for the Delaware City Compressor Station

Pollutant	Regulatory Thresholds (tons per year)			Potential Emissions (tons per year)		
	Major Source	Minor New Source Review	Title V	Existing Station	Proposed[1] Units 5 & 6	Proposed Modified Station[2]
NO_x	25	5	25	24.2[3]	17.1	24.2[4]
CO	100	5	100	36.0[3]	6.6	36.0[4]
VOC	25	5	25	13.4[3]	4.3	13.4[4]
SO_2	100	5	100	0.03	0.07	<0.1
PM_{10}	100	5	100	16.0	1.2	16.0
$PM_{2.5}$	100	5	100	16.0	1.2	16.0
GHG (as CO_2e)	75,000	--	100,000	6,233	13,731	15,529
Single HAP	--	--	10	2.8	0.8	2.8
Total HAPs	--	--	25	3.9	1.0	4.4

[1] Two Caterpillar G3606 TALE compressor engines.
[2] One existing compressor would be utilized as a backup unit.
[3] Includes existing Air Permit caps (APC-1996-0895 Amendment 4 Section 2.1).
[4] Includes proposed Air Permit caps.

Federal Regulations

Air emission sources in Delaware are regulated at the federal level by the EPA, and at the state level by the DNREC. The federal regulations established as a result of the CAA that are potentially applicable to the White Oak Project are as follows:

- Non-attainment New Source Review/Prevention of Significant Deterioration;
- Federal Class I Area Protection;
- Title V Operating Permit;
- New Source Performance Standards;
- National Emission Standards for Hazardous Air Pollutants;
- Greenhouse Gas Mandatory Reporting Rule and Tailoring Rule; and
- General Conformity.

Non-attainment New Source Review/Prevention of Significant Deterioration Review

New Source Review (NSR) refers to the pre-construction permitting programs under Parts C and D of the CAA that must be satisfied before construction can begin on new major sources or major modifications are made to existing major sources located in attainment or unclassified areas. This review may include a Prevention of Significant Deterioration (PSD) review. This review process is intended to prevent new air emission sources from causing existing air quality to deteriorate beyond acceptable levels as codified in the federal regulations. For sources located in non-attainment areas, the Non-attainment New Source Review (NNSR) program is implemented for the pollutants for which the area is classified as non-attainment.

The PSD review regulations are intended to preserve the air quality in areas where criteria pollutant levels are below the NAAQS that major new or modified stationary sources may contribute to. The PSD regulations apply to new major sources or major modifications of existing major sources located in an attainment area. The PSD regulations (40 CFR 52.21) define a "major source" as any source type belonging to a list of named source categories that emit, or have the PTE, 100 tpy or more of any regulated criteria pollutant. A major source under PSD can also be defined as any source not on the list of named source categories with a PTE equal to or greater than 250 tpy for criteria pollutants.

The Delaware City Compressor Station is located in New Castle County which is in non-attainment for $PM_{2.5}$ and O_3. Minor NSR applies to the construction of a new source which is not subject to NNSR or PSD, and has a PTE of 5 tpy or more of NO_x, VOC, $PM_{2.5}$, sulfur oxides, or total HAPs. As is shown in table 26, the modified Delaware City Compressor Station would remain a synthetic minor source, would not be subject to PSD or NNSR, but would be subject to Minor NSR for NO_x and CO.

Federal Class I Area Protection

Congress designated certain lands as Class I areas in 1977. Class I areas were designated because the air quality was considered a special feature of the area (for example, national parks or wilderness areas). These Class I areas are given special protection under the PSD program. The PSD program establishes air pollution increment increases that are allowed by new or modified air pollution sources. If the new source is required to demonstrate compliance with the PSD program requirements and is near a Class I area, the facility is required to demonstrate compliance with the PSD Class I increments. The source is also required to notify the appropriate federal land managers for the nearby Class I areas. Because the proposed emissions at the Delaware Compressor Station would be below the PSD thresholds and the station is more than 100 kilometers from the nearest Class I area, the compressor station would not be required to demonstrate compliance with the PSD Class I increments.

Title V Operating Permit

Title V of the CAA requires states to establish an air operating permit program. The requirements of Title V are outlined in 40 CFR 70 and the permits required by these regulations are often referred to as Part 70 permits. If a facility's PTE exceeds the criteria pollutant or HAP thresholds, the facility is considered a major source. The major source threshold level for an air emission source is 100 tpy for criteria pollutants. The major source HAP thresholds for a source are 10 tpy of any single HAP or 25 tpy of all HAPs in aggregate.

Eastern Shore's existing Delaware City Compressor Station operates as a synthetic minor source under permit APC-1996/0895 Amendment 4. A synthetic minor source is a source that agrees to limit its emissions through permit conditions (for example, restrictions on hours of operation, throughput, or capacity) so that its PTE air contaminants is less than the thresholds for applicability of a particular federal requirement. PTE means the maximum capacity of a stationary source to emit a pollutant under its physical and operational design, accounting for any physical or operational limitation on the capacity of the source to emit a pollutant. Air pollution

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control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, would be treated as part of its design if the limitation or the effect it would have on emissions is enforceable.

Eastern Shore's air permit includes the following restrictions on the existing Delaware City Compressor Station to ensure that it remains a synthetic minor source:

- NO_x, CO, and VOC emissions are capped at, respectively, 24.2, 36, and 13.3 tons per 12-month period;
- combined Units 1 through 4 operating time is limited to 13,333 hours during a 12-month period; and
- combined natural gas consumption by Units 1, 2, 3, and 4 is limited to 121.4 million standard cubic feet (scf) during a 12-month period.

Modifications to the air permit would include the following restrictions to ensure that the station remains a synthetic minor source:

- NO_x, CO, and VOC emissions would continue to be capped and would not change from the existing capped limits.

- Operating time would be subject to the following limitations:
  - Combined Units 1 through 4 operating time limited to 13,333 hours during a 12-month period when Units 5 and 6 do not operate during that same 12-month period.
  - For each 1-hour operating time reduction by Units 1, 2, 3, and 4 during a 12-month period, the operating time by Units 5 and 6 would be allowed to increase 1.85 hours during that same 12-month period.
  - If Units 5 and 6 were to operate for 17,520 hours during a 12-month period, Units 1, 2, 3, and 4 would be allowed to operate for up to 3,812 hours during that same 12-month period.

- Natural gas consumption would subject to the following limitations:
  - Combined consumption by Units 1, 2, 3, and 4 limited to 104.6 million scf during a 12-month period, assuming no natural gas was consumed by Units 5 and 6 during that same 12-month period.
  - For each reduction of 1 scf in consumption by Units 1, 2, 3, and 4 during a 12-month period, consumption by Units 5 and 6 would be allowed to increase by 3.085 scf during that same 12-month period.
  - If Units 5 and 6 were to consume 230.4 million scf during a 12-month period, Units 1, 2, 3, and 4 would be allowed to consume up to 29.9 million scf in that same 12-month period.

Eastern Shore submitted an application to modify its existing air permit. The DNREC approved the modification to the existing air permit on June 18, 2015.

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New Source Performance Standards

New Source Performance Standards (NSPS) for various engine sizes and types have been established by the EPA and implemented under the CAA. NSPS regulations are issued for categories of sources that cause or contribute significantly to air pollution which may reasonably be anticipated to endanger public health or welfare. The standards apply to new stationary sources of emissions, i.e., sources whose construction, reconstruction, or modification began after a standard for those sources was proposed.

The new compressor units (Units 5 and 6) would be subject to the NSPS general provisions in 40 CFR 60, subpart A, and Eastern Shore would continue to comply with the requirements for notification, record keeping, and performance testing.

NSPS subpart JJJJ applies to manufactures, owners, and operators of certain categories of stationary spark ignition internal combustion engines. Units 5 and 6 are in the category of non-emergency natural gas-fired lean-burn stationary spark ignition internal combustion engines constructed after June 12, 2006 and manufactured on or after July 1, 2007. Eastern Shore would comply with the provisions of NSPS subpart JJJJ for the new equipment as required by permit conditions issued by DNREC.

National Emission Standard for Hazardous Air Pollutants

National Emission Standard for Hazardous Air Pollutants, codified in 40 CFR 61 and 63, regulates HAP emissions. Part 61 defines requirements for industries that emit specific HAPs. Part 61 was promulgated prior to the 1990 CAA Amendments and may be superseded in Part 63. Natural gas transmission and storage or compressor stations are not among the industries listed in Part 61 and do not emit any pollutants listed in Part 61. Therefore, the compressor station is not subject to 40 CFR 61 of the National Emission Standard for Hazardous Air Pollutants requirements.

The 1990 CAA Amendments established a list of 189 HAPs (currently 187 HAPs), resulting in the promulgation of Part 63. Part 63, also known as Maximum Achievable Control Technology standards, defines major source categories that emit HAPs above Title V major source thresholds. The major source threshold is 10 tpy of any single HAP or 25 tpy for all combined HAP emissions. The Delaware City Compressor Station is an area (or minor) source of HAPs. Units 5 and 6 would comply with subpart ZZZZ by complying with subpart JJJJ, as described above.

Greenhouse Gas Mandatory Reporting Rule and Tailoring Rule

On September 22, 2009, the EPA issued the final Mandatory Reporting of Greenhouse Gases Rule. It requires reporting of GHG emissions from suppliers of fossil fuels and facilities that emit greater than or equal to 25,000 metric tons[11] of GHG, as CO_2e, per year. The GHG

[10] A metric ton is 2,205 pounds, or approximately 1.1 tons.

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emissions from construction of the White Oak Project are estimated to be about 3,537.11 metric tons per year. The EPA's reporting rule does not apply to construction emissions; however, we have included the construction emissions for accounting and disclosure purposes. Table 26 shows the estimated GHG emissions from the modified Delaware City Compressor Station. The station's GHG emissions would remain less than 25,000 metric tons of CO_2e.

General Conformity

The White Oak Project is located in the Metropolitan Philadelphia Interstate (including Chester County, Pennsylvania and New Castle County, Delaware) AQCR. Chester County and New Castle County are designated non-attainment for the 24-hour and annual $PM_{2.5}$ standard and marginal non-attainment for the 8-hour O_3 standard. As a result, additional regulations have been adopted to reduce emissions of $PM_{2.5}$ and O_3 precursors: VOCs and NO_x. The General Conformity Rule is codified in 40 CFR 93, Subpart B, "Determining Conformity of General Federal Actions to State or Federal Implementation Plans." General Conformity, if applicable, refers to the process to evaluate plans, programs, and projects to determine and demonstrate that they satisfy the requirements of the CAA and applicable State Implementation Plan. The Delaware City Compressor Station is not subject to General Conformity as it is subject to NSR.

We evaluated the estimated construction emissions to determine if general conformity rules would apply based on the exceedance of conformity thresholds. The White Oak Project would be subject to general conformity if the total project's direct and indirect emissions of VOCs, NO_x, and $PM_{2.5}$ in the Metropolitan Philadelphia Interstate AQCR exceeded 100 tpy for VOCs, NO_x, and $PM_{2.5}$, as specified in 40 CFR 93.153(b)1. As shown in table 26, the VOC, NO_x, and $PM_{2.5}$ emissions expected to be generated during construction of the affected portion of the project would be well below the general conformity thresholds. Therefore, a General Conformity Determination is not required.

State Regulations

DNREC's preconstruction review requirements are codified in Title 7 of Delaware's Administrative Code 1125 (7 DE Admin Code 1125). Operation of the modified Delaware City Compressor Station would be subject to the following state requirements:

- 7 DE Admin Code 1102 – Permits;
- 7 DE Admin Code 1104 - Particulate Emissions from Fuel Burning Equipment;
- 7 DE Admin Code 1108 – SO_2 Emissions from Fuel Burning Equipment;
- 7 DE Admin Code 1114 - Visible Emissions;
- 7 DE Admin Code 1119 - Control of Odorous Air Contaminants; and
- 7 DE Admin Code 1125 - Section 4.0 Minor NSR.

System Reliability Project

Long-term operational emissions associated with the System Reliability Project would result from the modifications at the Bridgeville Compressor Station.

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The Bridgeville Compressor Station currently consists of two Caterpillar G399 NA reciprocating internal-combustion engines each rated at 600 hp, one Onan emergency generator engine. The proposed addition of one 1,775-hp Caterpillar G3606 TALE reciprocating internal-combustion engine compressor units could result in an increase in the total PTE emissions for nitrogen oxides, volatile organic compounds, CO, $PM_{10}/PM_{2.5}$, and SO_2. The Bridgeville Compressor Station currently operates as a synthetic minor source under permit APC-2005/301 C/O.

A summary of the existing total criteria pollutant and revised total criteria pollutant emissions, GHG emissions, and HAPs, after modifications at the Bridgeville Compressor Station is shown in table 27.

Table 27. Existing and Estimated Potential to Emit Gases for the Bridgeville Compressor Station

Pollutant	Regulatory Thresholds (tpy)		Potential Emissions (tpy)		
	Major Source	Minor New Source Review	Existing Station	Proposed[1] Unit 3	Proposed Modified Station[2]
NO_x	100	5	65.30[2]	8.57	73.90
CO	100	5	67.50[2]	3.30	70.80
VOC	50	5	4.60[2]	2.16	6.80
SO_2	100	5	<0.1	<0.1	<0.1
PM_{10}	100	5	7.80	0.59	8.40
$PM_{2.5}$	100	5	7.80	0.59	8.40
GHG (as CO_2e)	75,000	--	3,050	6,864	9,914
Single HAP	10	5	0.18	0.49	0.70
Total HAPs	25	5	0.49	1.63	2.1

[1] One Caterpillar G3606 TALE compressor engine.
[2] Includes existing Air Permit caps (APC-2005/301 C/O Amendment 1 Section 2.1).

Federal Regulations

Air emission sources in Delaware are regulated at the federal level by the EPA and at the state level by the DNREC. The federal regulations established as a result of the CAA that are potentially applicable to the System Reliability Project are as follows:

- Non-attainment New Source Review/Prevention of Significant Deterioration;
- Federal Class I Area Protection;
- Title V Operating Permit;
- New Source Performance Standards;
- National Emission Standards for Hazardous Air Pollutants;
- Greenhouse Gas Mandatory Reporting Rule and Tailoring Rule; and
- General Conformity.

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Non-attainment New Source Review/Prevention of Significant Deterioration Review

The Bridgeville Compressor Station is located in Sussex County which is in attainment for all the criteria pollutants. Minor NSR applies to the construction of a new source which is not subject to NNSR or PSD, and has a PTE of 5 tpy or more of NO_x, VOC, $PM_{2.5}$, sulfur oxides, or total HAPs. As is shown in table 26, the modified Bridgeville Compressor Station would remain a synthetic minor source, would not be subject to PSD or NNSR, but would be subject to Minor NSR for NO_x.

Federal Class I Area Protection

The proposed emissions at the Bridgeville Compressor Station would be below the PSD thresholds and the station is more than 100 kilometers from the nearest Class I area; therefore, the compressor station would not be required to demonstrate compliance with the PSD Class I increments.

Title V Operating Permit

Eastern Shore's existing Bridgeville Compressor Station operates as a synthetic minor source under permit APC-2005/301 C/O. Eastern Shore's air permit includes the following restrictions on the existing station to ensure that it remains a synthetic minor source:

- NO_x, CO, and VOC emissions are capped at, respectively, 65.3, 67.5, and 4.6 tons per 12-month period;
- combined Units 1 and 2 operating time is limited to 8,760 hours during a 12-month period;
- the emergency generator operation is limited to 500 hours per 12-month period; and
- combined natural gas consumption by Units 1 and 2 is limited to 51.7 million scf during a 12-month period.

Eastern Shore submitted an application to the DNREC to modify its existing air permit for the Bridgeville Compressor Station. On January 26, 2016, the DNREC approved the modification to the existing air permit.

New Source Performance Standards

The new compressor unit (Unit 3) would be subject to the NSPS general provisions in 40 CFR 60, subpart A, and Eastern Shore would continue to comply with the requirements for notification, record keeping, and performance testing.

NSPS subpart JJJJ applies to manufactures, owners, and operators of certain categories of stationary spark ignition internal combustion engines. Unit 3 is in the category of non-emergency natural gas-fired lean-burn stationary spark ignition internal combustion engines constructed after June 12, 2006 and manufactured on or after July 1, 2007. Eastern Shore would

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comply with the provisions of NSPS subpart JJJJ for the new equipment as required by permit conditions issued by DNREC.

National Emission Standard for Hazardous Air Pollutants

The Bridgeville Compressor Station is an area (or minor) source of HAPs. Unit 3 would comply with subpart ZZZZ by complying with subpart JJJJ, as described above.

Greenhouse Gas Mandatory Reporting Rule and Tailoring Rule

The GHG emissions from construction of the System Reliability Project are estimated to be about 6,675.97 metric tons per year. The EPA's reporting rule does not apply to construction emissions; however, we have included the construction emissions for accounting and disclosure purposes. Table 27 shows the estimated GHG emissions from the modified Bridgeville Compressor Station. The station's GHG emissions would remain less than 25,000 metric tons of CO_2e.

General Conformity

A portion of the System Reliability Project is located in the Metropolitan Philadelphia Interstate AQCR. The Porter Road Loop is in New Castle County and this county is designated non-attainment for the 24-hour and annual $PM_{2.5}$ standard and marginal non-attainment for the 8-hour O_3 standard.

We evaluated the estimated construction emissions to determine if general conformity rules would apply to the System Reliability Project based on the exceedance of conformity thresholds. Construction of the Porter Road Loop would be subject to general conformity if the total direct and indirect emissions of VOCs, NO_x, and $PM_{2.5}$ in the Metropolitan Philadelphia Interstate AQCR exceeded 100 tpy for VOCs, NO_x, and $PM_{2.5}$, as specified in 40 CFR 93.153(b)1. As shown in table 27, the VOC, NO_x, and $PM_{2.5}$ emissions expected to be generated during construction of the affected portion of the project would be well below the general conformity thresholds. Therefore, a General Conformity Determination is not required.

State Regulations

DNREC's preconstruction review requirements are codified in Title 7 of Delaware's Administrative Code 1125 (7 DE Admin Code 1125). Operation of the modified Delaware City Compressor Station would be subject to the following state requirements:

- 7 DE Admin Code 1102 – Permits;
- 7 DE Admin Code 1104 - Particulate Emissions from Fuel Burning Equipment;
- 7 DE Admin Code 1108 – SO_2 Emissions from Fuel Burning Equipment;
- 7 DE Admin Code 1114 - Visible Emissions;
- 7 DE Admin Code 1119 - Control of Odorous Air Contaminants; and
- 7 DE Admin Code 1125 - Section 4.0 Minor NSR.

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Potential impacts on air quality associated with construction and operation of the White Oak Project and the System Reliability Project would be minimized by strict adherence to all applicable federal and state regulations. Based on the analyses presented above, we believe that operation of the proposed facilities would have no significant impact on regional air quality.

6.2. Noise

Construction of projects facilities and operation of the modified compressor stations may affect overall noise levels in the project areas. The land use in both project areas is primarily agricultural, upland forests, open lands, residential lands, and industrial/commercial. The ambient sound level of a region is defined by the total noise generated within the specific environment and is usually comprised of natural and artificial sounds. At any location, both the magnitude and frequency of environmental noise may vary considerably over the course of a day and throughout the week. This variation is caused in part by changing weather conditions, the effect of seasonal vegetation cover, and human activities.

Construction and operation of the White Oak and System Reliability Projects would affect the local noise environment. Two measurements used by federal agencies to relate the time-varying quality of environmental noise to its known effects on people are the equivalent sound level (L_{eq}) and the day-night sound level (L_{dn}). The L_{eq} is an A-weighted sound level[12] containing the same sound energy as instantaneous sound levels measured over a specific time period. Noise levels are perceived differently, depending on length of exposure and time of day, among other factors. The L_{dn} takes into account the duration and time the noise is encountered. Late night through early morning (10:00 p.m. to 7:00 a.m.) noise exposures are penalized +10 decibels (dB) to account for people's greater sensitivity to sound during nighttime hours. An L_{dn} of 55 dB on the A-weighted scale (dBA) is equivalent to a continuous L_{eq} noise level of 48.6 dBA. People's threshold for perception of a change in noise is considered to be 3 dB.

The EPA has indicated that an L_{dn} of 55 dBA protects the public from indoor and outdoor activity interference. We have adopted this criterion and use it to evaluate the potential noise impact from operation of HDD equipment during construction and permanent operation of compressor facilities.

Impacts are determined at receptors known as noise-sensitive areas (NSA). NSAs include residences, schools and day-care facilities, hospitals, long-term care facilities, places of worship, libraries, and parks and recreational areas (for example, wilderness areas) valued specifically for their solitude and tranquility.

The City of New Castle Ordinance, Chapter 16616, and the New Castle County Ordinance, Section 22.02.007 may be applicable to the Delaware City Compressor Station. Title 7 of the DE Admin Code 1149-Regulations Governing the Control of Noise, may apply to the Delaware City and Bridgeville Compressor Stations. We are not aware of local town or county noise regulations for the Bridgeville Compressor Station.

[12] The A-weighted scale is used because human hearing is less sensitive to low and high frequencies than to mid-range frequencies.

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The City of New Castle Ordinance restricts noise in residential districts from 7 am to 9 pm to 57 dBA and from 9 pm to 7 am to 52 dBA. In addition, the City of New Castle addresses the sound of pure tones, cyclical noise, repetitive impulsive sound, impulsive sound, infrasonic and ultrasonic noise. Because the FERC noise criteria of an L_{dn} of 55 dBA equates to an L_{eq} of 48.6 dBA, the FERC criteria is more restrictive than the City of New Castle nighttime noise requirement.

The New Castle County Ordinance requires in residential areas, that the sound level of a facility not exceed the existing ambient sound level by 10 dBA, and that any pure tone, cyclically varying sound or repetitive impulsive sound no exceed the existing ambient by 5 dBA. The New Castle County Ordinance is less stringent than the FERC noise criteria because of the large distance from the proposed Delaware City compressor units and the existing ambient sound levels.

Title 7 of the DE Admin Code 1149-Regulations Governing the Control of Noise, restricts noise based on land use categories for the noise source and the property boundary of the receiving land use. For the Delaware Compressor Station, the noise limits for the nearest NSA would be a maximum allowable sound level of 65 dBA from 7 am to 10 pm, and 55 dBA from 10 pm to 7 am. This same maximum allowable sound level would apply to the nearest residences to the Bridgeville Compressor Station; whereas, the maximum allowable sound level for the nearby school would be 75 dBA at any time. The FERC noise criterion is more stringent that the Delaware noise regulation.

Construction Impacts and Mitigation

Overall noise levels in both project areas would be affected during construction of the proposed facilities. While individuals in the immediate vicinity of the construction activities would experience an increase in noise, this effect would be temporary and local. The changing number and type of construction equipment present at these sites would result in varying levels of noise. The project would utilize conventional construction techniques and equipment, including excavators, bulldozers, heavy trucks (water and dump trucks), and similar heavy construction equipment. Construction equipment would be operated on an as-needed basis during daylight hours only; therefore, nighttime noise levels would remain unaffected by most construction activities.

White Oak Project

As discussed in section B.2.2, Eastern Shore must consult with the NPS and the COE regarding the crossing of the two tributaries of the West Branch of White Clay Creek National Wild and Scenic River for the White Oak Project. Based on consultation with the NPS and the COE, Eastern Shore may use the HDD technique to cross these waterbodies. Additionally, Eastern Shore has not specified whether any other waterbodies along the Daleville or Kemblesville Loop would be crossed by the HDD method. To ensure that the nearby NSAs to these waterbodies are not exposed to excessive noise levels during any potential HDD activities, **we recommend that:**

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- **Prior to any HDD construction for the White Oak Project, Eastern Shore should file with the Secretary an HDD noise analysis identifying the existing and projected noise levels at each NSA within 0.5 mile of each HDD entry and exit site. If noise attributable to the HDD is projected to exceed an L_{dn} of 55 dBA at any NSA, Eastern Shore should file with the noise analysis a mitigation plan to reduce the projected noise levels for the review and written approval by the Director of OEP. During drilling operations, Eastern Shore should implement the approved plan, monitor noise levels, include these noise levels in its weekly status reports, and make all reasonable efforts to restrict the noise attributable to the drilling operations to no more than an L_{dn} of 55 dBA at the NSAs.**

System Reliability Project

Eastern Shore proposes to cross all of waterbodies for the System Reliability Project by HDD. The list of waterbodies crossed by the Dover and Porter Road Loops is shown in tables 11 and 12. Eastern Shore has not provided information regarding the nearest NSAs to the proposed HDD entry and exit sites, the existing ambient noise levels at these NSAs, or the estimated noise levels at these NSAs attributable to the HDD activities. To ensure that the nearby NSAs to these waterbodies are not exposed to excessive noise levels during any potential HDD activities, **we recommend that:**

- **Prior to any HDD construction for the System Reliability Project, Eastern Shore should file with the Secretary an HDD noise analysis identifying the existing and projected noise levels at each NSA within 0.5 mile of each HDD entry and exit site. If noise attributable to the HDD is projected to exceed an L_{dn} of 55 dBA at any NSA, Eastern Shore should file with the noise analysis a mitigation plan to reduce the projected noise levels for the review and written approval by the Director of OEP. During drilling operations, Eastern Shore should implement the approved plan, monitor noise levels, include these noise levels in its weekly status reports, and make all reasonable efforts to restrict the noise attributable to the drilling operations to no more than an L_{dn} of 55 dBA at the NSAs.**

Eastern Shore would require its contractors to incorporate noise mitigation measures into their operating programs. Construction noise would be minimized by the use of mufflers on construction equipment and air compressors which meet federal noise level standards. Construction equipment would be located away from or shielded from residences and other sensitive noise receptors. At any construction areas within 25 feet of a residence, additional mitigation measures would be used as necessary. These may include constructing temporary noise barriers or curtains around equipment or work areas and equipping construction equipment engines with air intake silencers. Equipment and materials would be staged as far as practical from such areas.

Construction activities associated with the projects would result in short-term, temporary increases in ambient noise levels. With non-HDD-related construction limited to daytime hours,

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Eastern Shore's proposed mitigation measures, and our recommendations for the landowner complaint resolution and noise mitigation for any potential HDD activities, we believe that adjacent landowners would not be significantly affected by construction-related noise associated with the White Oak Project and System Reliability Project.

Operation Impacts and Mitigation

White Oak Project

The land surrounding the Delaware City Compressor Station is heavily industrialized with a large refinery and chemical plants. The nearest NSA is almost 1 mile from the existing compressor station. On October 13, 2014, Eastern Shore conducted a baseline sound level survey with ambient sound levels at the nearest NSA. During the survey, Units 1 through 3 were operating, which is considered full load as any of the four existing units is reserved as a spare unit. The compressor station was not audible at the NSA during the noise survey. At times during the noise survey measurements, audible sounds included the sound of a small airplane and distant traffic. Eastern Shore also calculated an L_{dn} of the existing station from the measured sound levels inside the station where the sound of the existing compressor units were dominant. Table 28 summarizes the existing and predicted noise levels at the nearby NSA for the modified Delaware City Compressor Station.

Table 28. Noise Analysis for the Modified Delaware City Compressor Station

NSAs	Distance and Direction of Closest NSA (feet)	Calculated L_{dn} of Existing Station at Full Load Operation[1,2](dBA)	Estimated L_{dn} of Proposed Compressor Units at Full Load (dBA)	Total Station L_{dn} (Existing Station + Expansion) (dBA)	Potential Increase Above Existing Station Sound Level (dB)
NSA 1 (Houses)	4,550 SW	41.1	32.8	41.7	0.6

[1] Estimated maximum day noise level for the existing station calculated from measured sound levels inside station where the sound of the existing compressor units were dominant. The Station was not audible at NSA #1 during the sound survey.

[2] Estimated L_{eq} or L_{dn} for 3 of 4 existing compressor units. One of any of the 4 existing units is reserved as a spare unit.

Eastern Shore would implement noise control measures for the proposed compressor units such as, but not limited to, an acoustically designed compressor building, low noise engine exhaust silencers, and low noise air inlet silencers.

In addition to the noise mitigation measures outlined above, Eastern Shore intends to install unit blowdown silencers for each proposed compressor unit at the Delaware City Compressor Station, and estimates that the initial sound for a blowdown event would be 31 dBA at NSA 1.

As shown in table 28, the estimated noise attributable to the modified Delaware City Compressor Station would be well below the FERC criteria of an L_{dn} of 55 dBA at the nearest NSA. Further, the estimated noise levels as a result of the compressor station modification would comply with the state, county, and city noise regulations. In general, an increase of 3 dB is the threshold of noticeable difference for humans, 5 dB is clearly noticeable, and a 10-dB difference would be perceived as twice the noise. The potential noise increase at NSA 1 is estimated to be 0.6 dB, and therefore, the noise increase would not be noticeable at the nearest NSA. To ensure that the noise attributable to operation of the modified stations would not exceed an L_{dn} of 55 dBA at the remaining nearby NSAs **we recommend that**:

- **Eastern Shore should file a noise survey with the Secretary no later than 60 days after placing the modified Delaware City Compressor Station in service. If a full load condition noise survey is not possible, Eastern Shore should provide an interim survey at the maximum possible horsepower load and provide the full load survey within 6 months. If the noise attributable to the operation of all of the equipment at the Delaware City Compressor Station under interim or full horsepower load conditions exceeds an L_{dn} of 55 dBA at the nearby NSAs, Eastern Shore should file a report on what changes are needed and shall install the additional noise controls to meet the level within 1 year of the in-service date. Eastern Shore should confirm compliance with the above requirement by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.**

System Reliability Project

The area surrounding the Bridgeville Compressor Station consists of residences, agricultural lands, and agricultural processing facilities upon level terrain. The nearest NSA is about 675 feet from the existing compressor station. On July 11, 2014, Eastern Shore conducted a baseline sound level survey with ambient sound levels at the nearest NSA. During the survey, the entire station (Units 1 and 2) was operating. The compressor station was the dominant sound at NSAs 1 through 3, other sounds at the NSAs included Highway 13 traffic, birds, planes, and wind in nearby trees. Table 29 shows the existing noise levels attributable the compressor station at full load operation at the NSAs and predicted noise levels for the new compressor unit at the Bridgeville Compressor Station.

Following the modification at the Bridgeville Compressor Station, only one of the existing units would operate at any one time due to the synthetic minor source air permitting requirements. Table 29 shows that the noise attributable to the new compressor unit would be below an L_{dn} of 55 dBA at the nearest NSAs; however, Eastern Shore did not provide an estimate of the noise attributable to all of the equipment at the modified compressor station at full load. To ensure that the noise levels attributable to the modified Bridgeville Compressor Station would not exceed an L_{dn} of 55 dBA at the nearest NSAs **we recommend that:**

- **Eastern Shore should file a noise survey with the Secretary no later than 60 days after placing the modified Bridgeville Compressor Station in service. If a full load condition noise survey is not possible, Eastern Shore should**

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provide an interim survey at the maximum possible horsepower load and provide the full load survey within 6 months. If the noise attributable to the operation of all of the equipment at the Bridgeville Compressor Station under interim or full horsepower load conditions exceeds an L_{dn} of 55 dBA at the nearby NSAs, Eastern Shore should file a report on what changes are needed and shall install the additional noise controls to meet the level within 1 year of the in-service date. Eastern Shore should confirm compliance with the above requirement by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.

Table 29. Noise Analysis for the New Compressor Unit at the Bridgeville Compressor Station

NSAs	Distance and Direction of Closest NSA (feet)	Calculated L_{dn} of Existing Station at Full Load Operation (dBA)	Estimated L_{dn} of Proposed Compressor Unit at Full Load (dBA)
NSA 1 (Houses)	675 W	61.2	48.4
NSA 2 (Houses)	650 SW	54.0	48.9
NSA3 (Houses)	525 SW	54.7	49.8
NSA 4 (School)	900 S	45.9	43.9
NSA 5 (Houses)	1,200 E	50.3	42.6

In addition to the noise mitigation measures outlined above, Eastern Shore intends to install unit blowdown silencers for each proposed compressor unit at the Bridgeville Compressor Station, and estimates that the initial sound for a blowdown event would be 50 dBA at the nearest NSA.

Based on the results of the noise analyses and our recommendations, we conclude that operation of the projects would have no significant impact on the noise environment in either project area.

7. Reliability and Safety

The transportation of natural gas by pipeline involves some incremental risk to the public due to the potential for accidental release of natural gas. The greatest hazard is a fire or explosion following a major pipeline rupture.

Methane, the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic, but is classified as a simple asphyxiate, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death.

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Methane has an auto-ignition temperature of 1,000 degrees Fahrenheit and is flammable at concentrations between 5.0 percent and 15.0 percent in air. An unconfined mixture of methane and air is not explosive; however it may ignite and burn if there is an ignition source. A flammable concentration within an enclosed space in the presence of an ignition source can explode. It is buoyant at atmospheric temperatures and disperses rapidly in air.

We received comments regarding pipeline safety and installing new gas pipelines within residential areas. This section describes the federal safety regulations for operating pipeline facilities in the United States. The DOT regulations summarized in this section are designed to ensure minimum requirements for safety of all populations and land use types, whether commercial, residential, or rural.

7.1. Safety Standards

The DOT is mandated to prescribe minimum safety standards to protect against risks posed by pipeline facilities under Title 49, U.S. Code Chapter 601. The DOT pipeline standards are published in Parts 190-199 of Title 49 of the CFR. Part 192 specifically addresses natural gas pipeline safety issues. The DOT's Pipeline and Hazardous Materials Safety Administration (PHMSA) administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. It develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards which set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety. PHMSA's safety mission is to ensure that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local level.

Title 49, U.S. Code Chapter 601 provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing the federal standards. A state may also act as DOT's agent to inspect interstate facilities within its boundaries; however, the DOT is responsible for enforcement actions. For the White Oak and System Reliability Projects, neither Pennsylvania nor Delaware have delegated authority to inspect interstate pipeline facilities.

Under a Memorandum of Understanding on Natural Gas Transportation Facilities dated January 15, 1993, between the DOT and the FERC, the DOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of the FERC's regulations require that an applicant certify that it will design, install, inspect, test, construct, operate, replace, and maintain the facility for which a Certificate is requested in accordance with federal safety standards and plans for maintenance and inspection. Alternatively, an applicant must certify that it has been granted a waiver of the requirements of the safety standards by the DOT in accordance with Section 3(e) of the Natural Gas Pipeline Safety Act. The FERC accepts this certification and does not impose additional safety standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert DOT. The Memorandum also

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provides for referring complaints and inquiries made by state and local governments and the general public involving safety matters related to pipelines under the Commission's jurisdiction.

The FERC also participates as a member of the DOT's Technical Pipeline Safety Standards Committee which determines if proposed safety regulations are reasonable, feasible, and practicable.

The pipeline and aboveground facilities associated with the White Oak and System Reliability Projects must be designed, constructed, operated, and maintained in accordance with the DOT Minimum Federal Safety Standards in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. The DOT specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

The DOT also defines area classifications, based on population density in the vicinity of the pipeline, and specifies more rigorous safety requirements for populated areas. The class location unit is an area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. The four area classifications are defined below:

Class 1	Location with 10 or fewer buildings intended for human occupancy.
Class 2	Location with more than 10 but less than 46 buildings intended for human occupancy.
Class 3	Location with 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building, or small well-defined outside area occupied by 20 or more people on at least 5 days a week for 10 weeks in any 12-month period.
Class 4	Location where buildings with four or more stories aboveground are prevalent.

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. For instance, pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated rock. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil and 24 inches in consolidated rock.

Class locations also specify the maximum distance to a sectionalizing block valve (*e.g.*, 10.0 miles in Class 1, 7.5 miles in Class 2, 4.0 miles in Class 3, and 2.5 miles in Class 4). Pipe wall thickness and pipeline design pressures; hydrostatic test pressures; maximum allowable operating pressure; inspection and testing of welds; and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas.

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At a minimum, all of the pipelines associated with the White Oak and System Reliability Projects would be designed and constructed to meet the Class 4 specifications in order to protect health and safety. The Class 4 designation requires that prior to operation the pipeline be hydrostatically tested to 150 percent of its maximum allowable operating pressure.

The DOT Pipeline Safety Regulations require operators to develop and follow a written integrity management program that contain all the elements described in 49 CFR 192.911 and address the risks on each transmission pipeline segment. The rule establishes an integrity management program which applies to all high consequence areas (HCA).

The DOT has published rules that define HCAs where a gas pipeline accident could do considerable harm to people and their property and requires an integrity management program to minimize the potential for an accident. This definition satisfies, in part, the Congressional mandate for DOT to prescribe standards that establish criteria for identifying each gas pipeline facility in a high-density population area.

The HCAs may be defined in one of two ways. In the first method an HCA includes:

- current Class 3 and 4 locations,
- any area in Class 1 or 2 where the potential impact radius[13] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle[14], or
- any area in Class 1 or 2 where the potential impact circle includes an identified site.

An identified site is an outside area or open structure that is occupied by 20 or more persons on at least 50 days in any 12-month period; a building that is occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12-month period; or a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate.

In the second method, an HCA includes any area within a potential impact circle which contains:

- 20 or more buildings intended for human occupancy, or
- an identified site.

Once a pipeline operator has determined the HCAs along its pipeline, it must apply the elements of its integrity management program to those segments of the pipeline within HCAs.

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[13] The potential impact radius is calculated as the product of 0.69 and the square root of: the maximum allowable operating pressure of the pipeline in psig multiplied by the square of the pipeline diameter in inches.

[14] The potential impact circle is a circle of radius equal to the potential impact radius.

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The DOT regulations specify the requirements for the integrity management plan at Part 192.911.

Because the pipelines would be in Class 4 locations, it is expected that the full length of the pipelines would be classified as HCAs. The pipeline integrity management rule for HCAs requires inspection of the pipeline HCAs every 7 years.

The DOT prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. Each pipeline operator is required to establish an emergency plan that includes procedures to minimize the hazards of a natural gas pipeline emergency. Key elements of the plan include procedures for:

- receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters;
- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;
- emergency system shutdown and safe restoration of service;
- making personnel, equipment, tools, and materials available at the scene of an emergency; and
- protecting people first and then property, and making them safe from actual or potential hazards.

Eastern Shore maintains an Operations and Maintenance Manual and Emergency Procedures Manual for its existing pipeline system, which would apply to the proposed loops and compressor station expansions.

The DOT requires that each operator establish and maintain liaison with appropriate fire, police, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency, and to coordinate mutual assistance. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. Eastern Shore would provide the appropriate training to local emergency service personnel before each pipeline is placed in service.

7.2. Pipeline Accident Data

The DOT requires all operators of natural gas transmission pipelines to notify the DOT of any significant incident and to submit a report within 30 days. Significant incidents are defined as any leaks that:

- caused a death or personal injury requiring hospitalization; or

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- involve property damage of more than $50,000 (1984 dollars)[15].

During the 20 year period from 1995 through 2014, a total of 1,265 significant incidents were reported on the more than 300,000 total miles of natural gas transmission pipelines nationwide.

Additional insight into the nature of service incidents may be found by examining the primary factors that caused the failures. Table 30 provides a distribution of the causal factors as well as the number of each incident by cause.

The dominant causes of pipeline incidents are corrosion and pipeline material, weld or equipment failure constituting 49.6 percent of all significant incidents. The pipelines included in the data set in table 30 vary widely in terms of age, diameter, and level of corrosion control. Each variable influences the incident frequency that may be expected for a specific segment of pipeline.

The frequency of significant incidents is strongly dependent on pipeline age. Older pipelines have a higher frequency of corrosion incidents and material failure, because corrosion and pipeline stress/strain is a time-dependent process.

Table 30. Natural Gas Transmission Pipeline Significant Incidents by Cause (1995-2014)

Cause	No. of Incidents	Percentage
Corrosion	291	23.0
Excavation[2]	207	16.4
Pipeline material, weld or equipment failure	337	26.6
Natural force damage	147	11.6
Outside force[3]	79	6.2
Incorrect operation	40	3.2
All other causes[4]	164	13.0
TOTAL	**1,265**	**-**

[1] All data gathered from PHMSA Significant incident files, January 14, 2016. http://www.phmsa.dot.gov/pipeline/library/data-stats/pipelineincidenttrends
[2] Includes third party damage
[3] Fire, explosion, vehicle damage, previous damage, intentional damage
[4] Miscellaneous causes or unknown causes

The use of both an external protective coating and a cathodic protection system, required on all pipelines installed after July 1971, significantly reduces the corrosion rate compared to unprotected or partially protected pipe.

[15] $50,000 in 1984 dollars is approximately $112,955.73 as of May 2015 (CPI, Bureau of Labor Statistics, 2015).

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Outside force, excavation, and natural forces are the cause in 34.2 percent of significant pipeline incidents. These result from the encroachment of mechanical equipment such as bulldozers and backhoes; earth movements due to soil settlement, washouts, or geologic hazards; weather effects such as winds, storms, and thermal strains; and willful damage. Table 31 provides a breakdown of external force incidents by cause.

Older pipelines have a higher frequency of outside forces incidents partly because their location may be less well known and less well marked than newer lines. In addition, the older pipelines contain a disproportionate number of smaller-diameter pipelines; which have a greater rate of outside forces incidents. Small diameter pipelines are more easily crushed or broken by mechanical equipment or earth movement.

Since 1982, operators have been required to participate in "One Call" public utility programs in populated areas to minimize unauthorized excavation activities in the vicinity of pipelines. The "One Call" program is a service used by public utilities and some private sector companies (*e.g.*, oil pipelines and cable television) to provide preconstruction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts.

7.3. Impact on Public Safety

We received comments from residents along both projects who were concerned about the consequences of an accident and the high risk of installing pipelines near homes. Although the transportation of natural gas via pipeline involves some degree of risk to the public in the event of an accident and subsequent release of gas, it is also important to examine the probabilistic level of risks for pipeline-related events.

We also received a comment from a resident near the Dover Loop regarding the effects of vibration on the pipelines from passing trains on the adjacent railroad tracks. Eastern Shore would construct the pipeline in accordance with the DOT regulations as discussed above, and the American Railway Engineering and Maintenance Association Standards. These standards specify the proper material selection, installation technique, and design requirements for pipelines installed in the vicinity of railway corridors to ensure safe operation of the pipeline facilities. In addition, Eastern Shore conducts annual integrity testing and maintenance required by 49 CFR 192 for pipelines constructed within the proximity of railroad tracks.

The service incidents data summarized in table 32 include natural gas transmission system failures of all magnitudes with widely varying consequences. Table 33 presents the annual injuries and fatalities that occurred on natural gas transmission lines from incidents for the 5 year period between 2010 and 2014. The majority of fatalities from pipelines are due to local distribution pipelines not regulated by FERC.

These are natural gas pipelines that distribute natural gas to homes and businesses after transportation through interstate natural gas transmission pipelines. In general, these distribution lines are smaller diameter pipes and/or plastic pipes which are more susceptible to damage.

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Local distribution systems do not have large right-of-ways and pipeline markers common to the FERC regulated natural gas transmission pipelines. Therefore, incident statistics inclusive of distribution pipelines are inappropriate to use when considering natural gas transmission projects.

Table 31. Outside Forces Incidents by Cause (1995-2014)

Cause	No. of Incidents	Percent of all Incidents
Third party excavation damage	172	13.6
Operator excavation damage	24	1.9
Unspecified excavation damage/previous damage	11	0.9
Heavy rain/floods	72	5.7
Earth movement	34	2.7
Lightning/temperature/high winds	26	2.1
Natural force (other)	15	1.2
Vehicle (not engaged with excavation)	47	3.7
Fire/explosion	8	0.6
Previous mechanical damage	6	0.5
Fishing or maritime activity	7	0.5
Intentional damage	1	0.1
Electrical arcing from other equipment/facility	1	0.1
Unspecified/other outside force	7	0.6
TOTAL	433	-

[1] Excavation, Outside Force, and Natural Force from table 30.

The nationwide totals of accidental fatalities from various anthropogenic and natural hazards are listed in table 33 in order to provide a relative measure of the industry-wide safety of natural gas transmission pipelines. Direct comparisons between accident categories should be made cautiously, however, because individual exposures to hazards are not uniform among all categories. The data nonetheless indicate a low risk of death due to incidents involving natural gas transmission pipelines compared to the other categories. Furthermore, the fatality rate is much lower than the fatalities from natural hazards such as lightning, tornados, or floods.

The available data show that natural gas transmission pipelines continue to be a safe, reliable means of energy transportation. From 1995 to 2014, there were an average of 63 significant incidents, 9 injuries and 2 fatalities per year. The number of significant incidents over the more than 303,000 miles of natural gas transmission lines indicates the risk is low for an incident at any given location. For the portion of the projects where looping is proposed, based on these numbers, we conclude that operation of the White Oak and System Reliability Projects would represent a slight increase in risk to the nearby public.

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Table 32. Injuries and Fatalities - Natural Gas Transmission Systems

Year	Injuries	Fatalities
2010[1]	61	10
2011	1	0
2012	7	0
2013	2	0
2014	1	1

[1] All of the fatalities in 2010 were due to the Pacific Gas and Electric pipeline rupture and fire in San Bruno, California on September 9, 2010.

Table 33. Nationwide Accidental Deaths

Type of Accident	Annual No. of Deaths
All accidents	117,809
Motor Vehicle	45,343
Poisoning	23,618
Falls	19,656
Injury at work	5,113
Drowning	3,582
Fire, smoke inhalation, burns	3,197
Floods[2]	81
Lightning[2]	49
Tornado[2]	72
Tractor Turnover[3]	62
Natural gas distribution lines[4]	14
Natural gas transmission pipelines[4]	2

[1] All data, unless otherwise noted, reflect 2005 statistics from U.S. Census Bureau, Statistical Abstract of the United States: 2010 (129th Edition) Washington, DC, 2009; http://www.census.gov/statab.
[2] NOAA National Weather Service, Office of Climate, Water and Weather Services, 30 year average (1985-2014) http://www.weather.gov/om/hazstats.shtml.
[3] Bureau of Labor Statistics, 2007 Census of Occupational Injuries.
[4] PHMSA significant incident files, January 14, 2016. http://www.phmsa.dot.gov/pipeline/library/data-stats/pipelineincidenttrends, 20 year average.

8. Cumulative Impacts

In accordance with NEPA and FERC policy, we evaluated the potential for cumulative impacts of the White Oak and System Reliability Projects. Cumulative impacts were assessed for the proposed projects when added to each other and for each project compared to other past, present, and reasonably foreseeable future activities.

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Cumulative effects generally refer to impacts that are additive or synergistic in nature and result from the construction of multiple projects in the same vicinity and time frame. Cumulative impacts represent the incremental effects of a proposed action when added to other past, present, or reasonably foreseeable future actions, regardless of the agency or party undertaking such actions. Cumulative impacts can result from individually minor, but collectively significant actions, taking place over a period of time. In general, small-scale projects with minimal impacts of short duration do not significantly contribute to cumulative impacts.

This cumulative impact analysis generally follows the methodology set forth in relevant guidance (Council on Environmental Quality, 2005; EPA, 1999). Under these guidelines, inclusion of other projects in the analysis is based on identification of impacts from other projects that would result in similar effects as the proposed White Oak and System Reliability Projects. We undertook this assessment considering the following factors:

- A past, present, or future project must impact a resource potentially affected by the proposed action. Distant projects were not considered because their impacts would not likely overlap.
- The time in the past or future of other projects was considered, since the potential for cumulative effects is dependent on the duration of the impact, and whether it be short-term, long-term, or permanent. Present projects would be considered to overlap in time of occurrence.
- The cumulative impacts discussed herein have been based on information found in other FERC filings, agency and public input, and other publicly accessible information.

For each environmental resource, we first evaluated the cumulative effects of the White Oak Project and the System Reliability Project with each other. Next, we evaluated the cumulative effect of either the White Oak Project or the System Reliability Project combined with other projects that meet our consideration criteria.

In assessing the two projects together, we note that the various components of the White Oak Project and the System Reliability Project are separated by at least 50 miles, with the exception of the White Oak Project Delaware City Compressor Station and the System Reliability Project Porter Road Loop which are both located in New Castle County, Delaware. The terminus of the System Reliability Project Porter Road Loop is about 3 miles from the White Oak Project Delaware City Compressor Station. As such, our cumulative impacts assessment between these two projects focuses on potential interactions from these two project components.

The proposed White Oak and System Reliability Projects would affect confined corridors within Chester County, Pennsylvania, and Kent, New Castle, and Sussex Counties, Delaware. For this analysis, we assessed the potential cumulative effects of the proposed projects with other projects within a 1-mile radius.

To assess cumulative impacts for each project along with other projects in the general area, we used information obtained from Eastern Shore's consultations with local authorities, and through our own research. Eastern Shore consulted public sources for each county or

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municipality crossed by the proposed pipeline routes to obtain information on any planned future developments. No oil and gas development occurs in the counties where the projects are located.

To date, no planned commercial, residential, or other developments have been identified within the vicinity of the White Oak Project Daleville and Kemblesville Loops. Similarly, no past, present, or reasonably foreseeable future projects were identified near the System Reliability Project Bridgeville Compressor Station. Therefore, these project components are not included in the cumulative impacts assessment.[16] Table 34 shows the past, present, and reasonably foreseeable future projects in the project areas considered in this EA.

The pipeline loops and compressor station expansions associated with the White Oak and System Reliability Projects are primarily within or adjacent to existing utility and road rights-of-way and existing facility footprints, thereby minimizing the associated environmental impacts of each project. Because the projects would result in limited environmental impacts and are not creating a new utility corridor or new facility site, we do not expect that either project would contribute appreciably to cumulative impacts on geology, vegetation, wildlife, cultural resources, or land use when considered with other projects in their respective areas. Therefore, cumulative impacts on these resources are not discussed below. The projects' impacts could contribute to cumulative impacts on soils, water resources, air quality, and noise.

Soils

Although the projects listed in table 34 are within a 1-mile radius from the proposed Eastern Shore projects, soils impacts would be highly localized and limited primarily to the project footprints during the period of construction. Cumulative impacts on soils would only occur if other projects are constructed at the same time and place as the proposed facilities. Therefore, the region of influence for cumulative impacts on soils is the footprint of the proposed projects.

As stated previously, the White Oak Project Delaware City Compressor Station is about 3 miles from the System Reliability Project Porter Road Loop. The cumulative impacts of both projects would be limited because of the separation in distance. Further, soil impacts at the Delaware City Compressor Station would be confined to the station site and would not result in a cumulative impact on soils when combined with the Porter Road Loop.

Similarly, the soil impacts at the White Oak Project Delaware City Compressor Station would be confined to construction at the station site and would not result in a cumulative impact on soils when combined with the Wrangle Hill Road project listed in table 34.

The soil impacts from the System Reliability Project Dover and Porter Road Loops could result in cumulative impacts when combined with the commercial and residential projects listed in table 34. The projects that are listed as "currently under review" by the county may or may not be under construction. The projects listed as "recently approved" could also be under

[16] The exception for both projects is for permanent air quality impacts, due to the wider region of influence for this resource.

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construction. One project in particular, the Leander Lakes Project, is under construction and is adjacent to the Dover Loop. Construction of the Dover and Porter Road Loops would disturb soils within the construction workspaces of the pipelines.

Impacts on soils would be minimized through implementation of the FERC Plan and county conservation district approved ESC Plans. The commercial and residential project proponents would also need to implement mitigation measures in accordance with county conservation district approved ESC Plans. We conclude that cumulative impacts on soils from the System Reliability Project and in consideration with other projects would be minor.

Water Resources

The projects, in addition to other projects listed in table 34, may have cumulative impacts on waterbodies and wetlands including changes in groundwater recharge; impacts on surface and groundwater quality; sedimentation and increased turbidity due to erosion or construction within surface waters; and temporary and permanent impacts on wetlands.

Construction at the White Oak Project Delaware City Compressor Station would not impact waterbodies or wetlands. Construction of the Porter Road Loop would impact 3.77 acres of wetlands, and operation of the pipeline would not impact wetlands. Eastern Shore would cross all of the waterbodies along the Porter Road Loop by the HDD method, thereby avoiding impacts on waterbodies. Because of the minimal impacts on waterbodies and wetlands for both projects, we do not anticipate cumulative impacts on water resources when considering the White Oak Project and System Reliability Project.

Similarly, because construction at the White Oak Project Delaware City Compressor Station would not impact waterbodies or wetlands, the Delaware City Compressor Station would not contribute to any cumulative impact on water resources when considered with the Wrangle Hill Road project.

The System Reliability Project Dover and Porter Road Loops combined with the projects identified in table 34 could result in cumulative impacts on water resources. Eastern Shore proposes to HDD under all of the waterbodies associated with the Dover and Porter Road Loops, thereby avoiding impacts on waterbodies and any cumulative impacts on waterbodies when considered with these other projects. Construction of the Porter Road Loop would result in minimal impacts on wetlands with no impact during operation. The Dover Loop would impact 9.18 acres of wetlands, totaling 12.95 acres for the entire System Reliability Project. Operation of the Dover Loop would impact 0.94 acre of wetland, with 0.86 acre of these impacts on forested wetlands. Impacts on wetlands associated with the Dover and Porter Road Loops would be temporary, and primarily limited to construction of the loops. Because Eastern Shore and the other project proponents would be required to comply with any mitigation requirements and permit conditions in their respective Clean Water Act Section 404 and 401 permits for any permanent wetland impacts, and the incremental impacts of the loops would be temporary and minor, we conclude that cumulative impacts on wetlands would not be significant.

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Table 34. Projects Occurring in the White Oak and System Reliability Project Areas

Project Name	Development Category	Status	Distance from the Project (mile)
White Oak Project-Delaware City Compressor Station			
Wrangle Hill Road	Road	Construction planned for July 2016	1.0
System Reliability Project-Porter Road Loop			
Woods at Mansion Farm	Residential	Recently approved	0.5
Village of Long Creek	Residential	Recently approved	0.4
Meridian Crossing II	Residential	Recently approved	0.6
Farmington – Phase 3	Residential	Recently approved	1.0
Colony at Summit Bridge - East	Residential	Currently under review by New Castle County	0.1
Colony at Summit Bridge - West	Residential	Currently under review by New Castle County	0.4
Pencader Hundred	Commercial	Currently under review by New Castle County	0.5
Caravel Academy	Commercial	Currently under review by New Castle County	0.5
Glasgow Avenue	Commercial	Currently under review by New Castle County	1.0
Fox Run Business Center	Commercial	Currently under review by New Castle County	1.0
Ricky Commerce Center, Lot 5A	Commercial	Currently under review by New Castle County	1.0
System Reliability Project-Dover Loop			
Leander Lakes	Residential	Currently under construction	Adjacent
Copper Run Apartment Complex	Residential	Approved in May 2013	0.5
Retail Building - General	Commercial	Time of approval and construction is not known	0.8

Air Quality

Construction-related air quality impacts are limited to the immediate area surrounding the construction right-of-way or aboveground facility site. The applicable timeframe for cumulative

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construction-related air quality impacts is within the calendar year(s) to be consistent with the analysis conducted for indirect emissions under the General Conformity regulations codified in 40 CFR 93, Subpart B.

The White Oak and System Reliability Projects may be constructed in the same general timeframes. The air quality impacts during construction of the White Oak Project Delaware City Compressor Station and the System Reliability Project Porter Road Loop would be short-term and intermittent along the pipeline right-of-way and aboveground facility site. In addition, Eastern Shore's proposed mitigation measures and our recommendation for a Fugitive Dust Control Plan for each project to minimize fugitive dust would minimize construction-related emissions from both projects. Therefore, we do not anticipate significant cumulative construction-related air quality impacts when considering the White Oak and the System Reliability Projects.

The PADEP and the DNREC would impose best management practices or site-specific mitigation measures to minimize construction-related air quality impacts associated with the projects listed in table 34. Similarly, Eastern Shore would comply with the applicable PADEP and DNREC requirements for minimizing construction emissions from the White Oak and System Reliability Projects, in addition to our recommended Fugitive Dust Control Plan to be used during construction. Each project would be required to meet applicable state and federal air quality standards to avoid significant impacts on air quality. Because of the temporary nature of pipeline construction and Eastern Shore's proposed mitigation measures, along with our recommended Fugitive Dust Control Plan, we do not anticipate that the White Oak or System Reliability Projects would contribute to significant cumulative construction-related air quality impacts within their respective areas and when combined with the projects listed in table 34.

The operational emissions from the White Oak and System Reliability Projects would be associated with the Delaware City and Bridgeville Compressor Stations. The two compressor stations are separated by at least 60 miles. Because of the distance between these two air emission sources, we do not anticipate significant cumulative air quality impacts to result from operation of the White Oak and System Reliability Projects.

The projects listed in table 34 would not be permanent emission sources; therefore, no cumulative operational air quality impacts would occur.

Noise

Because the impact of noise is highly localized and attenuates quickly as the distance from the noise source increases, construction-related noise impacts are limited to the immediate area surrounding the construction right-of-way or aboveground facility site. The related impacts are limited to the noise receptors in the vicinity of the right-of-way and the aboveground facility sites such that noise from simultaneous construction activities would be heard by the same receptor.

The White Oak and System Reliability Projects may be constructed in the same timeframes. Construction noise moves in a linear fashion along the pipeline right-of-way and varies during each phase of construction. Therefore, construction of the System Reliability

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Project Porter Road Loop would be intermittent during the construction period and the associated noise impacts would be of a short duration in a given area. Construction at the White Oak Project Delaware City Compressor Station would be confined to the station site. Considering that these two project components are about three miles from each other and would not impact any one NSA simultaneously, we do not expect cumulative noise impacts during construction.

Noise impacts would also occur during construction of the White Oak Project and the System Reliability Project and the other projects identified in table 34. It is unlikely that construction from the proposed projects and other projects would occur concurrently in the vicinity of one NSA; therefore, we do not expect cumulative noise impacts during construction of these projects.

Operational noise impacts from the White Oak Project and the System Reliability Project would result from the Delaware City and Bridgeville Compressor Station expansions. Noise generated from compressor station facilities is the greatest at the compressor station and can impact noise receptors to varying degrees (based on factors such as topography, vegetation, and noise mitigation equipment), with the noise impacts decreasing as distance from the facility increases. The Delaware City and Bridgeville Compressor Stations are separated by at least 60 miles. Because of the distance between these two noise sources, we do not anticipate significant cumulative noise impacts to result from operation of the White Oak and System Reliability Projects.

The projects listed in table 34 would not be permanent noise sources; therefore, no cumulative operational noise impacts would occur.

Climate Change

Climate change is the change in climate over time, whether due to natural variability or as a result of human activity, and cannot be represented by single annual events or individual anomalies. For example, a single large flood event or particularly hot summer are not indications of climate change, while a series of floods or warm years that statistically change the average precipitation or temperature over years or decades may indicate climate change. The Intergovernmental Panel on Climate Change (IPCC) is the leading international, multi-governmental scientific body for the assessment of climate change. The United States is a member of the IPCC and participates in the IPCC working groups to develop reports. The leading U.S. scientific body on climate change is the U.S. Global Change Research Program (USGCRP). Thirteen federal departments and agencies participate in the USGCRP, which began as a presidential initiative in 1989 and was mandated by Congress in the Global Change Research Act of 1990.

The IPCC and USGCRP have recognized that:

- globally, GHGs have been accumulating in the atmosphere since the beginning of the industrial era (circa 1750);

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- combustion of fossil fuels (coal, petroleum, and natural gas), combined with agriculture and clearing of forests is primarily responsible for this accumulation of GHG;
- these anthropogenic GHG emissions are the primary contributing factor to climate change; and
- impacts extend beyond atmospheric climate change alone, and include changes to water resources, transportation, agriculture, ecosystems, and human health.

In May 2014, the USGCRP issued a report, *Climate Change Impacts in the United States*, summarizing the impacts that climate change has already had on the United States and what projected impacts climate change may have in the future (USGCRP, 2014). The report includes a breakdown of overall impacts by resource and impacts described for various regions of the United States. Although climate change is a global concern, for this cumulative analysis, we focus on the potential cumulative impacts of climate change in the projects' areas.

The USGCRP's report notes the following observations of environmental impacts that may be attributed to climate change in the Northeast region:

- average temperatures have risen about 2 °F between 1895 and 2011 and are projected to increase another 1 to 8 °F over the next several decades with more frequent days above 90 °F;
- areas that currently experience ozone pollution problems are projected to experience an increase in the number of days that fail to meet the federal air quality standards;
- an increase in health risks and costs for vulnerable populations due to projected additional heat stress and poor air quality;
- precipitation has increased by about 5 inches and winter precipitation is projected to increase 5 to 20 percent by the end of the century;
- extreme/heavy precipitation events have increased more than 70 percent between 1958 and 2010 and are projected to continue to increase;
- sea levels have risen about 1 foot since 1900 and are projected to continue increasing 1 to 4 feet by 2100 stressing infrastructure (e.g., communications, energy, transportation, water, and wastewater);
- severe flooding due to sea-level rise and heavy downpours is likely to occur more frequently;
- crop damage from intense precipitation events, delays in crop plantings and harvest, and heat stress negatively affect crop yields;
- invasive weeds are projected to become more aggressive due to their benefit of higher CO_2 levels;
- a change in range, elevation, and intra-annual life cycle events of vegetation and wildlife species; and
- an increase in carrier habitat and human exposure to vector-borne diseases (e.g., Lyme disease or West Nile virus).

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The GHG emissions associated with construction and operation of the projects are discussed in more detail in section B.6.1. Emission of GHGs from the proposed projects would not have any direct impacts on the environment in the projects' areas. Currently, there is no standard methodology to determine how a project's relatively small incremental contribution to GHGs would translate into physical effects on the global environment.

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C. ALTERNATIVES

The FERC has three possible courses of action in processing a Certificate application. It may grant the application with or without conditions; postpone action pending further study; or deny the application. The FERC Commission will decide among these courses of action, depending on which would best serve the public convenience and necessity.

We considered several alternatives and route variations to the proposed action to determine if any were reasonable and preferable to the proposed action. Alternatives discussed in this section include the No-Action Alternative, Systems Alternatives, and Route Alternatives. The proposed modifications to existing compressor stations would occur within or adjacent to Eastern Shore's existing Delaware City and Bridgeville Compressor Stations. Construction and operation of similar compression facilities at undeveloped alternative sites would result in greater environmental impact and affect new landowners other than Eastern Shore. Therefore, we did not examine any alternative locations for the proposed compressor station modifications.

The evaluation criteria we used for our alternatives analysis are:

- meeting the objectives of the project;
- technical and economic feasibility and practicability; and
- significant environmental advantage over the proposed project.

1. No-Action Alternative

The no-action alternative would result in not implementing the proposed action and would avoid the potential environmental impacts associated with each project; however, the project objectives would not be met.

White Oak Project

According to Eastern Shore, the White Oak Project purpose is to provide incremental expansion capacity in order to provide 45,000 dekatherms per day of firm transportation service to the Garrison Energy Center. Although a Commission decision to deny the White Oak Project would avoid the environmental impacts addressed in this EA, the Garrison Energy Center would be forced to search for other sources of natural gas to meet their objectives, and in turn, other natural gas projects could be implemented to provide a substitute to the facilities proposed by Eastern Shore. These substitute projects could require the construction of additional and/or new pipeline facilities in the same or other locations as the proposed White Oak Project, which would result in their own sets of specific environmental impacts that could be greater than those associated with the current proposal.

The no-action alternative would not accomplish the objectives of the proposed White Oak Project and would likely result in the construction of other facilities that would not offer a significant environmental advantage over the White Oak Project. Therefore, we do not recommend the no-action alternative.

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System Reliability Project

According to Eastern Shore, the System Reliability Project's purpose is to provide incremental expansion capacity in order to provide increased dependability of contracted gas volumes to existing customers on the Eastern Shore pipeline system during high-demand winter months. Although a Commission decision to deny the System Reliability Project would avoid the environmental impacts addressed in this EA, Eastern Shore would be forced to search for other sources of natural gas to meet its objectives; in turn, other natural gas projects could be designed to provide a substitute to the facilities proposed in the System Reliability Project. These substitute projects could require the construction of additional and/or new pipeline facilities in the same or other locations as the proposed project, which would result in their own sets of specific environmental impacts that could be greater than those associated with the current proposal.

The no-action alternative would not accomplish the objectives of the proposed System Reliability Project and would likely result in the construction of other facilities that would not offer a significant environmental advantage over the System Reliability Project. Therefore, we do not recommend the no-action alternative.

2. System Alternatives

System alternatives make use of existing or modified natural gas transmission systems to meet the stated objective of the proposed action. The point of identifying and evaluating system alternatives is to determine if the potential environmental impact associated with the construction and operation of the proposed facilities could be avoided or minimized by using another pipeline system. Environmental considerations with system alternatives include, but are not limited to, new right-of-way requirements, land use effects, and stream and wetland disturbances. A system alternative could make it unnecessary to construct part or all of Eastern Shore's White Oak Project or System Reliability Project; although modifications or additions to another system may be required. While modifications or additions to existing systems could result in environmental impact, this impact may be less, the same, or more than associated with the proposed projects.

White Oak Project

Eastern Shore currently operates the only interstate natural gas transmission pipeline system within reasonable geographic proximity to the Garrison Energy Center. Therefore, no other pipeline system could meet the White Oak Project's objective of providing the Garrison Energy Center with additional capacity. Further, the proposed loops and compressor station expansion were selected to minimize environmental impacts to the greatest extent possible while using existing rights-of-way to limit the need for construction on undisturbed lands. Based on our analysis in this EA, we agree that the environmental impacts associated with the White Oak Project are minor and acceptable, thus we do not recommend any system alternative for the White Oak Project.

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System Reliability Project

Eastern Shore currently operates the only interstate natural gas transmission pipeline system in the so-called "Delmarva Peninsula," which is within reasonable geographic proximity of its existing customers. We are not aware of any competing pipeline company, system, or project that could reasonably be expected to serve as an environmentally preferable alternative to the System Reliability Project.

Eastern Shore stated that the System Reliability Project was designed to ensure that adequate pipeline and compression facilities could meet its customers' peak day demands. Peak day demands on a pipeline system may also be met, in part, by storing natural gas or equivalent fuel along the pipeline system for use on a peak day. This process is referred to as "peak shaving."

One form of peak shaving is underground natural gas storage. Underground storage requires favorable geological conditions, such as depleted gas production reservoirs or salt domes. Such geologic conditions are not present in the area served by Eastern Shore's system. Moreover, development of underground storage facilities is a costly process which may involve significant landowner and adverse environmental impacts. Eastern Shore does offer certain storage services to its customers using storage services it purchases from Transco; however, while these storage services mitigate customers' peak day supply needs, they do not mitigate peak day flow conditions on Eastern Shore's system because the storage facilities are located on an upstream pipeline and all gas withdrawn from storage must flow through Eastern Shore's system on a peak day for delivery to the ultimate consumers. Therefore, underground natural gas storage is not a viable alternative to the System Reliability Project.

Other forms of peak shaving include storing quantities of natural gas or propane above ground at strategic locations along the pipeline system. Such peak shaving facilities may take the form of compressed or liquid natural gas storage tanks or propane-air facilities. This type of peak shaving is generally not an alternative to system reinforcements because the peak shaving facilities have limited capabilities; are costly to install, operate and maintain; and would need to be deployed at a number of locations along the pipeline route. Further, the ability of aboveground storage facilities to address sustained peak day conditions is limited by their storage capacities.

The addition of peak shaving facilities would not alleviate the limitations that the System Reliability Project is intended to address, since system bottlenecks would still remain and could reduce Eastern Shore's ability to serve all of its customers when peak shaving facilities are unavailable or stored propane or compressed and liquid natural gas have been exhausted. Therefore, we conclude that peak shaving is not a viable alternative to the System Reliability Project.

The proposed loops and compressor station expansion for the System Reliability Project were selected to minimize environmental impacts to the greatest extent possible while using existing rights-of-way to limit the need for construction on undisturbed lands. Based on our analysis in this EA, we agree that the environmental impacts associated with the System

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Reliability Project are minor and acceptable, thus we do not recommend any system alternative for the System Reliability Project.

We also note that the White Oak Project objective and the System Reliability Project objective are independent of each other and serve different needs such that the completion of one project would not meet the needs of both projects. As such, one project cannot be considered a viable systems alternative for the other.

3. Alternative Pipeline Routes

White Oak Project

3.1. Kemblesville Loop Alternatives

Under Docket No. CP15-18-000, the NPS, several landowners, the Franklin Township Historical Commission, and the Franklin Township Historical Architectural Review Board requested in comments that we evaluate alternative routing of the originally proposed Kemblesville Loop based on potential adverse visual impacts on the Kemblesville Village Historic District, crossings of tributaries of the West Branch of the White Clay Creek National Wild and Scenic River, direct impacts on open space preserved through federal funding assistance through the NPS' National Wild and Scenic River Program, clearing of old growth forest, potential impacts on cultural resources, decreased property values, pipeline crossing of a future sewage facility, pipeline design concerns, and safety concerns.

In its February 20, 2015 letter, the NPS noted that the Kemblesville Loop Alternative 2 would be its preferred route, as the NPS considered that this alternate route would result in less overall disturbance. Staff requested information on the then-Kemblesville Loop Alternative 2 in order to address the NPS' concerns over the crossings of the two tributaries and construction within the watershed of the West Branch, as well as the feasibility of crossing these tributaries along the originally proposed Kemblesville Loop by HDD. FERC staff also opened a supplemental scoping period for interested parties to file comments on environmental issues specific to the Kemblesville Loop Alternative Route 2. Following this supplemental scoping period, Eastern Shore elected to amend its application to formally propose as its preferred route the Kemblesville Loop Alternative Route 2 in Docket No. CP15-18-001, instead of the originally proposed Kemblesville Loop. Comparisons of the currently proposed Kemblesville Loop to all of the alternative routes, including the originally proposed Kemblesville route, are shown below.

Table 35 presents a comparison of the proposed Kemblesville Loop (in other words, the former "Kemblesville Loop Alternative Route 2") to potential alternative routes. Figure 3 shows the current Kemblesville Loop as well as the alternative routes evaluated here.

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Table 35. Comparison of Impacts of Alternative Pipeline Routes for the Kemblesville Loop

Resource	Proposed Route (former Kemblesville Alternative Route 2)	Original Route	Alternative 1	Alternative 3	Alternative 4
Length (miles)	2.1	3.9	2.8	3.3	3.50
Existing Eastern Shore Right-of-Way (miles)	1.94	0	0.5	0	0.10
Road Right-of Way (miles)	0.08	0.7	0.5	0.5	1.10
Existing Utility Right-of-Way (miles)	0	0.9	0	0.8	0
Construction Impacts (acres)	24.69	33.4	22.1	29.1	28.80
Operation Impacts (acres)	0.1	13.4	7.6	12.1	9.80
Construction/ Operation Forest Impacts (acres)	1.72/0.04	11.80/2.6[4]	9.4/2.3	7.5/2.4	2.5/2.3
Construction/ Operation Wetland Impacts (acres)	0.42/0	0.28/0	0/0	0.28/0	0/0
Wild and Scenic River Tributary Impacts (acres)	0.04	0.04	0.02	1	1
Approximate Length of Designated Natural or Recreational Areas Crossed (miles)	0	0.48-Franklin Preserve; 0.01-Crossan Park; 0.41-Fox Chase Farm	0.94-Peacedale Preserve	0.41-Fox Chase Farm	1.1-Peacedale Preserve
Number of Road Crossings	9	6	8	6	9
Number of Residences within 50 feet of the Construction Workspace	18	16	28	15	5

Note: Impacts based on a 75-foot-wide right-of-way.
[1] For the original route, impacts on forest would likely be considerably less than 11.8 acres, because about 0.75 mile of the route that is depicted as forested on the topographic maps is actually within an existing utility right-of-way, where minimal tree clearing would be necessary.

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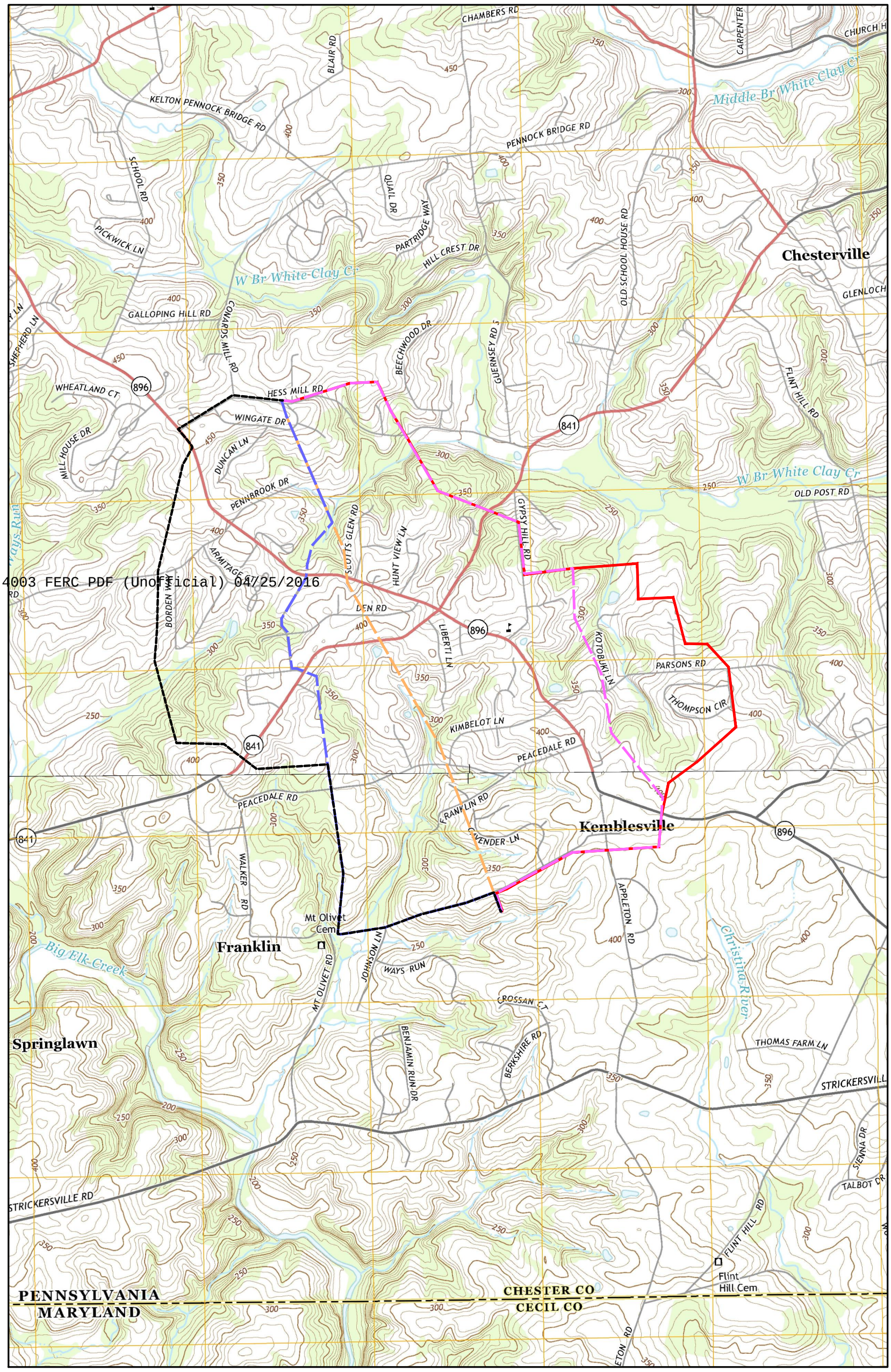

SOURCE: U.S GEOLOGICAL SURVEY QUADRANGLE MAPS OF WEST GROVE, PENNSYLVANIA, DATED 2013 AND NEWARK WEST, DELAWARE-MARYLAND-PENNSYLVANIA, DATED 2014.

0 1,000 2,000

Approximate Scale
1 inch = 2,000 feet

NORTH

LEGEND

- ORIGINAL PROPOSED ROUTE
- ALTERNATIVE 1
- ALTERNATIVE 2 (PREFERRED ROUTE)
- ALTERNATIVE 3
- ALTERNATIVE 4

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APPENDIX A-ALTERNATES MAP
2013/2014 USGS TOPOGRAPHIC MAP

WHITE OAK MAINLINE EXPANSION PROJECT
KEMBLESVILLE LOOP

CHESTER COUNTY,PENNSYLVANIA

JOB NO.	SCALE:	DATE:	DRAWN BY:	REVIEW BY:	SHEET:
18429	1"=2000'	DECEMBER 2015	MDP	TAS	2 OF 2

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Original Proposed Kemblesville Loop

Eastern Shore's originally proposed route is about 1.8 miles longer than the amended route and could have resulted in over six times the amount of forest clearing as the current Kemblesville Loop. A portion of the forested land crossed comprised old growth forest. In its comment letter to the White Oak Supplemental NOI, the NPS provided that preservation and maintenance of mature forest is one of the goals and objectives of the *White Clay Creek and its Tributaries Watershed Management Plan, Amended 2001*. The NPS also noted that the original route would likely open up a greater amount of forest to the spread of noxious weeds and vines.

The impacts on the tributaries to the White Clay Creek National Wild and Scenic River would be similar for the original Kemblesville route and the current route. The waterbody crossings for both routes would be about 10 or 12 feet across. The primary distinction, however, is that the crossings for the original route represent new crossings, while the current route crossing locations are along an existing pipeline corridor within previously disturbed workspaces.

The original proposed route crosses three recreational areas. One of these areas is the Franklin Preserve that the NPS noted is an open space preserved through federal funding assistance through the NPS' National Wild and Scenic River Program. The NPS also recommended mitigation or avoidance of impacts on Crossan Park and Fox Chase Farm (crossed by the original route) because of their recreational value. Landowners in the area reiterated the NPS concerns regarding these recreational areas.

We received comments from landowners, the Franklin Township Historical Commission, the Franklin Township Historical Architectural Review Board, and the NPS regarding concerns about potential impacts of the original Kemblesville route on the Kemblesville Village Historic District, which is eligible for the NRHP and whose southern boundary is within a few yards of the original route. The current proposed route avoids this district. We did receive comments from the Franklin Township Historical Commission regarding the current Kemblesville Loop and its potential impacts on previously recorded (CRGIS) historic properties, whose boundaries are within 2,000 feet of the currently proposed pipeline corridor.

The original route is not collocated with Eastern Shore's existing right-of-way but is instead collocated with other utility rights-of-way for about 0.9 mile. In general, collocation is preferable as it reduces the total acreage of new impacts on land uses, vegetation, wetlands, and other resources. In comparison, the current proposed route is collocated with Eastern Shore's existing right-of-way for its entirety. Further, the new pipeline would be installed within the existing right-of-way without expanding any easements except for 0.10 acre along the route. Whereas, the original route would require 13.4 acres of new right-of-way, meaning Eastern Shore would need to acquire new easements from landowners along the original route.

The number of residences within 50 feet of the construction workspace would be about the same for both routes, with two more residences impacted along the current proposed route. Homeowners along both routes responded to the White Oak NOI and Supplemental NOI expressing their concerns with pipeline safety, installation of a pipeline so close to their homes,

and whether another pipeline could legally be installed within Eastern Shore's existing right-of-way. Pipeline safety is discussed in section B.7 of this EA. Eastern Shore proposes specialized construction techniques to minimize construction impacts in residential and commercial areas (e.g., stovepipe and/or drag section construction). In addition, we are recommending in section B.4.1 that Eastern Shore file evidence of concurrence with residences within 10 feet of the proposed construction workspaces for both projects, as well as developing project-specific environmental complaint resolution procedures to be used during construction.

The Eastern Shore pipeline system in this area precedes the housing development that has built up around the existing right-of-way over the years. Eastern Shore is required by the DOT to maintain its right-of-way including vegetation maintenance and preventing structures from being built over the right-of-way. As is evident along this section of Eastern Shore's right-of-way, structures have been built over the right-of-way and houses have been built very close to the right-of-way. The DOT's PHMSA has acknowledged this common scenario across the United States and in 2010 sponsored the Pipelines and Informed Planning Alliance to provide guidance to pipeline operators, local government officials, property owners, and developers for the safe use and development of land near transmission pipelines. Nevertheless, pipeline operators are able to install additional pipelines within their existing rights-of-way provided these additional facilities meet DOT pipeline safety requirements and federal, state, and local agency environmental permitting requirements. Construction of either of the above Kemblesville routes would comply with the DOT regulations.

Given the increased environmental impacts associated with the original proposed route and the reasons explained above, we conclude that the original proposed route does not offer any significant environmental advantages to lead us to recommend it over the current proposed Kemblesville Loop.

Kemblesville Loop Alternative Route 1

The Kemblesville Loop Alternative 1 extends for about 2.8 miles and begins by following Eastern Shore's existing pipeline right-of-way for almost 0.5 mile. This alternative is about 0.7 mile longer than the current Kemblesville Loop. The Kemblesville Loop Alternative 1 also follows about 0.5 mile of road right-of-way.

The Kemblesville Loop Alternative 1 would result in less acres of construction impacts than the current Kemblesville Loop and less acreage impact on Wild and Scenic River tributaries; however, this alternative would result in considerably more permanent impacts (7.6 acres vs. 0.1 acre) due to the increased length and less collocation. This alternative would also impact a recreational area, whereas the current Kemblesville Loop would not. In addition, 10 more residences are located within 50 feet of the Kemblesville Loop Alternative 1 construction workspace than the current Kemblesville Loop.

For the reasons presented above, we do not consider the Kemblesville Loop Alternative 1 to be a preferable alternative.

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Kemblesville Loop Alternative Route 3

The Kemblesville Loop Alternative 3 is about 1.2 miles longer than the current Kemblesville Loop and is not collocated with Eastern Shore's existing right-of-way. However, this alternative would follow 0.5 mile of road right-of-way and 0.8 mile of existing utility right-of-way.

The Kemblesville Loop Alternative 3 would result in considerably more permanent impacts (12.1 acres vs. 0.1 acre) due to the increased length and less collocation. The alternative would impact over twice as many Wild and Scenic River Tributary acres as the current Kemblesville Loop, although it would impact fewer residences within 50 feet of the construction workspace (15 vs. 18). In addition, this alternative would impact one of the same recreational areas as the original proposed route. For the reasons presented above, we do not consider the Kemblesville Loop Alternative 3 to be a preferable alternative.

Kemblesville Loop Alternative 4

The Kemblesville Loop Alternative 4 is about 1.4 miles longer than the current Kemblesville Loop, and would be collocated with Eastern Shore's existing right-of-way for only 0.1 mile. The potential merits of this alternative include collocation with about 1.1 miles of road right-of-way and that it would affect fewer residences within 50 feet of the construction workspace (5 vs. 18).

However, the overall permanent impacts associated with the Kemblesville Loop Alternative 4 would be considerably greater (9.8 acres vs. 0.1) due primarily to route length. In addition, the alternative would cross the Peacedale Preserve recreational area and impact over twice as many Wild and Scenic River Tributary acres as the current Kemblesville Loop. For the reasons presented above, we do not consider the Kemblesville Loop Alternative 4 to be a preferable alternative.

System Reliability Project

3.2. Porter Road Loop Alternatives

On February 2, 2016, a landowner suggested two possible alternatives to the proposed Porter Road Loop alignment; one alternative would route the pipeline along U.S. Route 71, and the other would route the pipeline along Delaware Route 40 (see figure 4). These alternatives were suggested to keep from increasing the number of utilities already routed along Porter Road, specifically another natural gas pipeline, and thereby increasing the potential for gas leaks along both sides of Porter Road.

The Route 71 Alternative would increase the pipeline segment length from the currently proposed 2.5 miles along Porter Road to about 7.7 miles. The 5.2-mile increase in length would likely result in substantially greater environmental impacts and would still affect landowners, just along a different road. Regarding impacts associated with natural gas pipeline operations,

including natural gas leaks, our analysis is shown in section B.7.3. Therefore, it was not considered further as a reasonable alternative to the proposed Porter Road Loop alignment.

Similarly, the Route 40 Alternative would increase the pipeline segment length from the currently proposed 2.5 miles along Porter Road to about 4.3 miles. The 1.8-mile increase in length would likely result in considerably greater environmental impacts and would still affect landowners along that road. Therefore, it was not considered further as a reasonable alternative.

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N

START POINT

END POINT

Belltown Woods
Bear Post Office
Delpro Company
Pencader Cemetery
Glasgow
Lauren Farms
Porter
Caravel Farms
Melody Meadows II
Clay Acres
Hickory Woods
Marabou Meadow
Melody Meadows
Porter Square
Woodside Manor
Countryside Farms
Saint Paul Cemetery
Rolling M
Kirkwood
Little Jersey
Parkside
Lums Pond
Delaware Veterans Memorial Cemetery
Chesapeake and Delaware Canal
Mount Pisgah Cemetery
Dragon Creek
Williamsbu

LEGEND

- PROPOSED PIPELINE (2.5 MI.)
- ALTERNATIVE 01 (3.0 MI.)
- ALTERNATIVE 02 (3.4 MI.)
- U.S. ROUTE 40 ALTERNATIVE (4.3 MI.)
- DE ROUTE 71 ALTERNATIVE (7.7 MI.)

SOURCE: U.S. GEOLOGICAL SURVEY QUADRANGLE MAPS OF ELKTON, MARYLAND-DELAWARE, AND SAINT GEORGES, DELAWARE; BOTH DATED 2011.

0 1,000 2,000
Approximate Scale
1 inch = 2,000 feet

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ALTERNATES MAP

SYSTEM RELIABILITY PROJECT
PORTER ROAD LOOP

NEW CASTLE COUNTY, DELAWARE

JOB NO.	SCALE:	DATE:	DRAWN BY:	REVIEW BY:	FIGURE:
18704	1"=2,000'	MARCH 2016	JMW	TAS	1

D. CONCLUSIONS AND RECOMMENDATIONS

We conclude that approval of the White Oak Project and System Reliability Project would not constitute a major federal action significantly affecting the quality of the human environment. This finding is based on the above environmental analysis; Eastern Shore's applications and supplemental filings; implementation of Eastern Shore's proposed mitigation; and our recommended mitigation below. We recommend that the Commission Order for each project contain a finding of no significant impact and include the mitigation measures listed below as conditions to any Certificate the Commission may issue.

1. Eastern Shore shall follow the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests) for both projects and as identified in the EA, unless modified by the Order. Eastern Shore must:

    a. request any modification to these procedures, measures, or conditions in a filing with the Secretary;
    b. justify each modification relative to site-specific conditions;
    c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and
    d. receive approval in writing from the Director of OEP **before using that modification.**

2. The Director of OEP has delegated authority to take whatever steps are necessary to ensure the protection of all environmental resources during construction and operation of the projects. This authority shall allow:

    a. the modification of conditions of the Order; and
    b. the design and implementation of any additional measures deemed necessary (including stop-work authority) to assure continued compliance with the intent of the environmental conditions as well as the avoidance or mitigation of adverse environmental impact resulting from project construction and operation.

3. **Prior to any construction**, Eastern Shore shall file an affirmative statement with the Secretary for both projects, certified by a senior company official, that all company personnel, EIs, and contractor personnel will be informed of the EI's authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs **before** becoming involved with construction and restoration activities.

4. The authorized facility locations for each project shall be as shown in the EA, as supplemented by filed alignment sheets. **As soon as they are available, and before the start of construction**, Eastern Shore shall file with the Secretary any revised detailed survey alignment maps/sheets at a scale not smaller than 1:6,000 with station positions for all facilities approved by the Order. All requests for modifications of environmental conditions of the Order or site-specific clearances must be written and must reference

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locations designated on these alignment maps/sheets.

Eastern Shore's exercise of eminent domain authority granted under NGA Section 7(h) in any condemnation proceedings related to the Order must be consistent with these authorized facilities and locations. Eastern Shore's right of eminent domain granted under NGA Section 7(h) does not authorize it to increase the size of its natural gas facilities to accommodate future needs or to acquire a right-of-way for a pipeline to transport a commodity other than natural gas.

5. Eastern Shore shall file with the Secretary detailed alignment maps/sheets and aerial photographs at a scale not smaller than 1:6,000 identifying all route realignments or facility relocations, and staging areas, pipe storage yards, new access roads, and other areas that would be used or disturbed and have not been previously identified in filings with the Secretary. Approval for each of these areas must be explicitly requested in writing. For each area, the request must include a description of the existing land use/cover type, documentation of landowner approval, whether any cultural resources or federally listed threatened or endangered species would be affected, and whether any other environmentally sensitive areas are within or abutting the area. All areas shall be clearly identified on the maps/sheets/aerial photographs. Each area must be approved in writing by the Director of OEP **before construction in or near that area**.

   This requirement does not apply to extra workspace allowed by the FERC's Plan and/or minor field realignments per landowner needs and requirements which do not affect other landowners or sensitive environmental areas such as wetlands.

   Examples of alterations requiring approval include all route realignments and facility location changes resulting from:

   a. implementation of cultural resources mitigation measures;
   b. implementation of endangered, threatened, or special concern species mitigation measures;
   c. recommendations by state regulatory authorities; and
   d. agreements with individual landowners that affect other landowners or could affect sensitive environmental areas.

6. **Within 60 days of the acceptance of the Certificate and before construction begins**, Eastern Shore shall file an Implementation Plan for each project with the Secretary for review and written approval by the Director of OEP. Eastern Shore must file revisions to the plans as schedules change. Each plan shall identify:

   a. how Eastern Shore will implement the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests), identified in the EA, and required by the Order;
   b. how Eastern Shore will incorporate these requirements into the contract bid documents, construction contracts (especially penalty clauses and specifications),

and construction drawings so that the mitigation required at each site is clear to onsite construction and inspection personnel;

c. the number of EIs assigned, and how the company will ensure that sufficient personnel are available to implement the environmental mitigation;
d. company personnel, including EIs and contractors, who will receive copies of the appropriate material;
e. the location and dates of the environmental compliance training and instructions Eastern Shore will give to all personnel involved with construction and restoration (initial and the refresher training as the project progresses and personnel change);
f. the company personnel (if known) and specific portion of Eastern Shore's organization having responsibility for compliance;
g. the procedures (including use of contract penalties) Eastern Shore will follow if noncompliance occurs; and
h. for each discrete facility, a Gantt or PERT chart (or similar project scheduling diagram), and dates for:

i. the completion of all required surveys and reports;
ii. the environmental compliance training of onsite personnel;
iii. the start of construction; and
iv. the start and completion of restoration.

7. Beginning with the filing of its Implementation Plan, Eastern Shore shall file updated status reports for each project with the Secretary on a **weekly** basis until all construction and restoration activities are complete. On request, these status reports will also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:

a. an update on Eastern Shore's efforts to obtain the necessary federal authorizations;
b. the construction status of the project, and work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally-sensitive areas;
c. a listing of all problems encountered and each instance of noncompliance observed by the EI(s) during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other federal, state, or local agencies);
d. a description of the corrective actions implemented in response to all instances of noncompliance, and their cost;
e. the effectiveness of all corrective actions implemented;
f. a description of any landowner/resident complaints that may relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns; and
g. copies of any correspondence received by Eastern Shore from other federal, state, or local permitting agencies concerning instances of noncompliance, and Eastern Shore's response.

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8. **Prior to receiving written authorization from the Director of OEP to commence construction of either project**, Eastern Shore shall file with the Secretary documentation that it has received all applicable authorizations required under federal law (or evidence of waiver thereof).

9. Eastern Shore must receive written authorization from the Director of OEP **before placing either project into service**. Such authorization will only be granted following a determination that rehabilitation and restoration of the right-of-way and other areas affected by the projects are proceeding satisfactorily.

10. **Within 30 days of placing the authorized facilities in service**, Eastern Shore shall file an affirmative statement with the Secretary, certified by a senior company official:

    a. that the respective facilities have been constructed in compliance with all applicable conditions, and that continuing activities will be consistent with all applicable conditions; or
    b. identifying which of the Certificate conditions Eastern Shore has complied with or will comply with. This statement shall also identify any areas affected by the projects where compliance measures were not properly implemented, if not previously identified in filed status reports, and the reason for noncompliance.

11. **Prior to construction of the White Oak Project**, Eastern Shore shall complete its consultation with the NPS and the COE and file with the Secretary, for review and written approval of the Director of OEP, its final construction and restoration plan for the crossings of the tributaries to the West Branch of White Clay Creek.

12. **Prior to construction of the White Oak Project and System Reliability Project**, Eastern Shore shall file with the Secretary, for review and written approval of the Director of OEP, site-specific HDD crossing plans where this method is determined to be feasible and appropriate, and an HDD Inadvertent Surface Release Contingency Plan. The crossing plans shall detail the crossing and operational procedures as well as the responsibilities for the prevention, containment, and cleanup of any releases associated with the HDD(s).

13. **Prior to construction**, Eastern Shore shall file with the Secretary a revised construction workspace configuration that avoids temporary workspaces on parcel 26-L along the White Oak Project Daleville Loop for the review and written approval of the Director of OEP.

14. **Prior to construction**, Eastern Shore shall file with the Secretary evidence of landowner concurrence with the site-specific residential construction plans for any residence within 10 feet of the proposed construction workspaces for the White Oak and System Reliability Projects.

15. Eastern Shore shall develop and implement an environmental complaint resolution procedure. The procedure shall provide landowners with clear and simple directions for

identifying and resolving their environmental mitigation problems/concerns during construction of the respective projects (either White Oak or System Reliability), and restoration of the rights-of-way. **Prior to construction of each project**, Eastern Shore shall mail the complaint procedures to each landowner whose property would be crossed.

a. In its letter to affected landowners, Eastern Shore shall:

(1) provide a local contact that the landowners should call first with their concerns; the letter should indicate how soon a landowner should expect a response;
(2) instruct the landowners that if they are not satisfied with the response, they should call Eastern Shore's Hotline (the letter should indicate how soon to expect a response); and
(3) instruct the landowners that if they are still not satisfied with the response from Eastern Shore's Hotline, they should contact the Commission's Landowner Helpline at 877-337-2237 or at LandownerHelp@ferc.gov.

b. In addition, Eastern Shore shall include in its weekly status report for each project a copy of a table that contains the following information for each problem/concern:

(1) the identity of the caller and date of the call;
(2) the location by MP and identification number from the authorized alignment sheet(s) of the affected property;
(3) a description of the problem/concern; and
(4) an explanation of how and when the problem was resolved, will be resolved, or why it has not been resolved.

16. **Prior to construction**, Eastern Shore shall file with the Secretary, for review and written approval of the Director of OEP, an Unanticipated Discovery of Contamination Plan applicable to both the White Oak Project and System Reliability Project. The plan shall include identifying hazardous materials, testing, and disposing of the contaminated media according to appropriate state and federal regulations.

17. Eastern Shore **shall not begin construction** of the System Reliability Project facilities and/or use of any staging, storage, or temporary work areas and improved access roads **until**:

a. Eastern Shore files with the Secretary:

i. remaining cultural resources survey report(s) and addendum(s);
ii. site evaluation report(s) and avoidance/treatment plan(s), as required; and
iii. comments on the cultural resources reports, addendums and plans from the Delaware SHPO;

b. the Advisory Council on Historic Preservation is afforded an opportunity to comment if historic properties would be adversely affected; and

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c. the FERC staff reviews and the OEP approves the cultural resources reports and plans, and notifies Eastern Shore in writing that treatment plans/mitigation measures (including archaeological data recovery) may be implemented and/or construction may proceed.

All materials filed with the Commission containing **location, character, and ownership** information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: **"CONTAINS PRIVILEGED INFORMATION - DO NOT RELEASE."**

18. **Prior to construction of either the White Oak Project or System Reliability Project**, Eastern Shore shall file with the Secretary, for review and approval by the Director of OEP, a Fugitive Dust Control Plan. The plan shall specify the precautions that Eastern Shore would take to minimize fugitive dust emissions from the Daleville, Kemblesville, Porter Road, and Dover Loops construction activities, including additional mitigation measures to control fugitive dust emissions of particulate matter with an aerodynamic diameter less than or equal to 2.5 microns. The plan shall clearly explain how Eastern Shore would implement measures, such as:

a. watering the construction workspace and access roads;

b. providing measures to limit track-out onto the roads;

c. identifying the speed limit that Eastern Shore would enforce on unsurfaced roads;

d. covering open-bodied haul trucks, as appropriate;

e. clarifying that the EI has the authority to determine if/when water or a palliative needs to be used for dust control; and

f. clarifying the individuals with the authority to stop work if the contractor does not comply with dust control measures.

19. **Prior to any HDD construction for either the White Oak Project or System Reliability Project**, Eastern Shore shall file with the Secretary an HDD noise analysis identifying the existing and projected noise levels at each NSA within 0.5 mile of each HDD entry and exit site. If noise attributable to the HDD is projected to exceed an L_{dn} of 55 dBA at any NSA, Eastern Shore shall file with the noise analysis a mitigation plan to reduce the projected noise levels for the review and written approval by the Director of OEP. During drilling operations, Eastern Shore shall implement the approved plan, monitor noise levels, include these noise levels in its weekly status reports, and make all reasonable efforts to restrict the noise attributable to the drilling operations to no more than an L_{dn} of 55 dBA at the NSAs.

20. Regarding the White Oak Project, Eastern Shore shall file a noise survey with the Secretary **no later than 60 days** after placing the modified Delaware City Compressor Station in service. If a full load condition noise survey is not possible, Eastern Shore shall provide an interim survey at the maximum possible horsepower load and provide the full load survey **within 6 months**. If the noise attributable to the operation of all of

the equipment at the Delaware City Compressor Station under interim or full horsepower load conditions exceeds an L_{dn} of 55 dBA at the nearby NSAs, Eastern Shore shall file a report on what changes are needed and shall install the additional noise controls to meet the level **within 1 year** of the in-service date. Eastern Shore shall confirm compliance with the above requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls.

21. Regarding the System Reliability Project, Eastern Shore shall file a noise survey with the Secretary **no later than 60 days** after placing the modified Bridgeville Compressor Station in service. If a full load condition noise survey is not possible, Eastern Shore shall provide an interim survey at the maximum possible horsepower load and provide the full load survey **within 6 months**. If the noise attributable to the operation of all of the equipment at the Bridgeville Compressor Station under interim or full horsepower load conditions exceeds an L_{dn} of 55 dBA at the nearby NSAs, Eastern Shore shall file a report on what changes are needed and shall install the additional noise controls to meet the level **within 1 year** of the in-service date. Eastern Shore shall confirm compliance with the above requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls.

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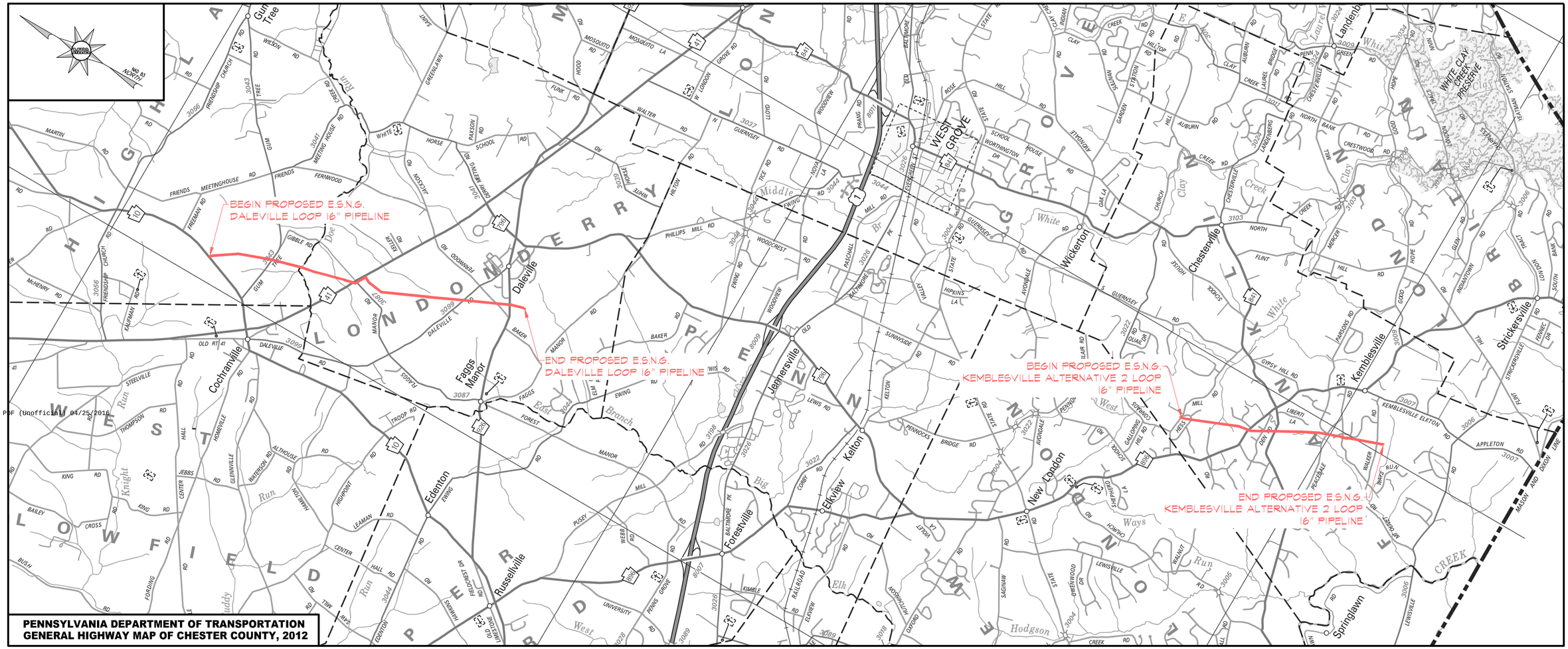
Appendix 1 – Detailed Aerial Maps for the White Oak Project

EASTERN SHORE NATURAL GAS
WHITE OAK MAINLINE EXPANSION PROJECT

HIGHLAND, LONDONDERRY & FRANKLIN TOWNSHIPS, CHESTER COUNTY, PENNSYLVANIA



OVERALL SITE PLAN

SCALE 1"=2500'

2500 1250 0 1250 2500 5000

SCALE: 1" = 2500'

LEGEND

PROPOSED PIPELINE		LIMITS OF STUDY CORRIDOR	
EXISTING E.S.N.G. PIPELINE	ESNG-G	FENCE	
LIMITS OF CONSTRUCTION		EXISTING GAS	UG
EXISTING PERMANENT EASEMENT		CENTERLINE OF STREAM	
RAILROAD TRACK		DELINEATED WETLAND BOUNDARY	NW
ROAD RIGHT-OF-WAY		DELINEATED WATERS OF U.S.	US
PROPERTY LINE		OVERHEAD UTILITY LINE	OHE
EDGE OF PAVEMENT		STORM DRAIN	SD
BUILDING		WATER LINE	W
PROPOSED PERMANENT EASEMENT		SEWER LINE	SAN
		FORCE MAIN	FM

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

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TELEPHONE (302) 734-6710 - FAX (302) 734-6745

16" PROPOSED PIPELINE
WHITE OAK MAINLINE EXPANSION PROJECT
HIGHLAND/LONDONDERRY/FRANKLIN TOWNSHIPS, PA

PROJECT NO:	18429	DATE:	12/15/2015
DESIGN BY:	JJM	SCALE:	AS NOTED
CHECKED BY:	CWB	SHEET:	1 OF 11

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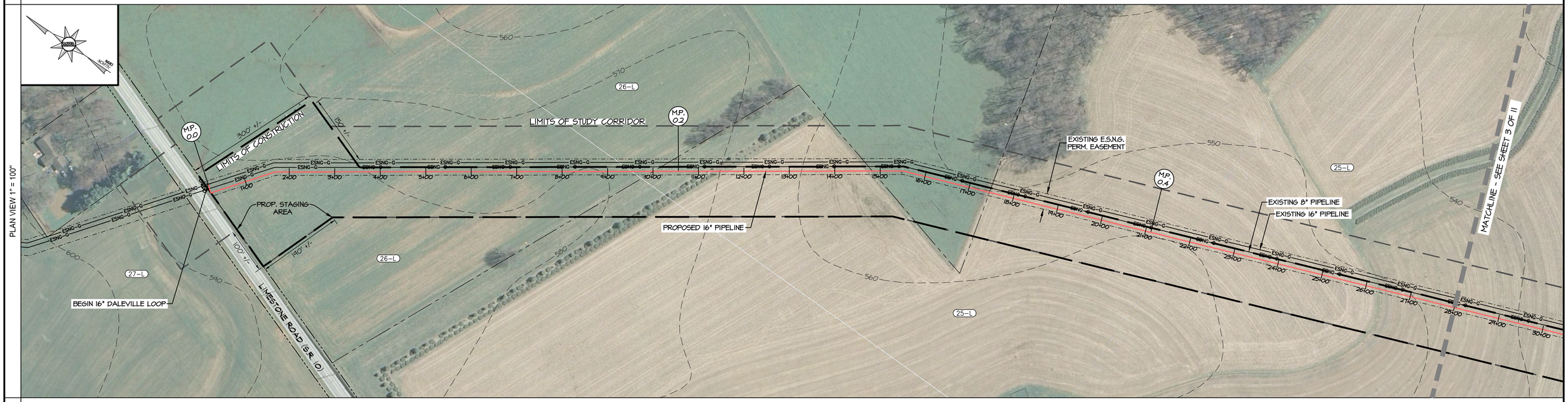
OWNERSHIP

0+00		10+00		14+82		17+44		28+00
	(26-L) N/F KENDALL D. & DARLA J. KURTZ		(25-L) N/F ROBERT D. & JENNIFER C. MCNEIL		(26-L) N/F KENDALL D. & DARLA J. KURTZ		(25-L) N/F ROBERT D. & JENNIFER C. MCNEIL	

ANGLES

PLAN VIEW 1" = 100'



MATERIAL STATIONS

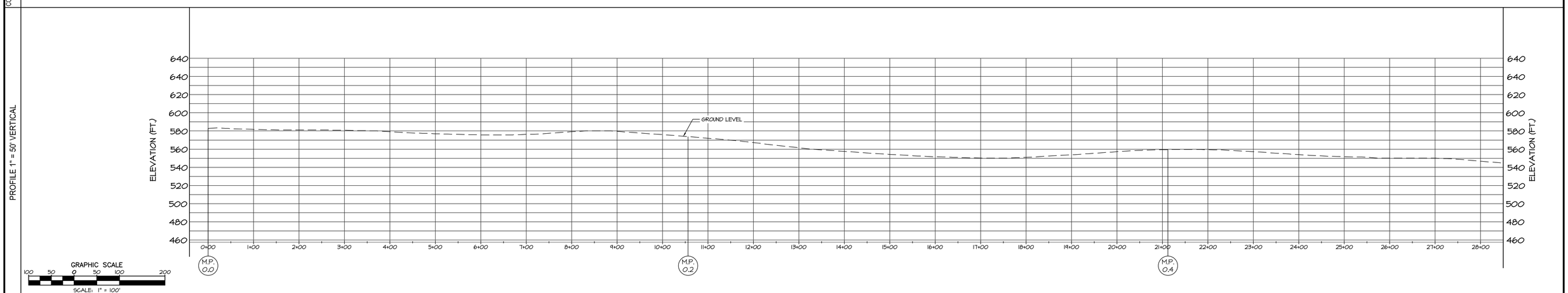
0+00		28+00
	16" PIPELINE	

TERRAIN/ ENVIRONMENTAL

0+00		28+00
	CLEARED	

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
100 50 0 50 100 200
SCALE: 1" = 100'

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

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16" PROPOSED PIPELINE
DALEVILLE LOOP
WHITE OAK MAINLINE EXPANSION PROJECT
HIGHLAND/LONDONDERRY TOWNSHIPS, PA

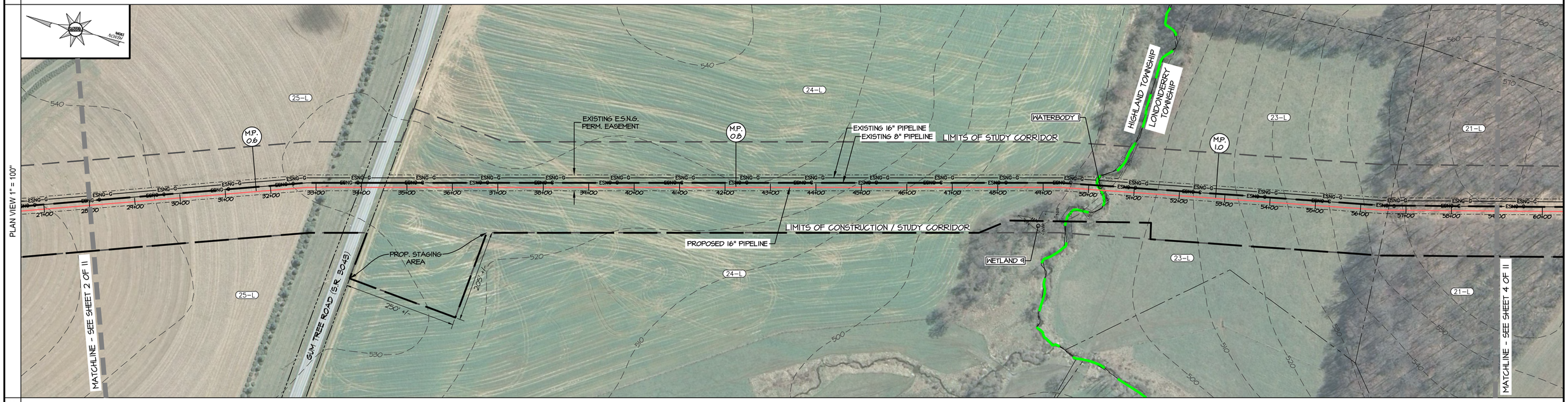
PROJECT NO:	18429	DATE:	12/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	2 OF 11

OWNERSHIP

25-L N/F ROBERT D. & JENNIFER C. MCNEIL (28+00 – 33+95) | GUM TREE ROAD (34+49) | 24-L N/F GLENVILLE FARMS (34+49 – 50+25) | 23-L N/F GLENVILLE FARMS (50+25 – 56+80) | 21-L N/F HONEYCROFT VILLAGE, LP. (56+80 – 59+00)

ANGLES

PLAN VIEW 1" = 100'



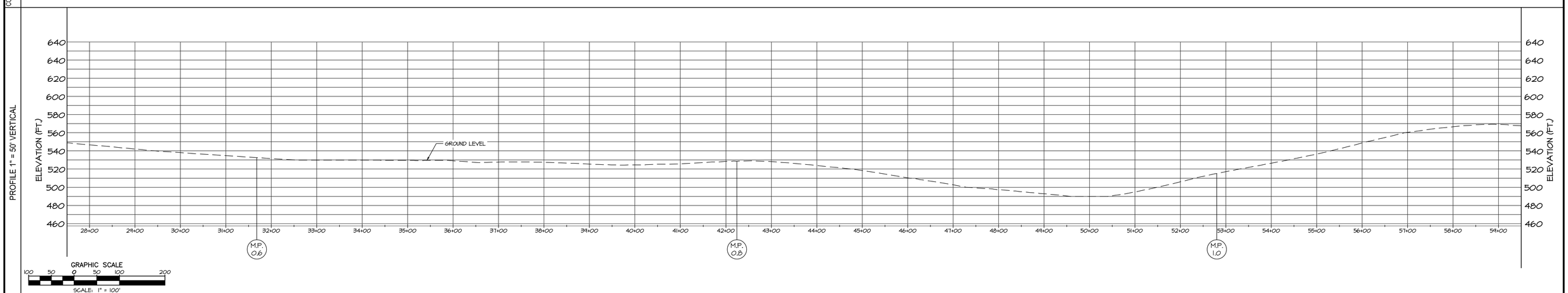
STATIONS

MATERIAL: 16" PIPELINE (28+00 – 59+00)

TERRAIN/ ENVIRONMENTAL: CLEARED (28+00 – 50+23); WATERS OF THE U.S. (50+23 – 50+36); CLEARED (50+36 – 59+00)

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



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MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
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WHITE OAK MAINLINE EXPANSION PROJECT
HIGHLAND/LONDONDERRY TOWNSHIPS, PA

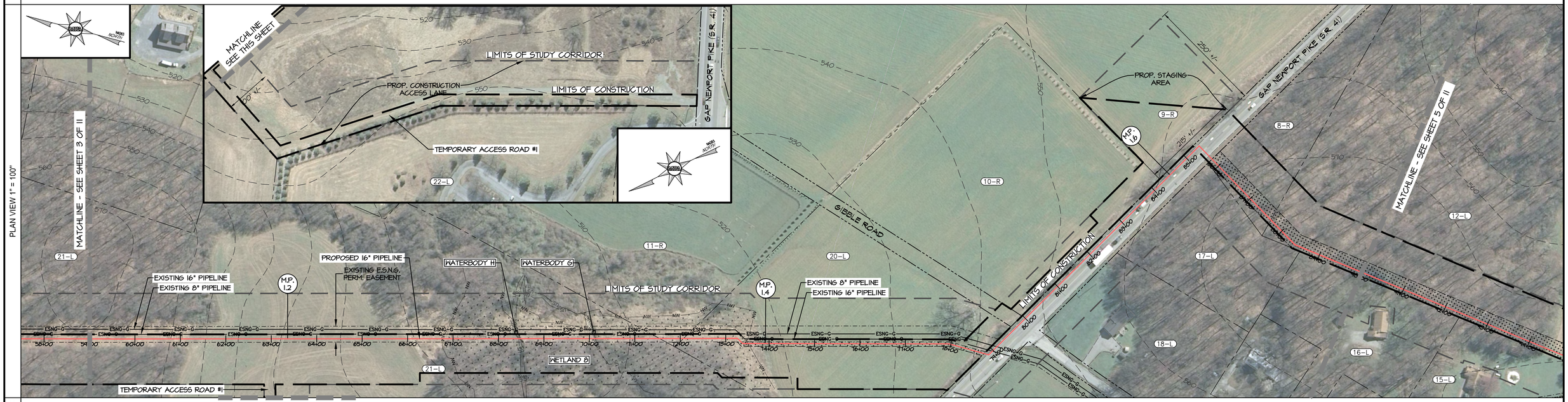
PROJECT NO:	18429	DATE:	12/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	3 OF 11

OWNERSHIP

(21-L) N/F HONEYCROFT VILLAGE, LP. (59+00 – 71+54)
(11-R) N/F SUZANNE H. KLOUD (71+54 – 72+05)
(20-L) N/F WINDURRA USA, LLC. (72+05 – 78+75)
(8-R) N/F STUART R. & MILDRED BOBB (78+75 – 85+78)
GAP NEWPORT PIKE (85+78 – 87+64)
(12-L) N/F LLANDUEY LTD. (87+64 – 90+00)

ANGLES

PLAN VIEW 1" = 100'



MATERIAL STATIONS

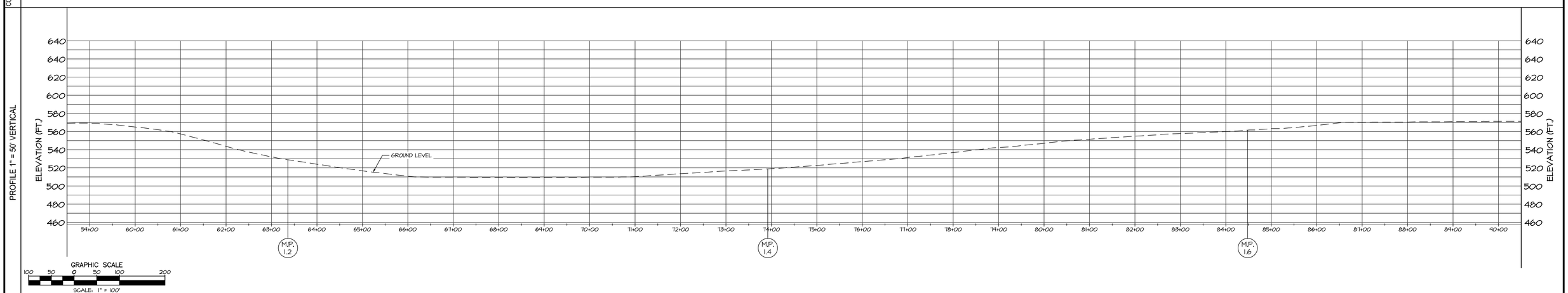
16" PIPELINE (59+00 – 90+00)

TERRAIN/ ENVIRONMENTAL

CLEARED (59+00 – 60+78)
WATERS OF THE U.S. – WETLANDS (60+78 – 68+44)
WETLANDS (68+44 – 68+49)
CLEARED (68+49 – 73+54)
WOODED (73+54 – 90+00)

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
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SCALE: 1" = 100'

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

MORRIS & RITCHIE ASSOCIATES, INC.
ENGINEERS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
18 BOULDEN CIRCLE, SUITE 36
NEW CASTLE, DELAWARE 19720
(302) 326-2200
FAX: (302) 326-2399
WWW.MRAGTA.COM

EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

16" PROPOSED PIPELINE
DALEVILLE LOOP
WHITE OAK MAINLINE EXPANSION PROJECT
HIGHLAND/LONDONDERRY TOWNSHIPS, PA

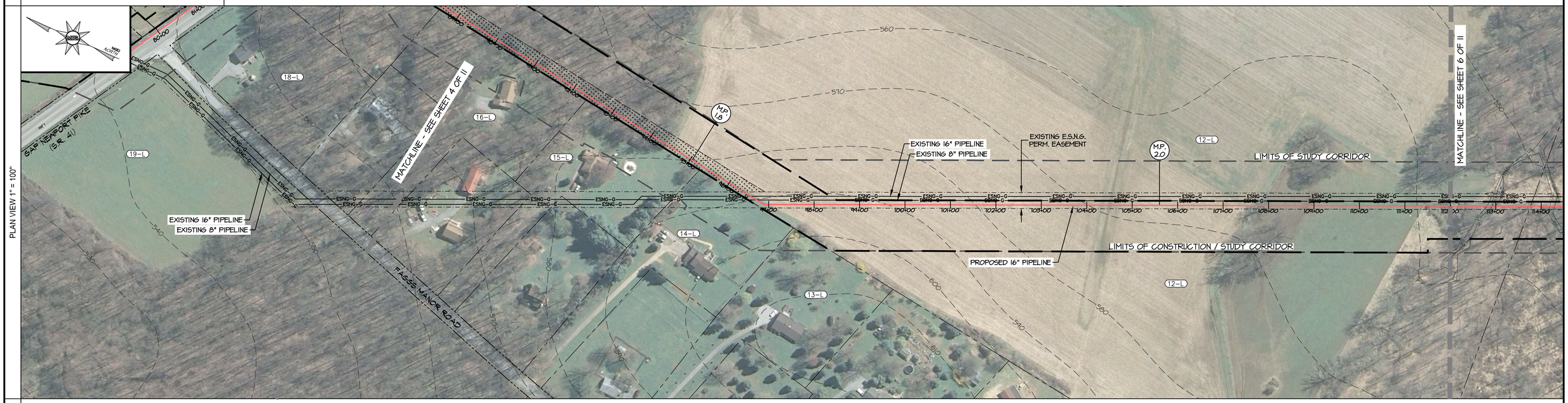
PROJECT NO:	18429	DATE:	12/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	4 OF 11

20160425-4003 FERC PDF (Unofficial) 04/25/2016

OWNERSHIP

ANGLES

PLAN VIEW 1" = 100'



MATERIAL

16" PIPELINE

90+00 — 112+00

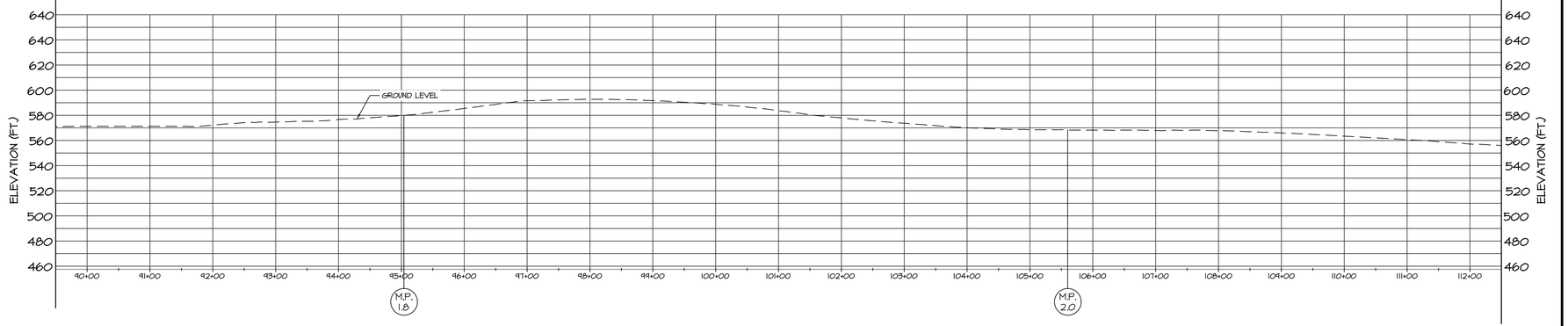
TERRAIN/ ENVIRONMENTAL

WOODED: 90+00 — 94+36

CLEARED: 94+36 — 112+00

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE

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SCALE: 1" = 100'

STATIONS

20160425-4003 FERC PDF (Unofficial) 04/25/2016

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

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16" PROPOSED PIPELINE
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HIGHLAND/LONDONDERRY TOWNSHIPS, PA

PROJECT NO:	18429	DATE:	12/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	5 OF 11

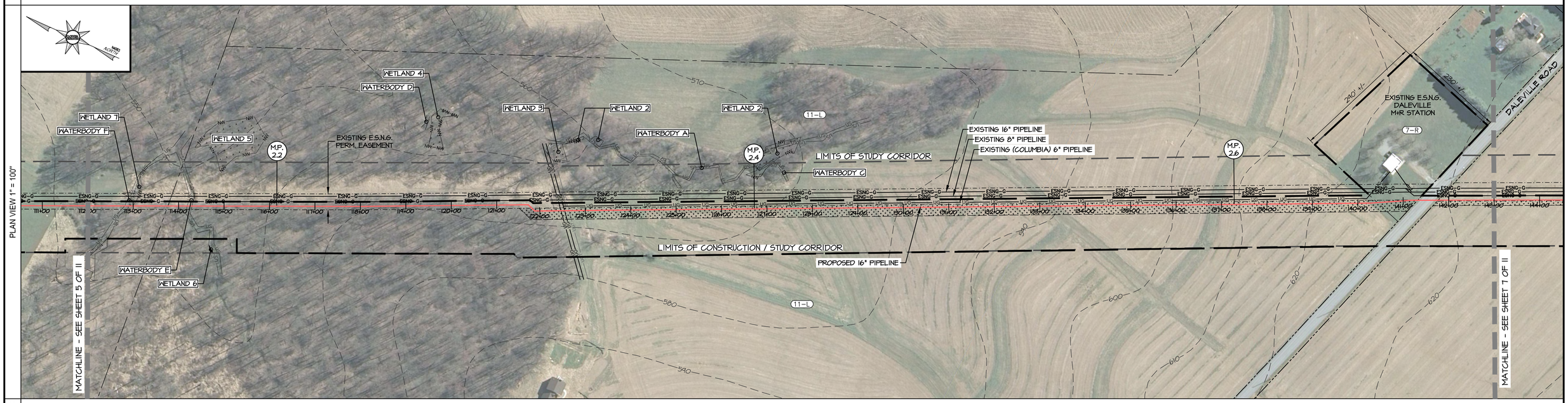
OWNERSHIP

12-L N/F LLANDUEY LTD. | 11-L N/F HANS & TONYA E. STOLTZFUS | 7-R N/F EASTERN SHORE NATURAL GAS CO. | DALEVILLE ROAD | 10-L N/F PIOS STREET ROAD FARM, LP.

112+00 | 113+74 | 140+35 | 141+27 | 141+72 | 143+00

ANGLES

PLAN VIEW 1" = 100'



MATERIAL STATIONS

16" PIPELINE

112+00 | 143+00

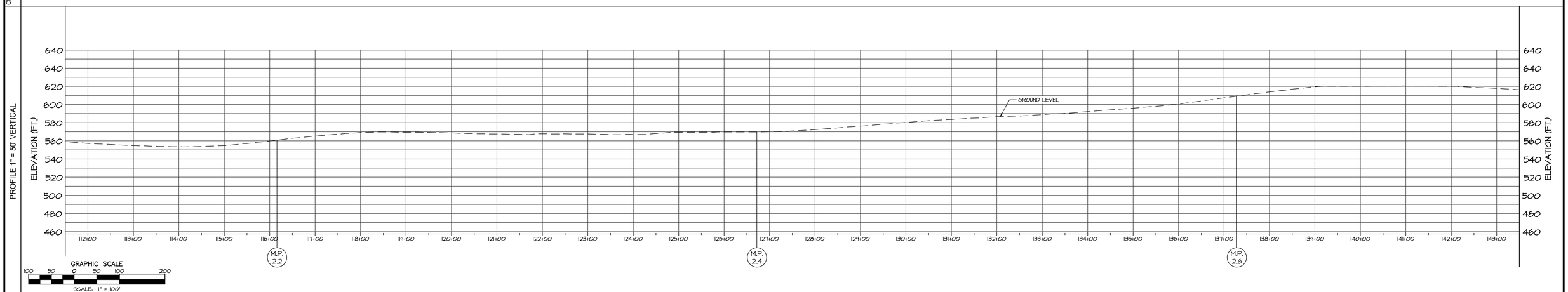
TERRAIN/ ENVIRONMENTAL

CLEARED | WATERS OF THE U.S. | CLEARED | WATERS OF THE U.S. | CLEARED

112+00 | 112+82 | 112+91 | 114+19 | 114+30 | 143+00

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
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SCALE: 1" = 100'

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

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16" PROPOSED PIPELINE
DALEVILLE LOOP
WHITE OAK MAINLINE EXPANSION PROJECT
HIGHLAND/LONDONDERRY TOWNSHIPS, PA

PROJECT NO:	18429	DATE:	12/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	6 OF 11

20160425-4003 FERC PDF (Unofficial) 04/25/2016

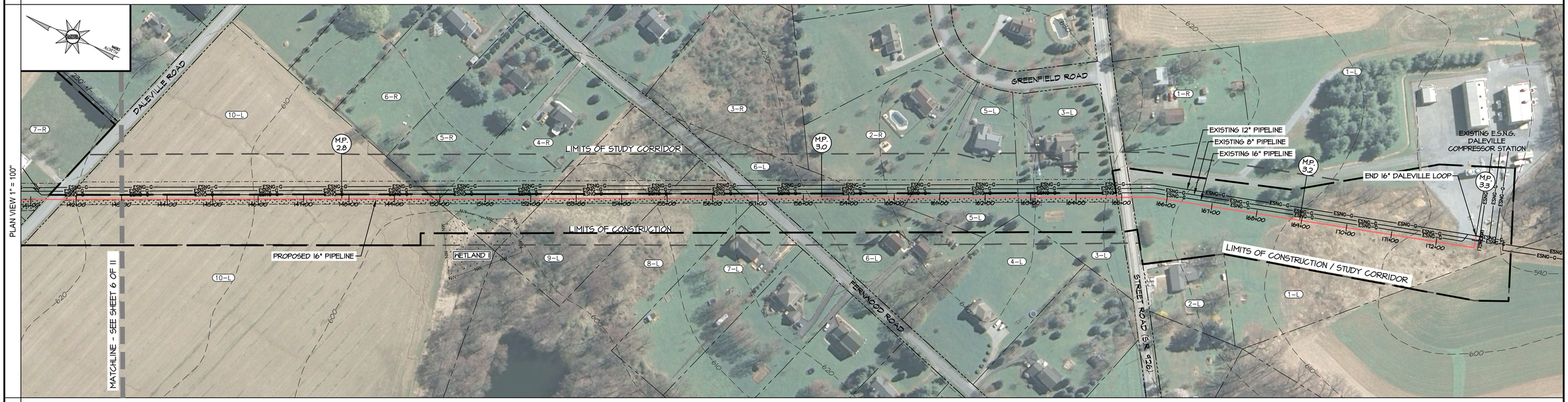
20160425-4008 FERC PDF (Unofficial) 04/25/2016

OWNERSHIP

143+00	(10-L) N/F PIOS STREET ROAD FARM, LP.	149+88	(4-R) N/F MARK L. & DENISE BLACH	152+27	(9-L) N/F PIOS STREET ROAD FARM, LP.	154+86	(8-L) N/F PIOS STREET ROAD FARM, LP.	156+72	FERNWOOD ROAD (6-L) N/F DAVID & CRYSTAL M. DICKENS	159+73	(2-R) N/F MARK & MELANIE SCHILLINGER (5-L) N/F FRANCIS A. & JANICE U. LASAK	162+69	(3-L) N/F RANDY K. & KATHLEEN E. BEACH	164+86	STREET ROAD (1-L) N/F EASTERN SHORE NATURAL GAS CO.	173+11
	(5-R) N/F WILLIAM H. & HEATHER E. DITZEL															

ANGLES

PLAN VIEW 1" = 100'



MATERIAL

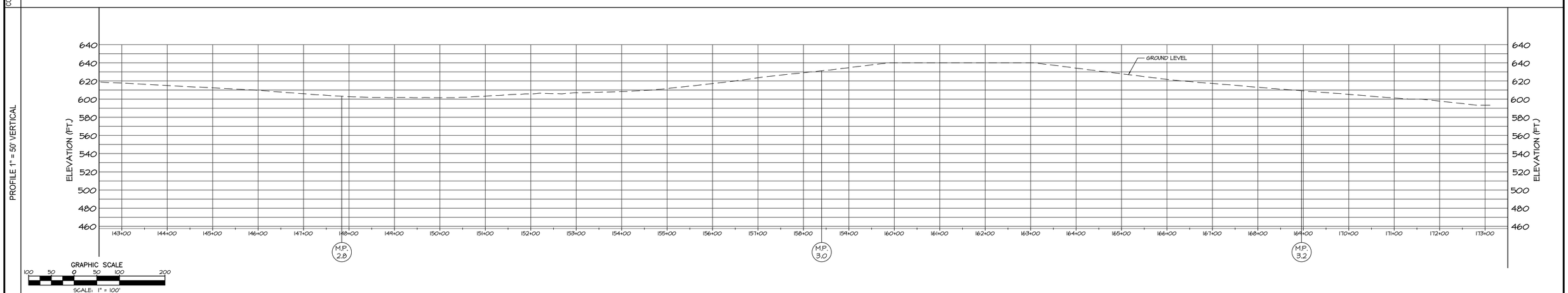
16" PIPELINE (143+00 to 173+11)

TERRAIN/ ENVIRONMENTAL

CLEARED (143+00 to 173+11)

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
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SCALE: 1" = 100'

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

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TELEPHONE (302) 734-6710 - FAX (302) 734-6745

16" PROPOSED PIPELINE DALEVILLE LOOP
WHITE OAK MAINLINE EXPANSION PROJECT
HIGHLAND/LONDONDERRY TOWNSHIPS, PA

PROJECT NO:	18429	DATE:	12/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	7 OF 11

OWNERSHIP

Parcel	Owner	Stations
KI-1	N/F-MICHAEL D. & DEBRA MCCLEARY YATES	0+00 – 0+42
HESS MILL ROAD		0+42 – 0+79
KI-2	N/F-MICHAEL F. & LISA A. LLOYD	0+79 – 3+27
KI-3	N/F-DAVID A. & TRACY S. PHILIPP	3+27 – 5+53
WINGATE DRIVE		5+53 – 6+04
KI-5	N/F-FREDRICK F. & HEIDI M. SCHEING	6+04 – 9+93
KI-6		9+93 – 12+91
KI-9	N/F-THOMAS E. & MELISSA W. SARVER	12+91 – 17+15
KI-9.01		17+15 – 17+68
KI-10		17+68 – 19+00

ANGLES

PLAN VIEW 1" = 100'

STATIONS

MATERIAL

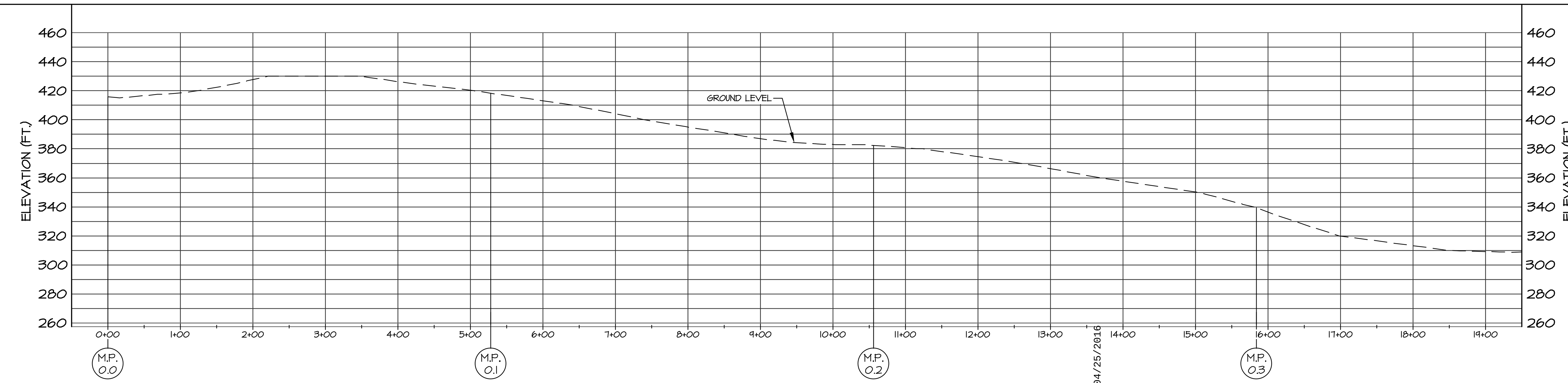
0+00 — 16" PIPELINE — 19+00

TERRAIN / ENVIRONMENTAL

0+00 — CLEARED — 11+57 — WOODED — 12+99 — CLEARED — 19+00

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
100 50 0 50 100 200
SCALE: 1" = 100'

MATERIAL SPECIFICATIONS								TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.			STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

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WWW.MRAGTA.COM

EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

16" PROPOSED PIPELINE
KEMBLESVILLE ALTERNATIVE 2 LOOP
WHITE OAK MAINLINE EXPANSION PROJECT
FRANKLIN TOWNSHIP, PA

PROJECT NO:	18429	DATE:	12/15/2015
DESIGN BY:	JJM/DKS	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	8 OF 11

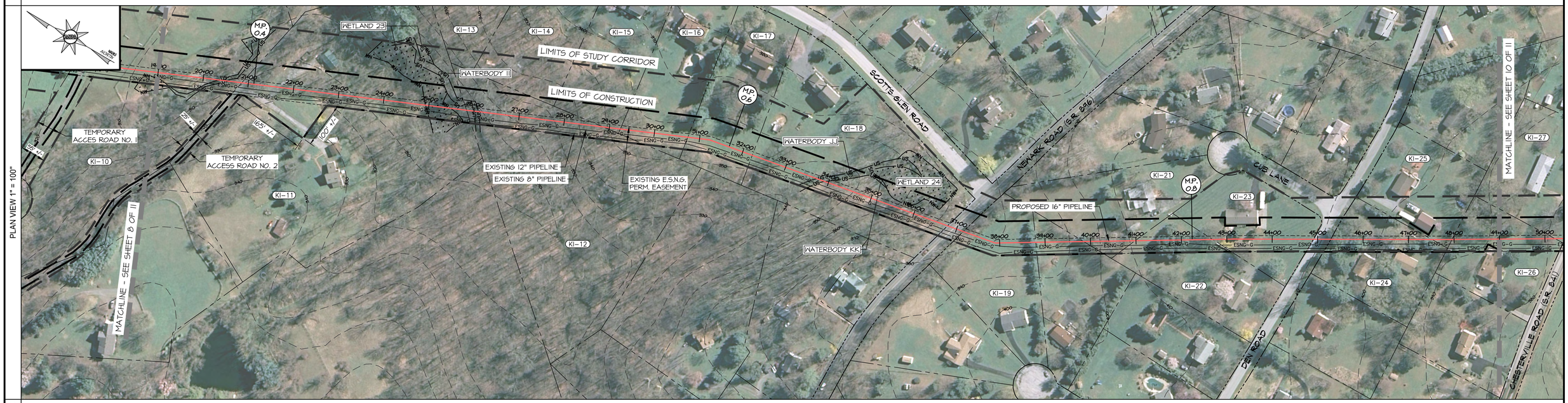
20160425-4003 FERC PDF (Unofficial) 04/25/2016

OWNERSHIP

19+00	KI-10 N/F-THOMAS E. & MELISSA N. SARVER	20+85	KI-11 N/F-PETER E. & KELLY K. MESSIKOMER	25+84	KI-15 N/F-CARLTON R. & JOYCE A. WHITE / KI-12 N/F-CHRISTOPHER B. & MEGAN L. WOLFE	28+85	29+25	KI-16 N/F-STEPHEN H. & KAREN A. ROSSI	30+74	KI-17 N/F-LINDA J. HALDEMAN	32+22	KI-18 N/F-WALTER FISCHUK	36+79	37+16	KI-19 N/F-JOHN A. & LINDA E. FOGLEMAN	38+80	KI-20 N/F-ERIK R. & YVETTE R. JOHNSON	39+45	KI-21 N/F-GEORGE A. & JUDITH R. CRAIG	40+99	KI-22 N/F-IAN STEWART & KERA VALENTIN	42+69	KI-23 N/F-JOSEPH J. & IRENE A. GIBSON	44+91	DEN ROAD	45+29	KI-25 N/F-CARLOS M. RIVERA / KI-24 N/F-HAYWARD S., III & DENISE A. HOUGHTON	47+52	47+96	KI-26 N/F-JAMES PHILIP & MARTHA J. GOMEN	49+00

ANGLES

PLAN VIEW 1" = 100'



STATIONS

MATERIAL

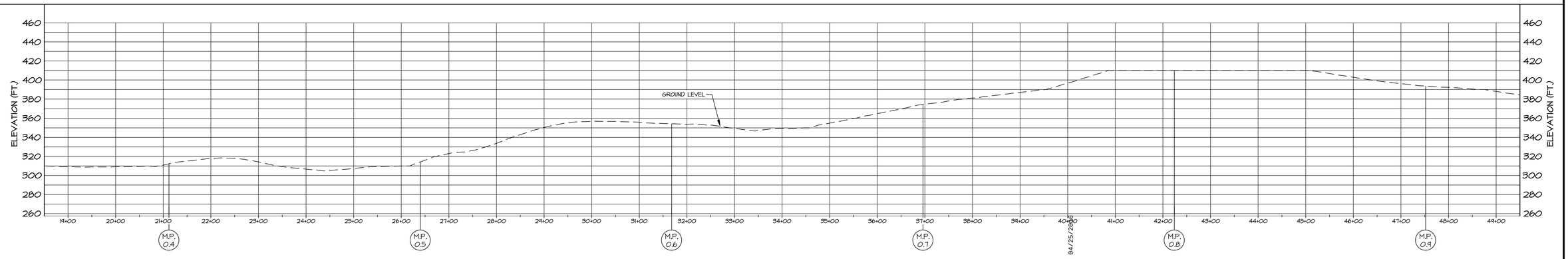
19+00	16" PIPELINE	49+00

TERRAIN/ ENVIRONMENTAL

19+00	19+36	20+34	20+51	20+85	21+05	21+44	22+40	24+92	25+48	25+99	26+10	30+00	33+74	33+92	36+79	37+16	37+47	49+00
CLEARED	WATERS OF U.S.	WOODED		WOODED	CLEARED	WOODED	CLEARED	WOODED	WETLANDS	WOODED	WATERS OF U.S.	WOODED	CLEARED	WATERS OF U.S.	WOODED	CLEARED	WOODED	CLEARED

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
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SCALE: 1" = 100'

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

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NEW CASTLE, DELAWARE 19720
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TELEPHONE (302) 734-6710 - FAX (302) 734-6745

16" PROPOSED PIPELINE
KEMBLESVILLE ALTERNATIVE 2 LOOP
WHITE OAK MAINLINE EXPANSION PROJECT
FRANKLIN TOWNSHIP, PA

PROJECT NO:	18429	DATE:	12/15/2015
DESIGN BY:	JJM/DKS	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	9 OF 11

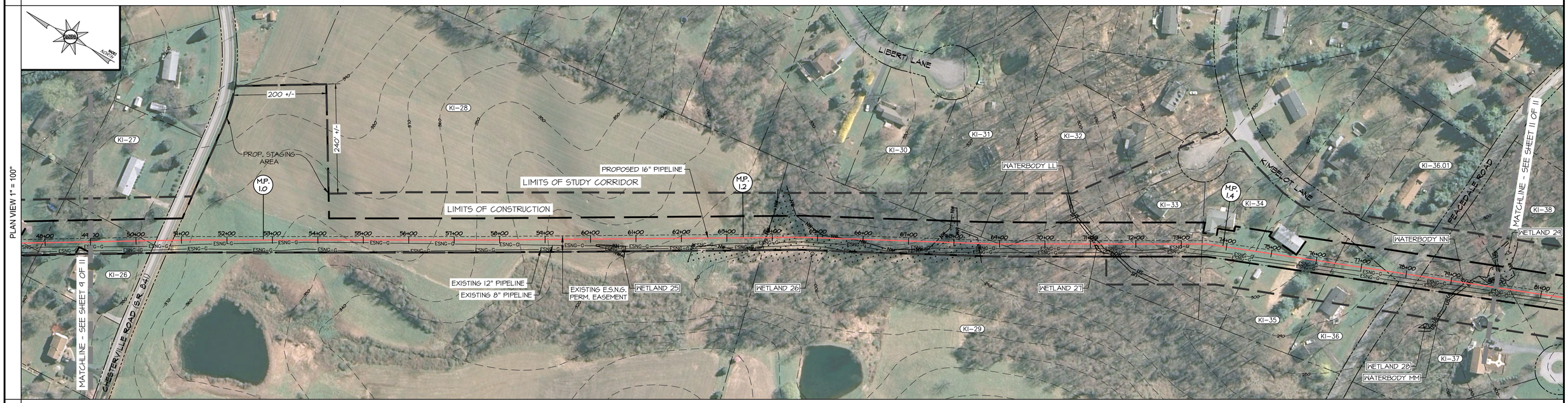
20160425-0060 FERC PDF (Unofficial) 04/25/2016

OWNERSHIP

49+00	50+22	50+44	50+81	63+87	69+01	69+31	73+46	74+65	76+42	77+55	77+96	78+33	80+00
KI-26 N/F JAMES PHILIP & MARTHA J. GOMEN	KI-27 N/F DONALD S. & SHIRLEY PALMER CHESTERVILLE ROAD (S.R. 841)		KI-28 N/F GIFFORD M. NOWLAND	KI-29 N/F DENNIS WHITESEL / KI-30 N/F ANTHONY R. & MARIANNA H. CERULLI	KI-31 N/F MICHAEL L. & JACQUELINE E. ANGELOTTO / KI-32 N/F PAUL A., JR. & CHRISTINE TARABA	KI-33 N/F JOANNE M. MURPHY	KIMBELOT LANE KI-34 N/F WILLIAM A. LANAHAN		PEACEDALE ROAD KI-35 N/F KEVIN & DIANE KLINGER				

ANGLES

PLAN VIEW 1" = 100'



STATIONS

MATERIAL

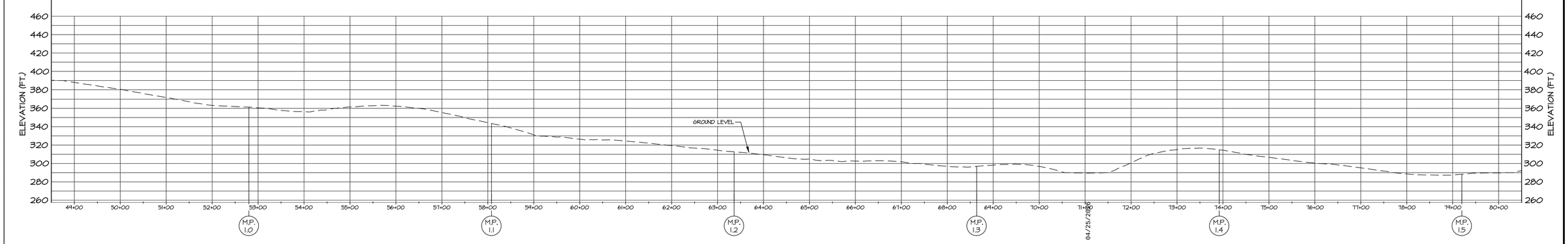
49+00	80+00
16" PIPELINE	

TERRAIN / ENVIRONMENTAL

49+00	63+36	63+85	65+68	67+59	68+54	71+08	71+22	72+77	78+32	79+26	79+43	80+00
CLEARED		WOODED / WETLANDS	WOODED	WETLANDS	WOODED	WETLANDS	WATERS OF U.S. / WOODED	CLEARED		WOODED	WATERS OF U.S. / WOODED	

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
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SCALE: 1" = 100'

MATERIAL SPECIFICATIONS					
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.

TEST LEAD/STATIONS			
STATION	TYPE	STATION	TYPE

REFERENCE DRAWINGS	
DESCRIPTION	DRAWING NUMBER

REVISIONS			
NO.	DATE	DESCRIPTION	BY

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16" PROPOSED PIPELINE
KEMBLESVILLE ALTERNATIVE 2 LOOP
WHITE OAK MAINLINE EXPANSION PROJECT
FRANKLIN TOWNSHIP, PA

PROJECT NO:	18429	DATE:	12/15/2015
DESIGN BY:	JJM/DKS	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	10 OF 11

20160425-0060 FERC PDF (Unofficial) 04/25/2016

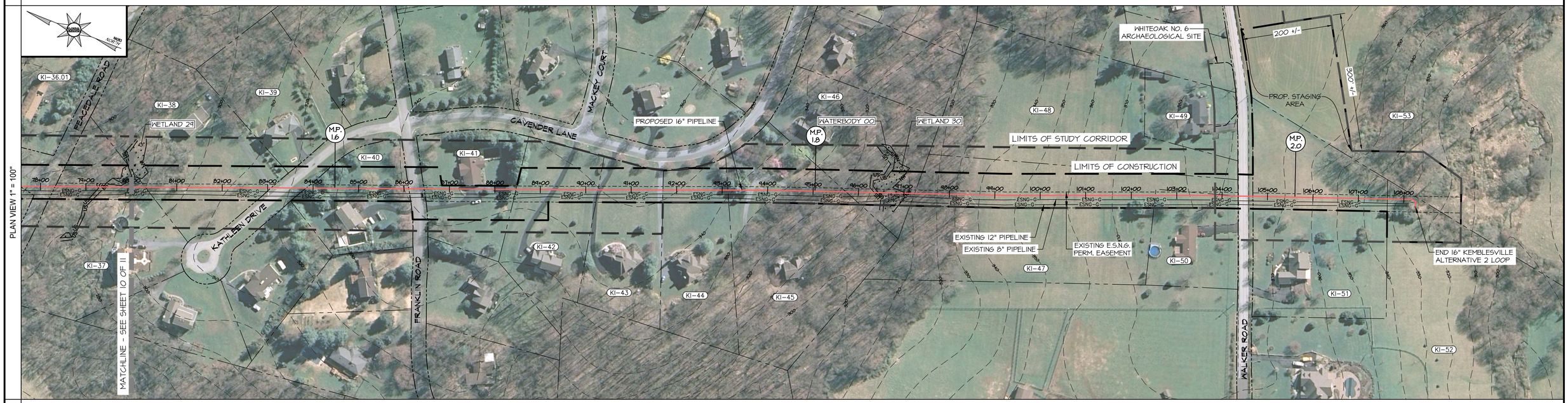
OWNERSHIP

KI-37	KI-38	KI-40	KI-41	KI-42	KI-43	KI-44	KI-45	KI-46	KI-47	KI-50	KI-51	KI-52
N/F-KEVIN & DIANE KLINGER	N/F-MARTIN EDMUND & MARY ELIZABETH PANCZNER	N/F-MICHAEL H. & BARBARA A. SHEAFFER	N/F-ROBERT H. & MARJORIE H. BEACHY	N/F-ERIC C. & TRACY K. NORRIS	N/F-JEFFREY & RACHELLE STOUT	N/F THOMAS J. JR. & SUSAN GLUCIDENIS	N/F-MARK E. & ANDREA L. HAM	N/F-CONSTANCE M. CHIASSON	N/F-DON S. & NANCY M. KONOPSKI		N/F-DENNIS S. & ANDREA L. SOLIDAY	N/F-FRANCES L. LEVINSON

80+00 | 80+30 | 83+08 | 83+65 | 86+11 | 86+44 | 88+46 | 90+27 | 91+70 | 93+13 | 95+73 | 97+23 | 102+53 | 104+33 | 104+35 | 104+68 | 107+64 | 108+39

ANGLES

PLAN VIEW 1" = 100'



STATIONS

MATERIAL

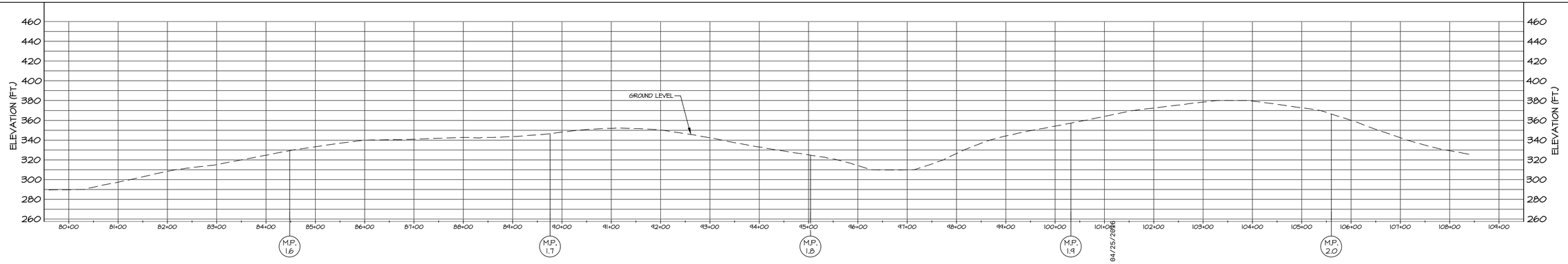
16" PIPELINE: 80+00 – 108+39

TERRAIN/ ENVIRONMENTAL

80+00	80+84	94+53	96+34	96+44	97+04	98+19	108+01	108+27	108+39
WOODED	CLEARED	WATERS OF U.S. WOODED		WETLANDS WOODED			CLEARED	WOODED	CLEARED

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
100 50 0 50 100 200
SCALE: 1" = 100'

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

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16" PROPOSED PIPELINE
KEMBLESVILLE ALTERNATIVE 2 LOOP
WHITE OAK MAINLINE EXPANSION PROJECT
FRANKLIN TOWNSHIP, PA

PROJECT NO:	18429	DATE:	12/15/2015
DESIGN BY:	JJM/DKS	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	11 OF 11

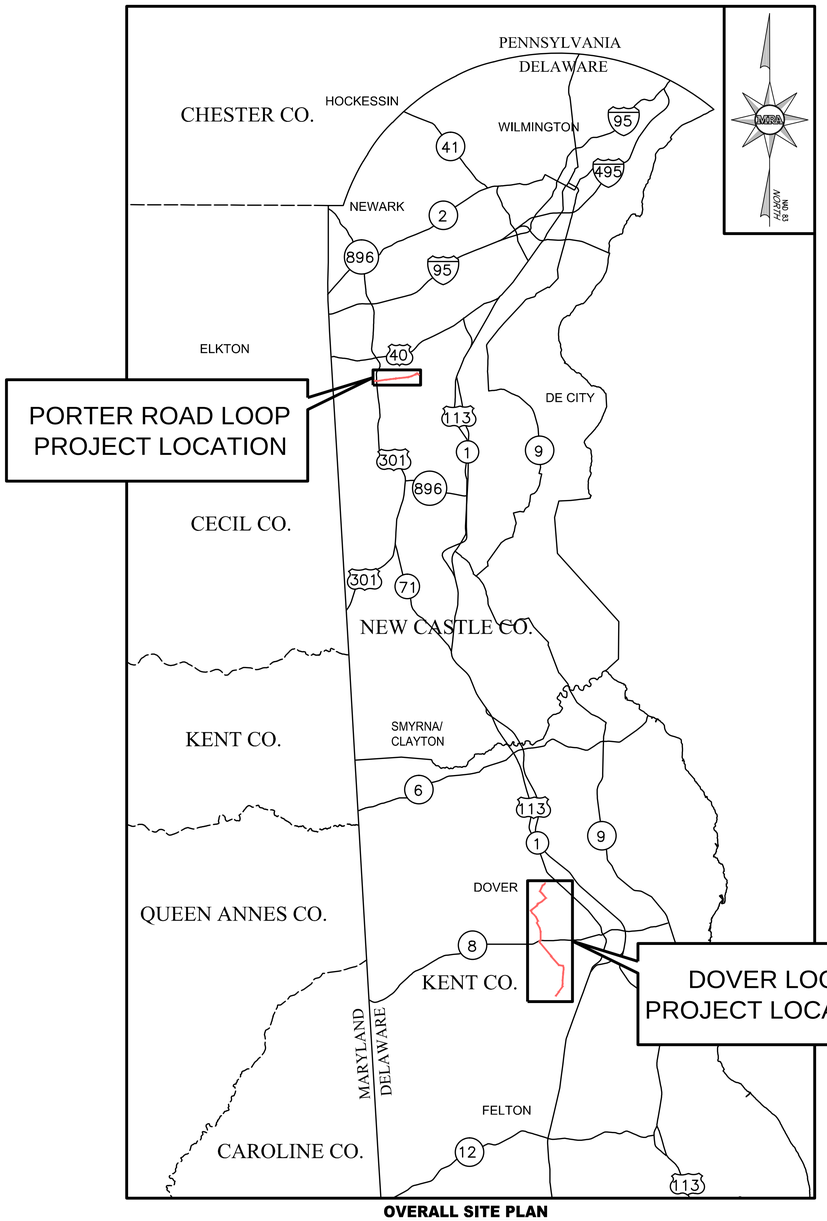
20160425-2806.pdf (Unofficial) 04/25/2016

20160425-4003 FERC PDF (Unofficial) 04/25/2016

Appendix 2 – Detailed Aerial Maps for the System Reliability Project

EASTERN SHORE NATURAL GAS
SYSTEM RELIABILITY PROJECT

NEW CASTLE AND KENT COUNTIES, DELAWARE



OVERALL SITE PLAN

SCALE 1"=20,000'

500 250 0 250 500 1000

SCALE: 1" = 500'

LEGEND

PROPOSED PIPELINE	LIMITS OF STUDY CORRIDOR
EXISTING E.S.N.G. PIPELINE (ESNG-C)	FENCE
LIMITS OF CONSTRUCTION	EXISTING GAS (UG)
EXISTING PERMANENT EASEMENT	CENTERLINE OF STREAM
RAILROAD TRACK	DELINEATED WETLAND BOUNDARY (NW)
ROAD RIGHT-OF-WAY	DELINEATED WATERS OF U.S. (US)
PROPERTY LINE	OVERHEAD UTILITY LINE (OHE)
EDGE OF PAVEMENT	STORM DRAIN (SD)
BUILDING	WATER LINE (W)
PROPOSED PERMANENT EASEMENT	SEWER LINE (SAN)
	FORCE MAIN (FM)

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

MORRIS & RITCHIE ASSOCIATES, INC.
ENGINEERS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
18 BOULDEN CIRCLE, SUITE 36
NEW CASTLE, DELAWARE 19720
(302) 326-2200
FAX: (302) 326-2399
WWW.MRAGTA.COM

EASTERN SHORE NATURAL GAS
510 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

16" PROPOSED PIPELINE
SYSTEM RELIABILITY PROJECT
NEW CASTLE & KENT COUNTIES, DELAWARE

PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	DPS	SCALE:	AS NOTED
CHECKED BY:	CWB	SHEET:	1 OF 19

20160425-4003 FERC PDF (Unofficial) 04/25/2016

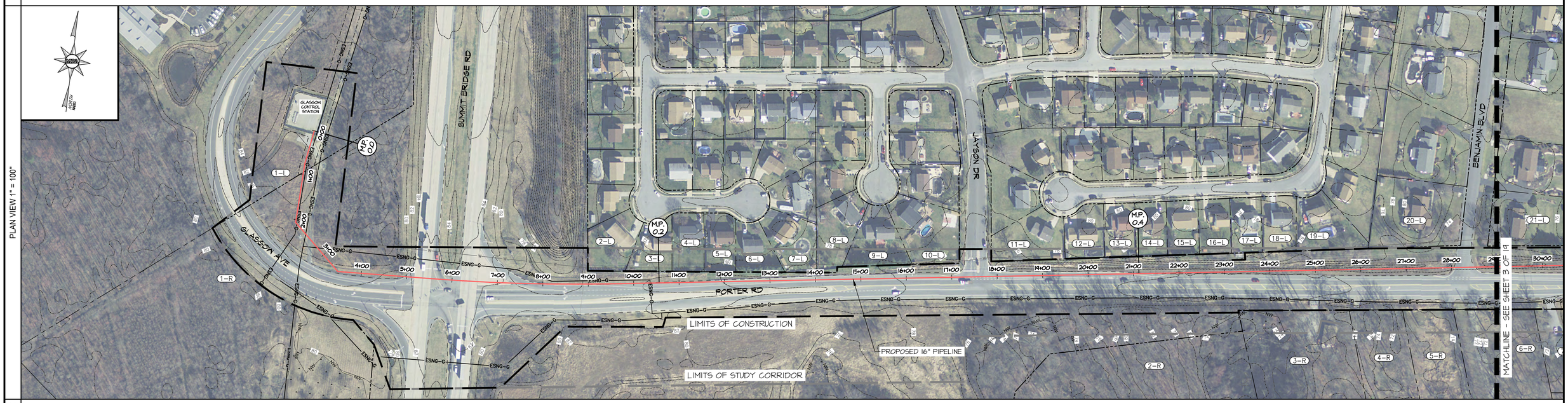
OWNERSHIP

1-L — ESNG PERMANENT EASEMENT

0+00 — SUMMIT BRIDGE ROAD (US 301/S.R. 896) — 8+99 — PORTER ROAD (C.R. 400) — 29+00

ANGLES

PLAN VIEW 1" = 100'



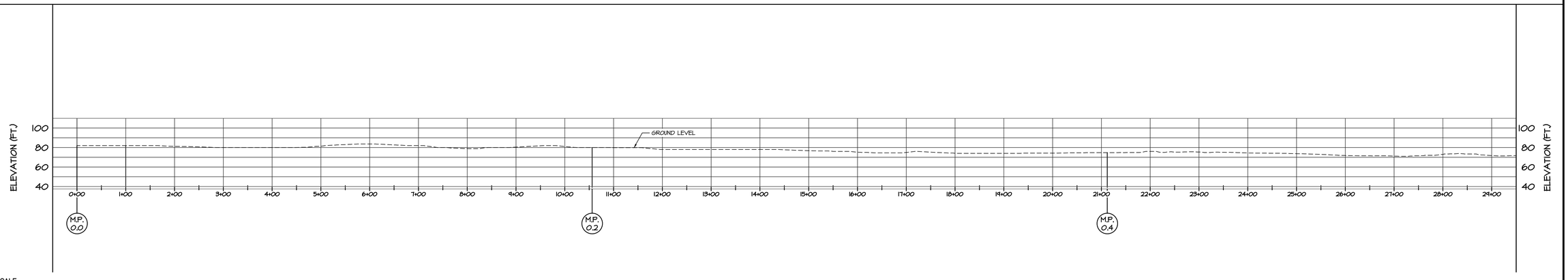
STATIONS

MATERIAL — 16" PIPELINE — 0+00 — 29+00

TERRAIN / ENVIRONMENTAL — CLEARED — 0+00 — 29+00

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
100 50 0 50 100 200
SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
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16" PROPOSED PIPELINE
PORTER ROAD LOOP
SYSTEM RELIABILITY PROJECT
NEW CASTLE COUNTY, DELAWARE

PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	DPS	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	2 OF 19

20160425-4009 FERC PDF (Unofficial) 04/25/2016

OWNERSHIP

ANGLES

PLAN VIEW 1" = 100'

STATIONS

MATERIAL

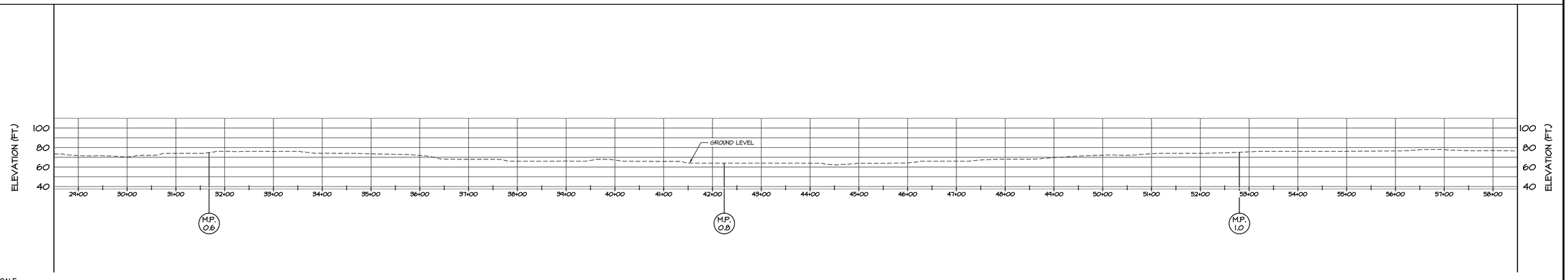
16" PIPELINE

TERRAIN / ENVIRONMENTAL

CLEARED

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
100 50 0 50 100 200
SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

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16" PROPOSED PIPELINE
PORTER ROAD LOOP
SYSTEM RELIABILITY PROJECT
NEW CASTLE COUNTY, DELAWARE

PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	DPS	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	3 OF 19

20160425-4003 FERC PDF (Unofficial) 04/25/2016

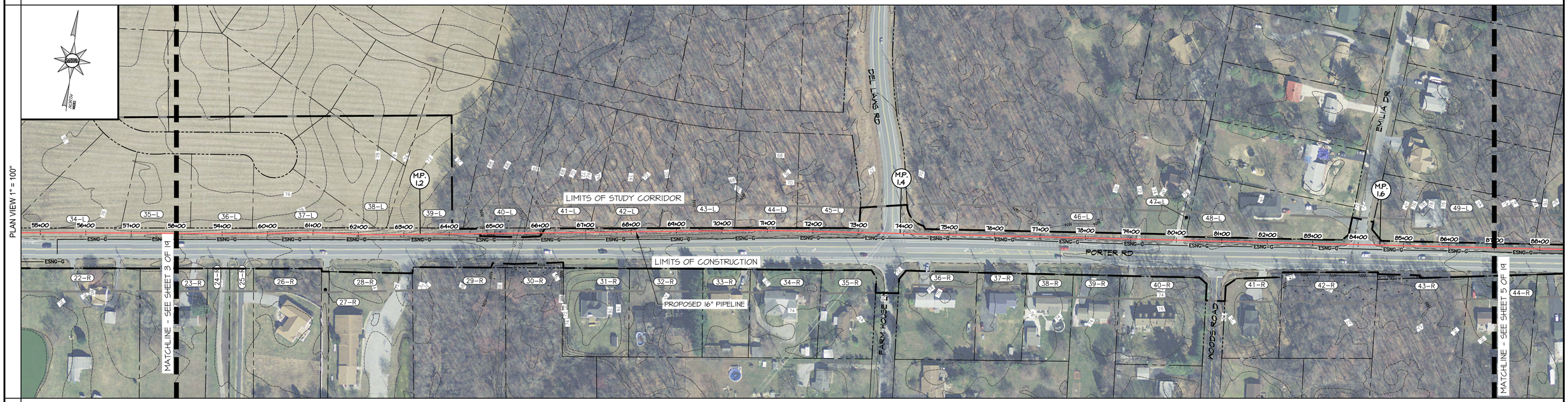
OWNERSHIP

ANGLES

PLAN VIEW 1" = 100'

PORTER ROAD (C.R. 400)

58+00 — 87+00



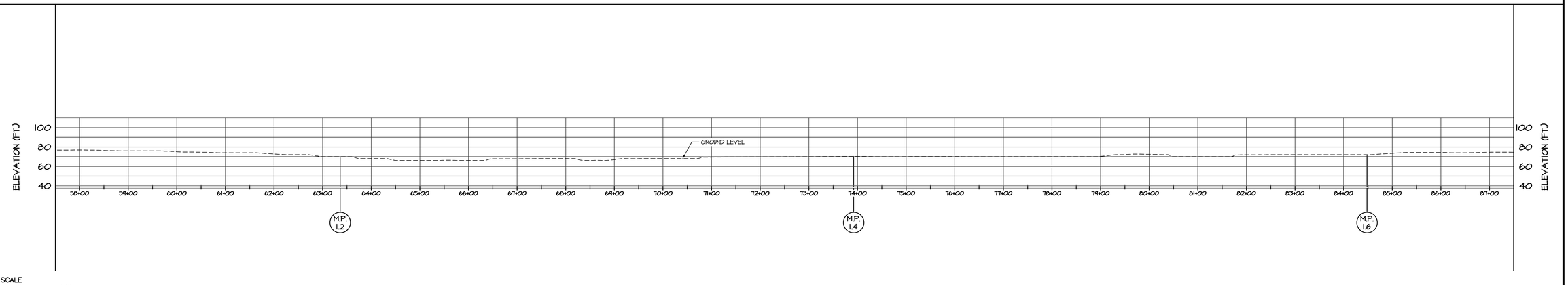
STATIONS

MATERIAL: 16" PIPELINE (58+00 — 87+00)

TERRAIN / ENVIRONMENTAL: CLEARED (58+00 — 87+00)

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
100 50 0 50 100 200
SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

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16" PROPOSED PIPELINE
PORTER ROAD LOOP
SYSTEM RELIABILITY PROJECT
NEW CASTLE COUNTY, DELAWARE

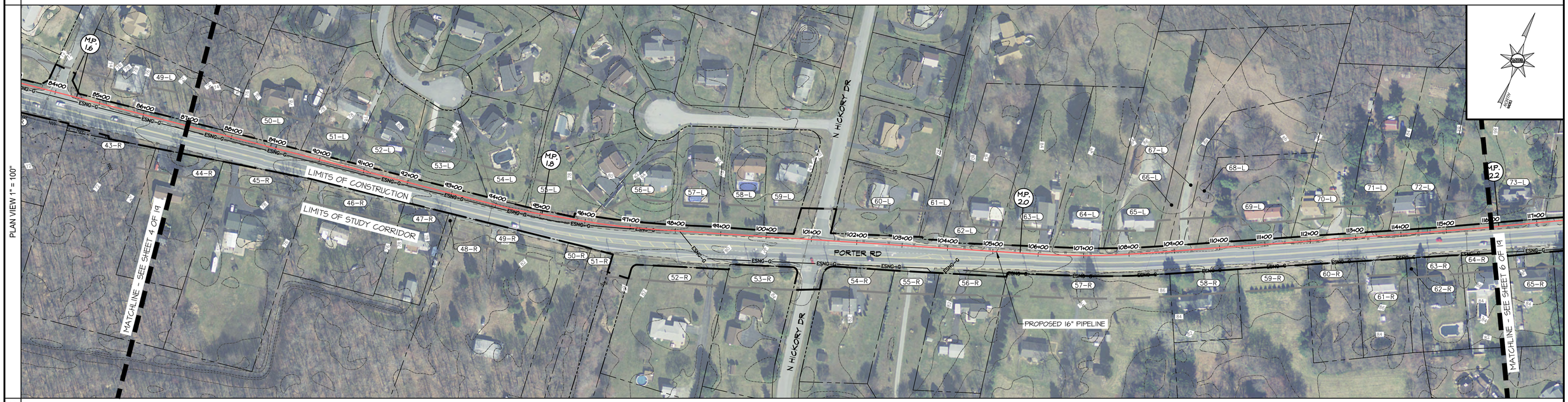
PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	DPS	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	4 OF 19

20160425-4003 FERC PDF (Unofficial) 04/25/2016

OWNERSHIP

ANGLES

PLAN VIEW 1" = 100'



STATIONS

MATERIAL

20160425-4003 FERC PDF (Unofficial) 04/25/2016

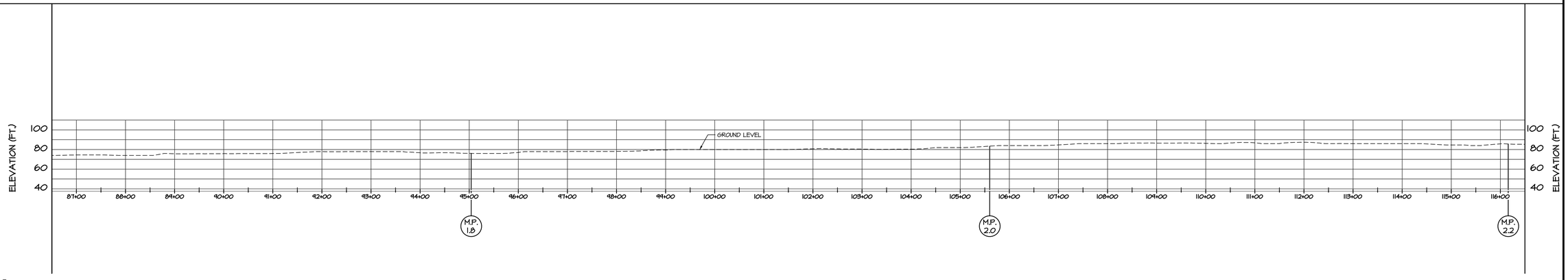
87+00 — 16" PIPELINE — 116+00

TERRAIN / ENVIRONMENTAL

87+00 — CLEARED — 116+00

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
100 50 0 50 100 200
SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

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16" PROPOSED PIPELINE
PORTER ROAD LOOP
SYSTEM RELIABILITY PROJECT
NEW CASTLE COUNTY, DELAWARE

PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	DPS	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	5 OF 19

OWNERSHIP

ANGLES

PLAN VIEW 1" = 100'

STATIONS

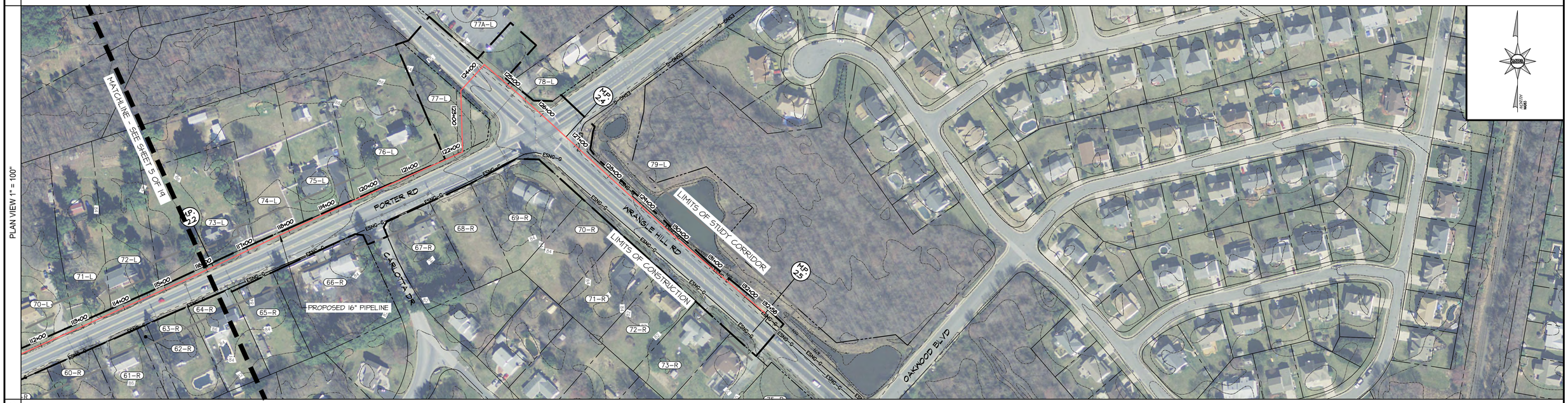
MATERIAL

TERRAIN / ENVIRONMENTAL

CONSTRUCTION METHOD

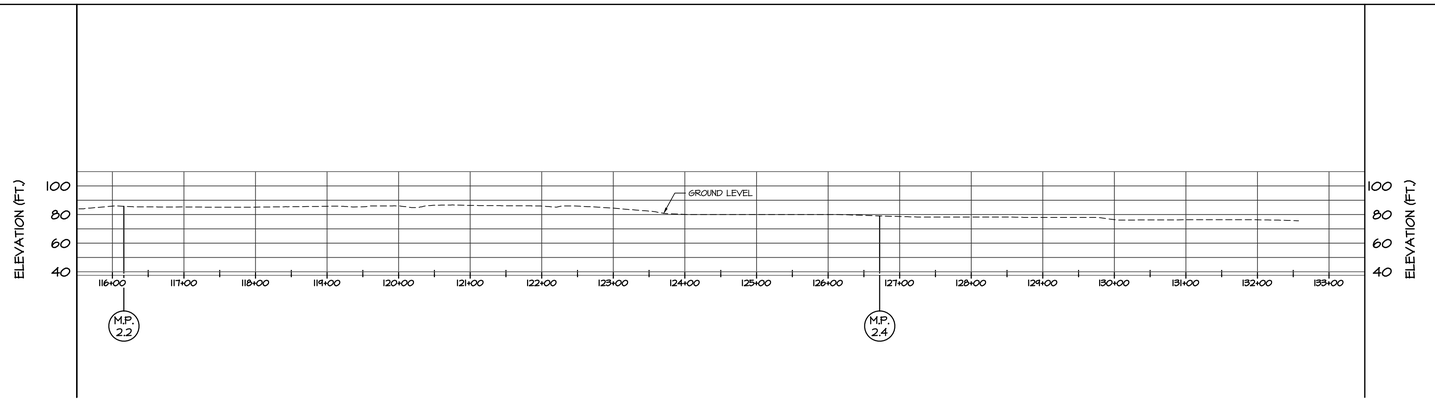
PROFILE 1" = 50' VERTICAL

116+00 — PORTER ROAD (C.R. 400) — 122+28 | (77-L) ESNG PERMANENT EASEMENT | 123+63 — WRANGLE HILL ROAD (C.R. 356) — 132+58



MATERIAL: 16" PIPELINE — 116+00 to 132+58

TERRAIN / ENVIRONMENTAL: CLEARED — 116+00 to 132+58



GRAPHIC SCALE
100 50 0 50 100 200
SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

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16" PROPOSED PIPELINE
PORTER ROAD LOOP
SYSTEM RELIABILITY PROJECT
NEW CASTLE COUNTY, DELAWARE

PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	DPS	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	6 OF 19

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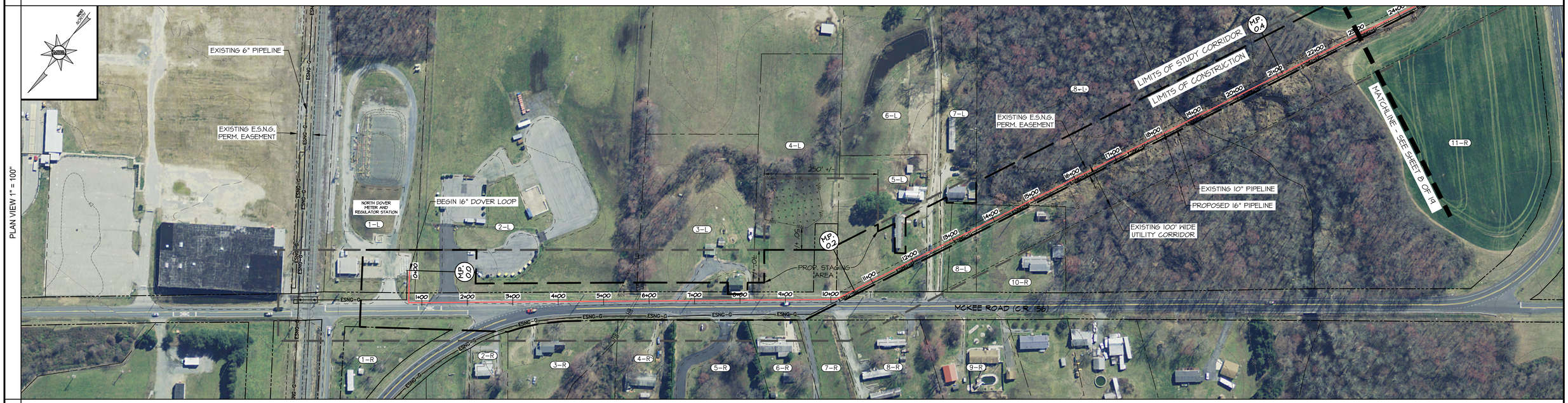
20160425-4003 FERC PDF (Unofficial) 04/25/2016

OWNERSHIP

EASTERN SHORE NATURAL GAS (1-L) | 0+00 | 0+19 | MCKEE ROAD (C.R. 155) | 10+47 | N/F WILLIAM A. & JANICE A. DURHAM (5-L) | 12+28 | 12+92 (6-L) | N/F DAWN E. MORRIS (7-L) | 13+57 (8-L) | 14+67 (10-R) | N/F PAUL & NORMA R. GREENAGE (8-L) | 18+78 | N/F MARY ANN LAMBERTSON (11-R) | 23+00

ANGLES

PLAN VIEW 1" = 100'



STATIONS

MATERIAL

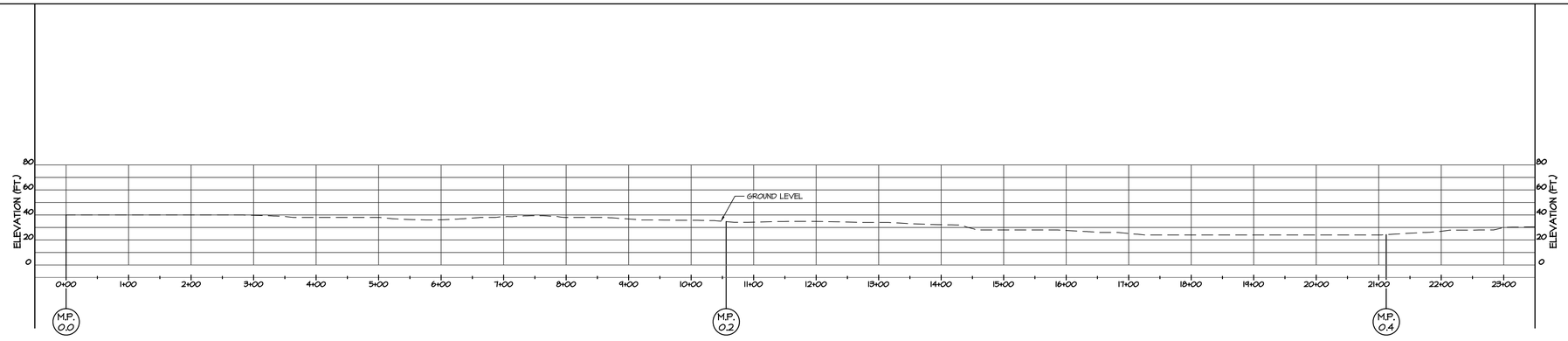
16" PIPELINE: 0+00 – 23+00

TERRAIN / ENVIRONMENTAL

CLEARED: 0+00 – 5+68
U.S. WATERS: 5+68 – 5+74
CLEARED: 5+74 – 14+75
WETLANDS: 14+75 – 15+79
CLEARED: 15+79 – 16+49
WETLANDS: 16+49 – 19+92
U.S. WATERS: 19+92 – 20+28
WETLANDS: 20+28 – 22+21
U.S. WATERS: 22+21 – 23+00

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
100 50 0 50 100 200
SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

MORRIS & RITCHIE ASSOCIATES, INC.
ENGINEERS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
18 BOULDEN CIRCLE, SUITE 36
NEW CASTLE, DELAWARE 19720
(302) 326-2200
FAX: (302) 326-2399
WWW.MRAGTA.COM

EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

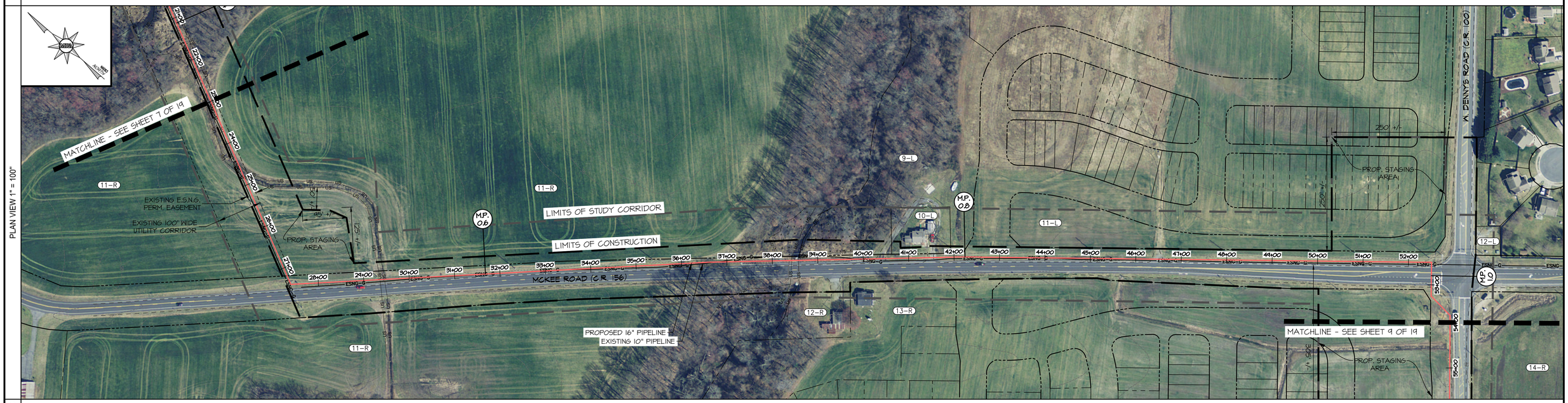
16" PROPOSED PIPELINE
DOVER LOOP
SYSTEM RELIABILITY PROJECT
KENT COUNTY, DELAWARE

PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	7 OF 19

OWNERSHIP

ANGLES

PLAN VIEW 1" = 100'



STATIONS

MATERIAL

16" PIPELINE

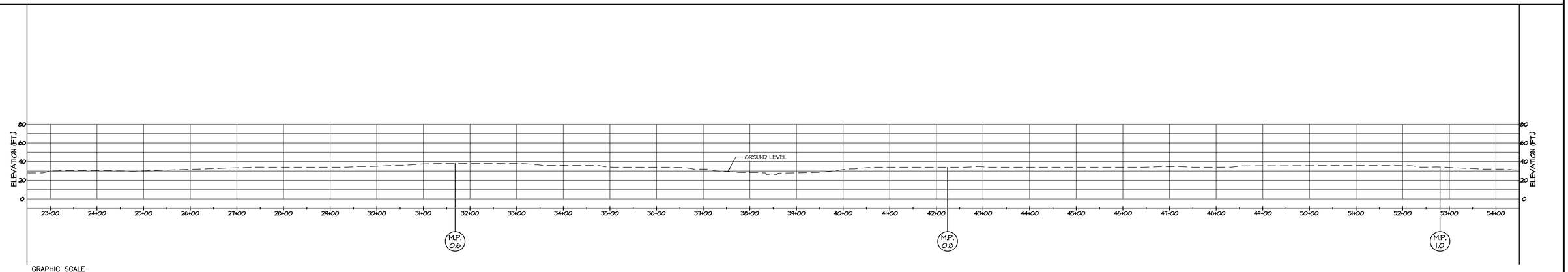
23+00 — 54+00

TERRAIN / ENVIRONMENTAL

U.S. WATERS	CLEARED	U.S. WATERS	CLEARED	U.S. WATERS	CLEARED
23+00	23+45	24+50	24+62	38+43	38+57	54+00

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
100 50 0 50 100 200
SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
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16" PROPOSED PIPELINE
DOVER LOOP
SYSTEM RELIABILITY PROJECT
KENT COUNTY, DELAWARE

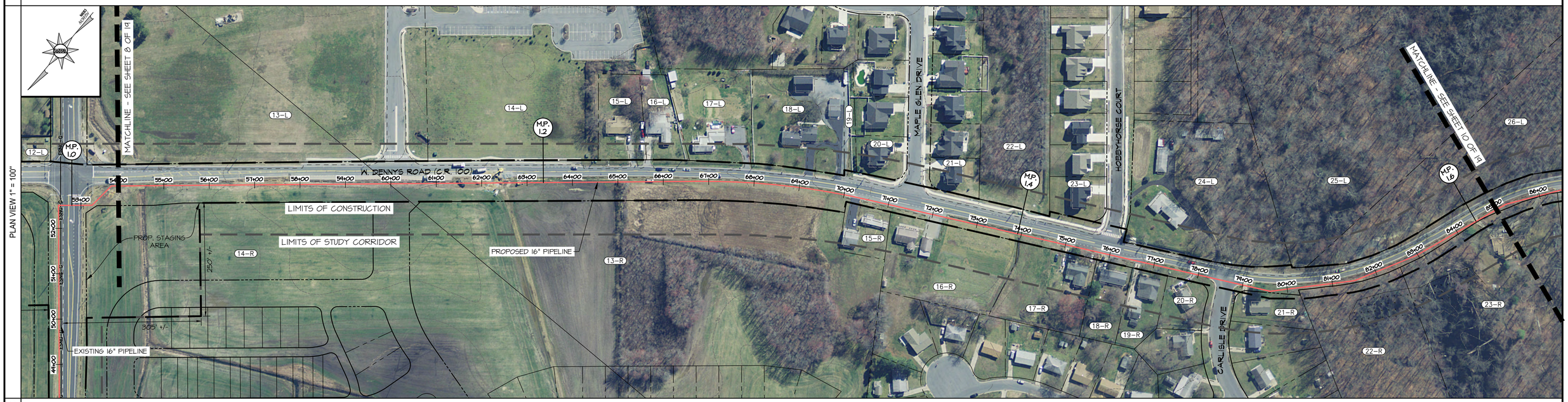
PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	8 OF 19

20160425-4003 FERC PDF (Unofficial) 04/25/2016

OWNERSHIP

ANGLES

PLAN VIEW 1" = 100'



STATIONS

MATERIAL

16" PIPELINE

54+00 — 85+00

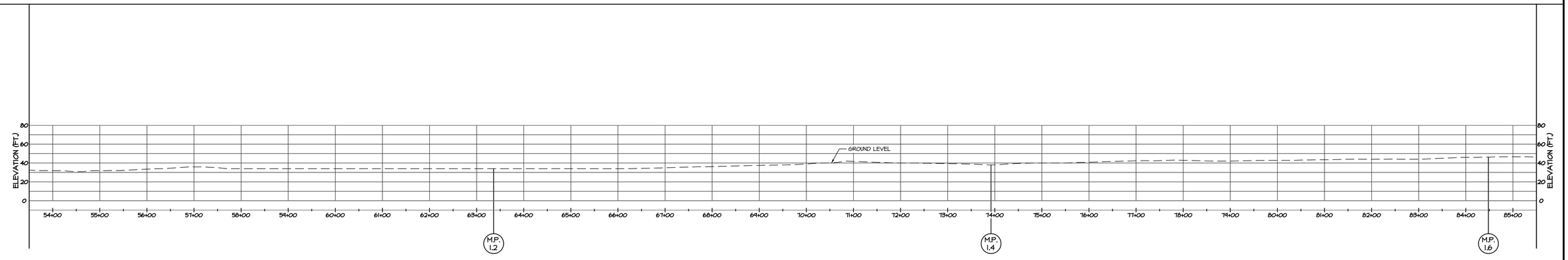
TERRAIN / ENVIRONMENTAL

CLEARED

54+00 — 85+00

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
100 50 0 50 100 200
SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
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16" PROPOSED PIPELINE
DOVER LOOP
SYSTEM RELIABILITY PROJECT
KENT COUNTY, DELAWARE

PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	9 OF 19

20160425-4009 FERC PDF (Unofficial) 04/25/2016

OWNERSHIP

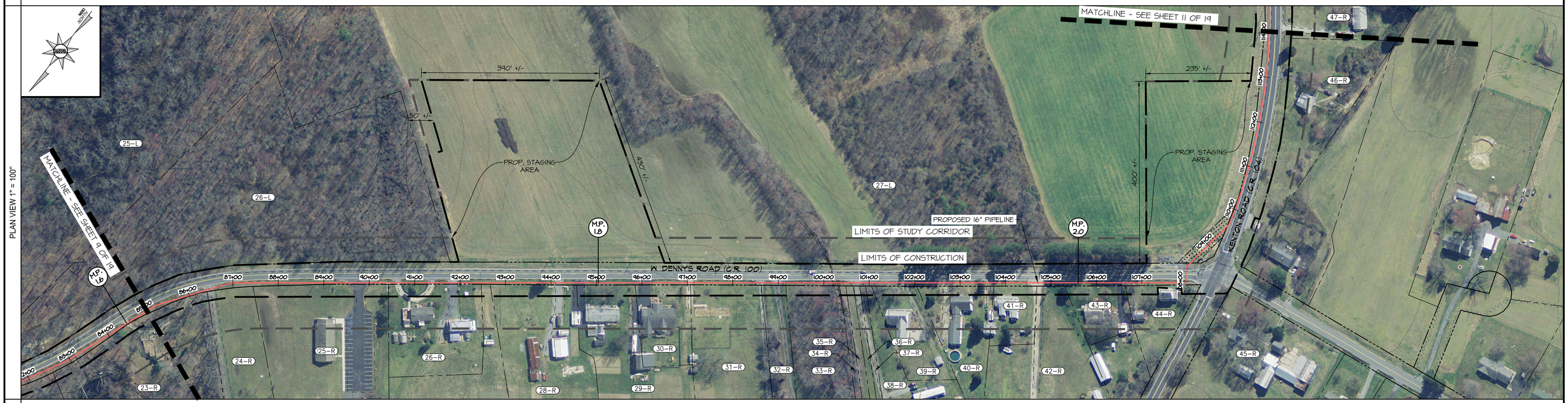
W. DENNYS ROAD (C.R. 100) — 85+00

27-L N/F PRESTWICK ASSOCIATES, INC. — 109+65 to 114+00

KENTON ROAD (C.R. 104) — 114+00

ANGLES

PLAN VIEW 1" = 100'



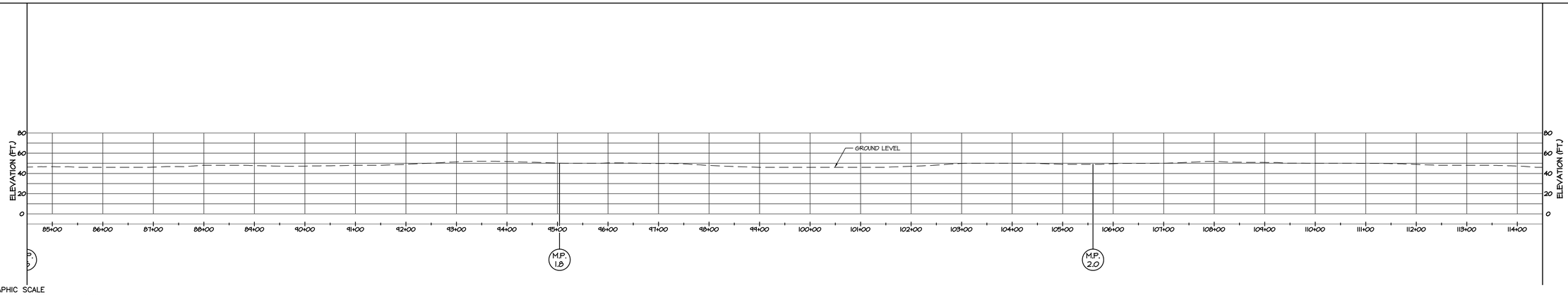
STATIONS

MATERIAL — 16" PIPELINE — 85+00 to 114+00

TERRAIN / ENVIRONMENTAL — CLEARED 85+00 to 100+18; U.S. WATERS 100+18 to 100+20; CLEARED 100+20 to 114+00

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
100 50 0 50 100 200
SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

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16" PROPOSED PIPELINE
DOVER LOOP
SYSTEM RELIABILITY PROJECT
KENT COUNTY, DELAWARE

PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	10 OF 19

20160425-4003 FERC PDF (Unofficial) 04/25/2016

OWNERSHIP

KENTON ROAD (C.R. 104) — 114+00 to 144+46 — 146+00

(60-R) N/F ROBERT L. & LYNN P. EDGELL

ANGLES

PLAN VIEW 1" = 100'

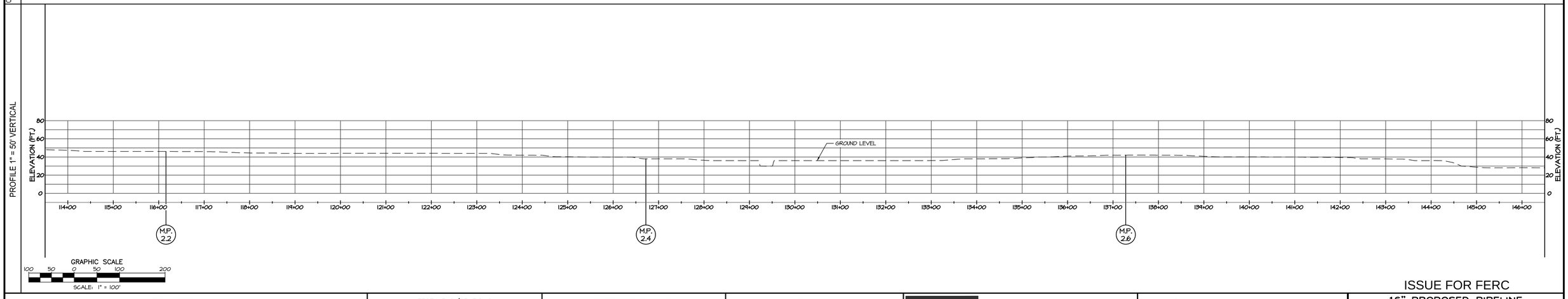
STATIONS

MATERIAL — 16" PIPELINE — 114+00 to 146+00

TERRAIN / ENVIRONMENTAL — CLEARED 114+00 to 129+28; U.S. WATERS 129+28 to 129+54; CLEARED 129+54 to 144+46; WOODED 144+46 to 144+73; WETLANDS 144+73 to 146+00

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
100 50 0 50 100 200
SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

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16" PROPOSED PIPELINE
DOVER LOOP
SYSTEM RELIABILITY PROJECT
KENT COUNTY, DELAWARE

PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	11 OF 19

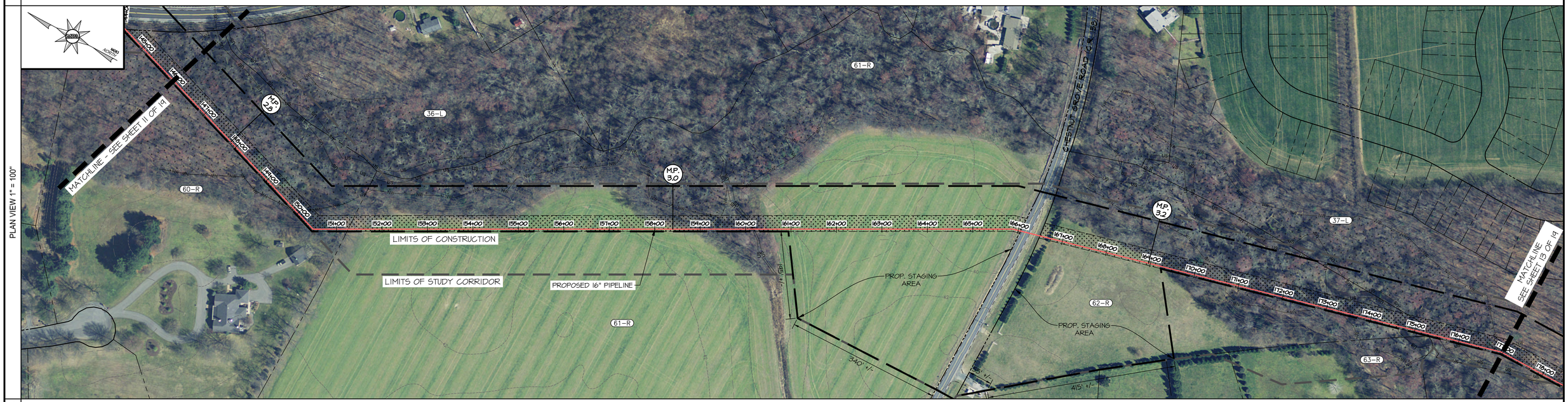
20160425-4008 FERC PDF (Unofficial) 04/25/2016

OWNERSHIP

146+00	60-R N/F ROBERT L. & LYNN P. EDGELL	151+26	61-R N/F MARY ELLEN BOBOLA, ETAL	165+06	CHESTNUT GROVE ROAD (C.R. 158)	166+60	62-R N/F EBEN P. & JACQUELINE M. ROBERTS	175+28	37-L N/F LIBORIO WATERGATE, LLC	177+00

ANGLES

PLAN VIEW 1" = 100'



STATIONS

MATERIAL

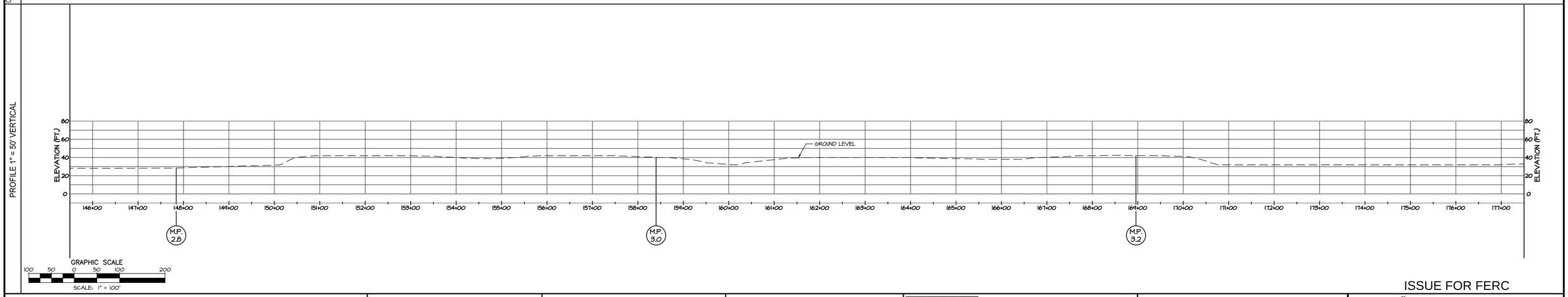
16" PIPELINE

TERRAIN / ENVIRONMENTAL

148+00	WETLANDS	149+88	WOODED	151+26	CLEARED	158+63	U.S. WATERS / WOODED	160+12	WOODED	160+38	CLEARED	169+12	WOODED	170+71	WETLANDS	172+83	WOODED / WETLANDS	173+28	WOODED / U.S. WATERS / WETLANDS	174+58	WOODED	176+05	WETLANDS	177+00

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
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SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

MORRIS & RITCHIE ASSOCIATES, INC.
ENGINEERS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
18 BOULDEN CIRCLE, SUITE 36
NEW CASTLE, DELAWARE 19720
(302) 326-2200
FAX: (302) 326-2399
WWW.MRAGTA.COM

EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

16" PROPOSED PIPELINE
DOVER LOOP
SYSTEM RELIABILITY PROJECT
KENT COUNTY, DELAWARE

PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	12 OF 19

20160425-4003 FERC PDF (Unofficial) 04/25/2016

20160425-4003 FERC PDF (Unofficial) 04/25/2016

OWNERSHIP

37-L NF LIBORIO WATERGATE, LLC | 64-R NF TKFM, LLC | 65-R NF TKFM, LLC | FORREST AVE | DOVER HIGH DRIVE

177+00 | 178+48 | 188+20 | 201+22 | 205+90 | 207+00

ANGLES

PLAN VIEW 1" = 100'

STATIONS

MATERIAL

16" PIPELINE

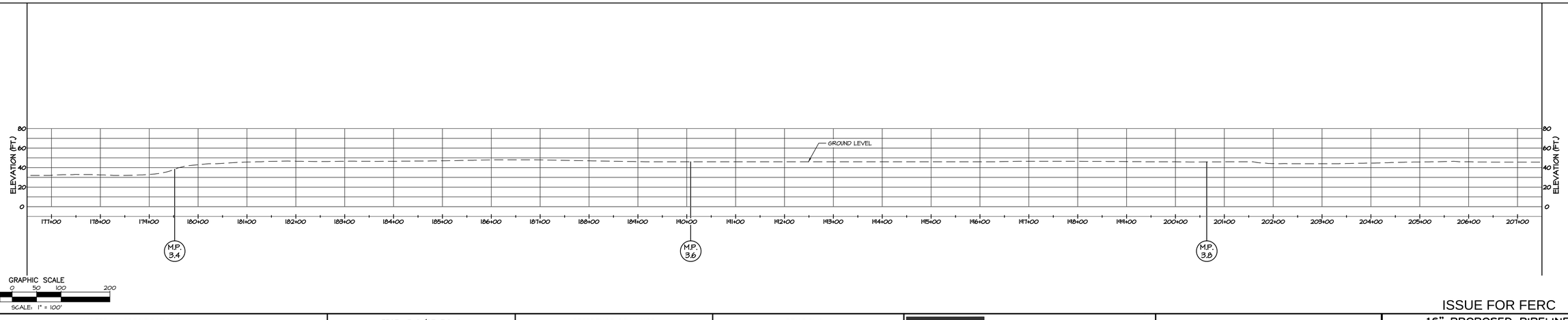
177+00 | 207+00

TERRAIN / ENVIRONMENTAL

WETLANDS 177+00 | WOODED 177+06 | 178+21 | U.S. WATERS 178+79 | WOODED 181+07 | CLEARED 207+00

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
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SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

MORRIS & RITCHIE ASSOCIATES, INC.
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16" PROPOSED PIPELINE
DOVER LOOP
SYSTEM RELIABILITY PROJECT
KENT COUNTY, DELAWARE

PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	13 OF 19

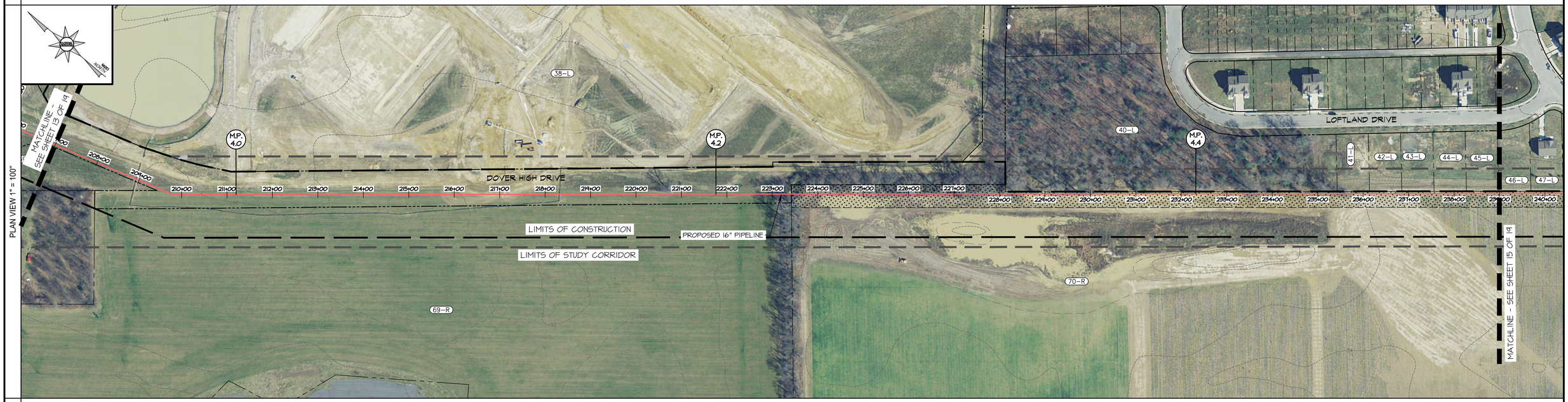
OWNERSHIP

DOVER HIGH DRIVE (207+00 – 223+42)

10-R N/F FARM LANDS, LP (223+42 – 238+00)

ANGLES

PLAN VIEW 1" = 100'



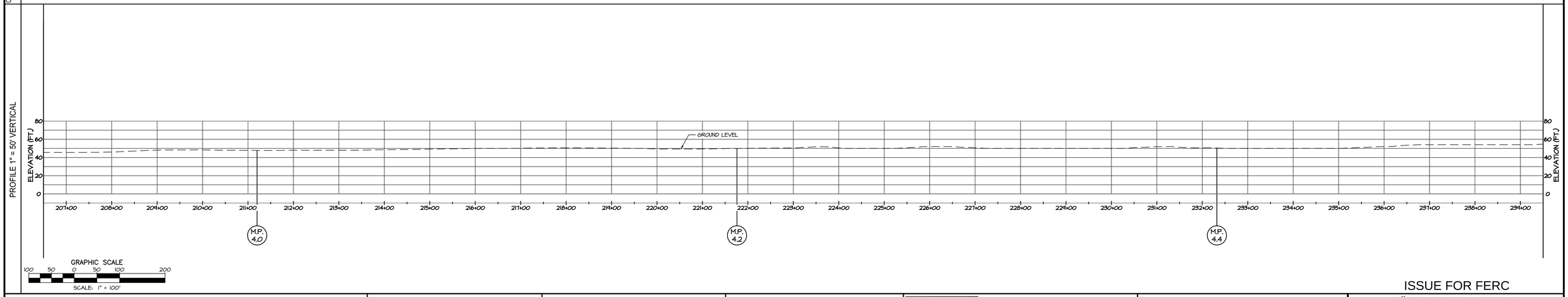
STATIONS

MATERIAL: 16" PIPELINE (207+00 – 238+00)

TERRAIN / ENVIRONMENTAL: CLEARED (207+00 – 223+14); WOODED (223+14 – 223+63); CLEARED (223+63 – 238+00)

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
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SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

MORRIS & RITCHIE ASSOCIATES, INC.
ENGINEERS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
18 BOULDEN CIRCLE, SUITE 36
NEW CASTLE, DELAWARE 19720
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FAX: (302) 326-2399
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EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

16" PROPOSED PIPELINE
DOVER LOOP
SYSTEM RELIABILITY PROJECT
KENT COUNTY, DELAWARE

PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	14 OF 19

20160425-4003 FERC PDF (Unofficial) 04/25/2016

OWNERSHIP

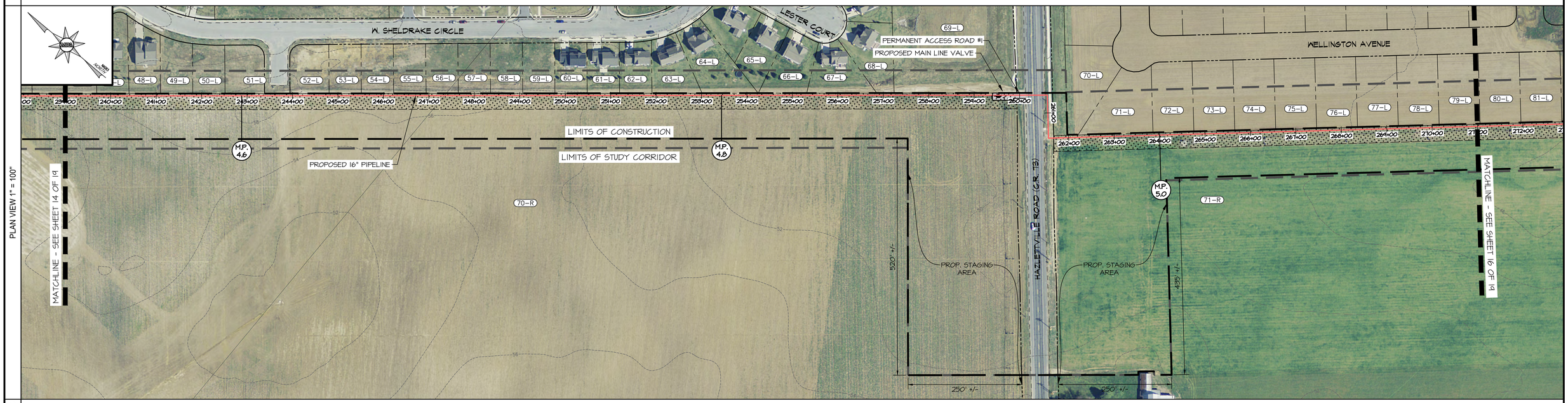
T0-R N/F FARM LANDS, LP (239+00 – 259+94)

HAZLETTVILLE ROAD (C.R. 73) (261+67)

T1-R N/F FARM LANDS, LP (271+00)

ANGLES

PLAN VIEW 1" = 100'



STATIONS

MATERIAL

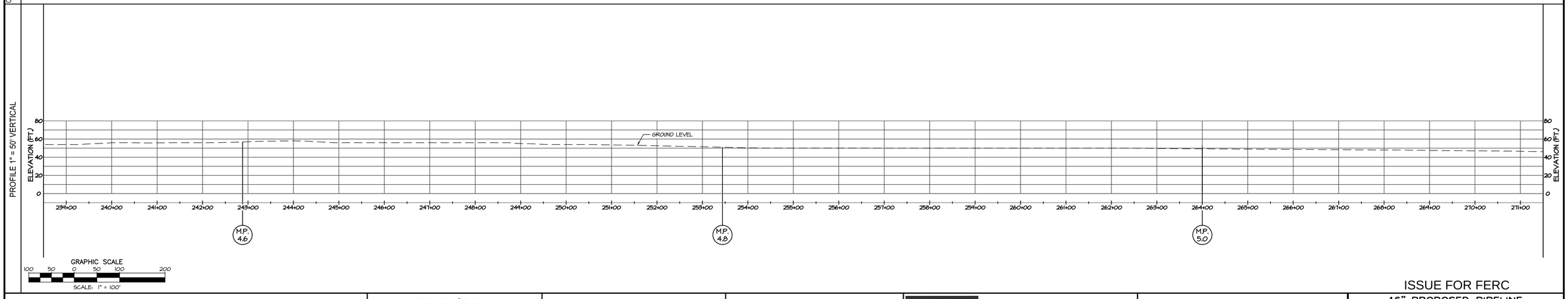
239+00 — 16" PIPELINE — 271+00

TERRAIN / ENVIRONMENTAL

239+00 — CLEARED — 271+00

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
100 50 0 50 100 200
SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

MORRIS & RITCHIE ASSOCIATES, INC.
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16" PROPOSED PIPELINE
DOVER LOOP
SYSTEM RELIABILITY PROJECT
KENT COUNTY, DELAWARE

PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	15 OF 19

20160425-4003 FERC PDF (Unofficial) 04/25/2016

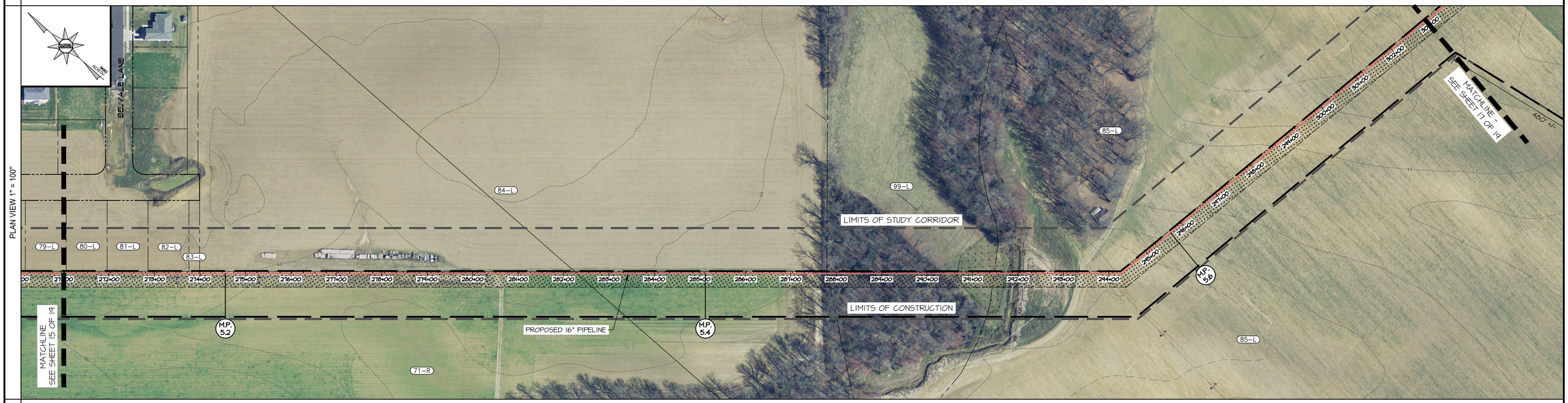
20160425-4003 FERC PDF (Unofficial) 04/25/2016

OWNERSHIP

271+00 — 71-R N/F FARM LANDS, LP — 287+80 — 99-L N/F STEPHANIE LEHANE & LINDA C. FIZER, TRUSTEES — 291+47 — 85-L N/F FARM LANDS, LP — 303+00

ANGLES

PLAN VIEW 1" = 100'



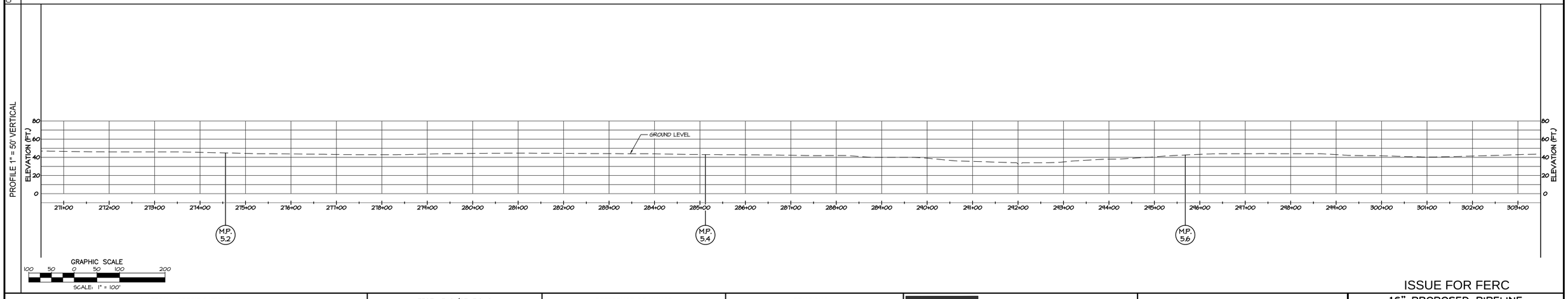
STATIONS

MATERIAL: 271+00 — 16" PIPELINE — 303+00

TERRAIN / ENVIRONMENTAL: 271+00 — CLEARED — 287+66 — WOODED — 290+38 — CLEARED — 303+00

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
100 50 0 50 100 200
SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

MORRIS & RITCHIE ASSOCIATES, INC.
ENGINEERS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
18 BOULDEN CIRCLE, SUITE 36
NEW CASTLE, DELAWARE 19720
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EASTERN SHORE NATURAL GAS
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16" PROPOSED PIPELINE
DOVER LOOP
SYSTEM RELIABILITY PROJECT
KENT COUNTY, DELAWARE

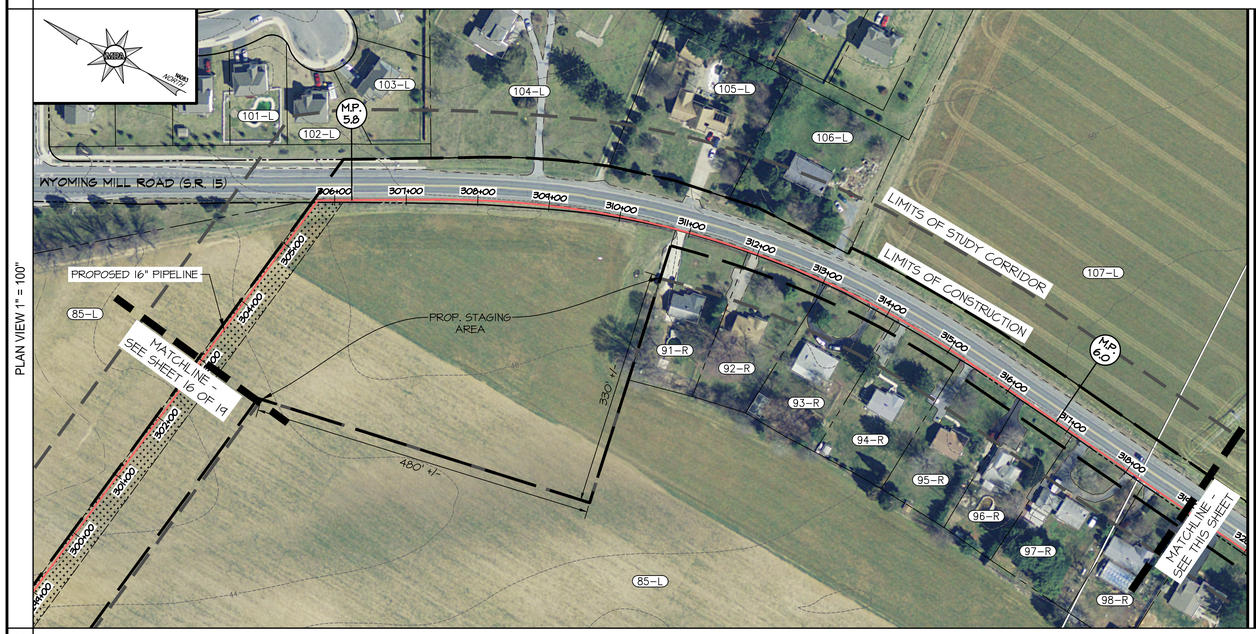
PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	16 OF 19

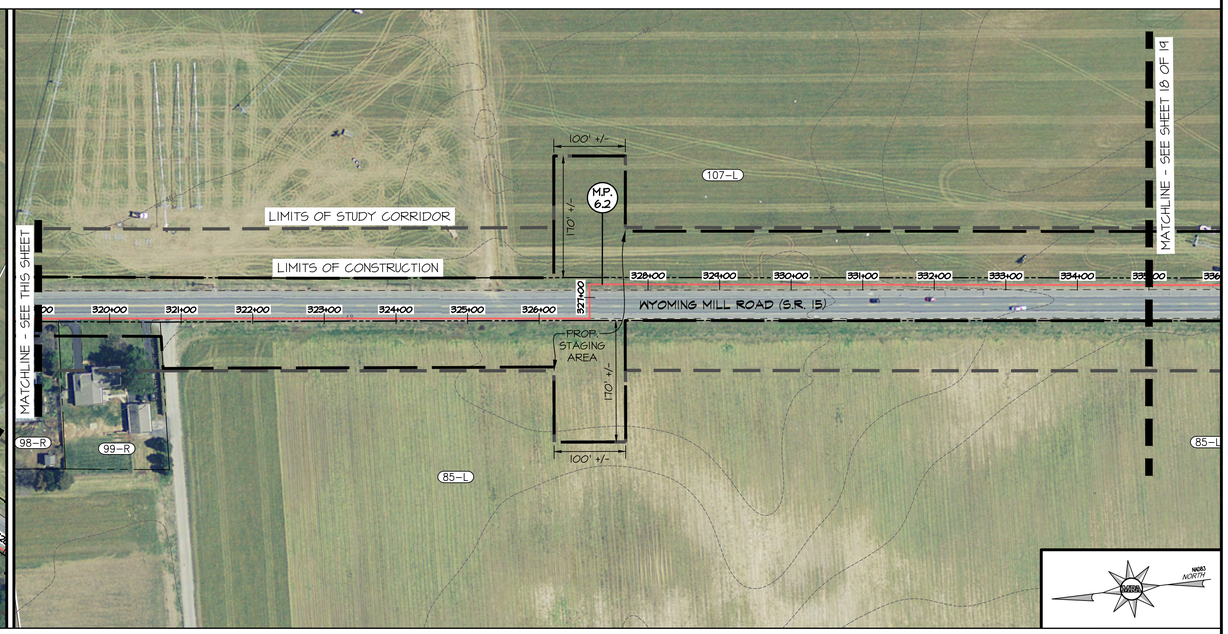
OWNERSHIP

303+00 — (85-L) N/F FARM LANDS, LP — 305+73 — WYOMING MILL ROAD (S.R. 15) — 319+00 — WYOMING MILL ROAD (S.R. 15) — 335+00

ANGLES

PLAN VIEW 1" = 100'





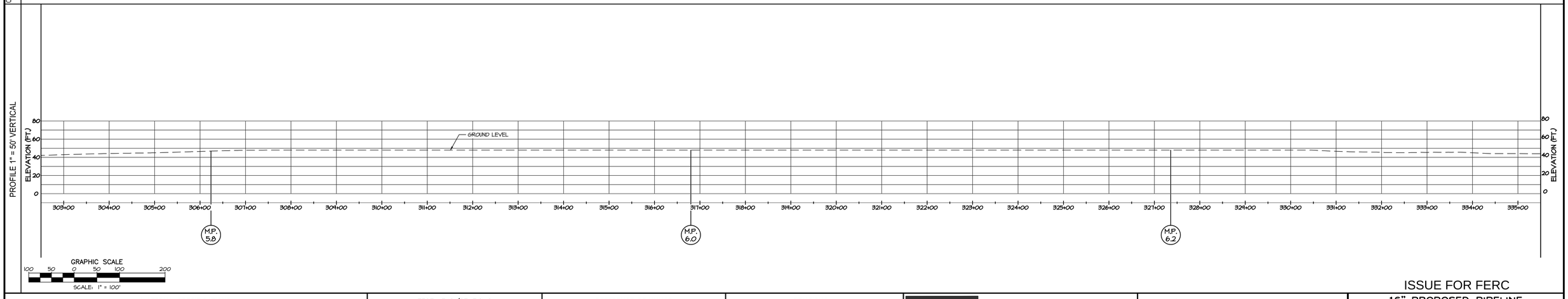
STATIONS

MATERIAL — 303+00 — 16" PIPELINE — 335+00

TERRAIN / ENVIRONMENTAL — 303+00 — CLEARED — 335+00

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
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SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

MORRIS & RITCHIE ASSOCIATES, INC.
ENGINEERS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
18 BOULDEN CIRCLE, SUITE 36
NEW CASTLE, DELAWARE 19720
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EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

16" PROPOSED PIPELINE
DOVER LOOP
SYSTEM RELIABILITY PROJECT
KENT COUNTY, DELAWARE

PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	17 OF 19

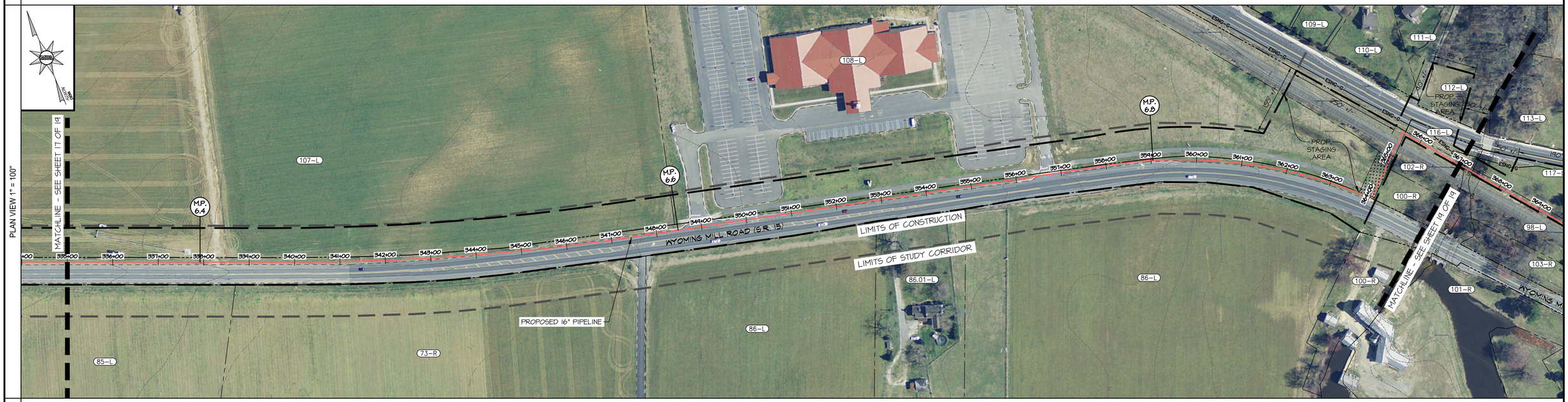
20160425-4003 FERC PDF (Unofficial) 04/25/2016

OWNERSHIP

335+00 — WYOMING MILL ROAD (S.R. 15) — 383+78 — (108-L) N/F WYOMING UNITED METHODIST CHURCH — 384+83 — 387+00 — (102-R) N/F DEL. R.R. REAL ESTATE AGENT

ANGLES

PLAN VIEW 1" = 100'



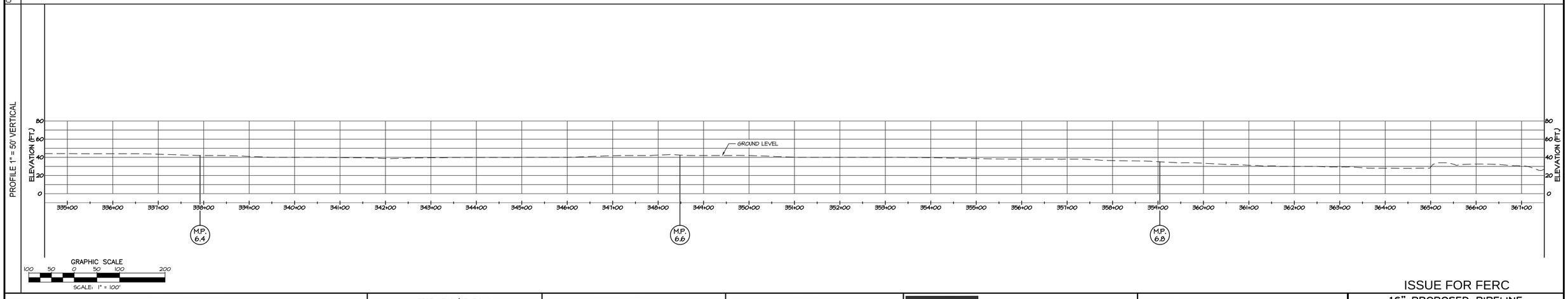
STATIONS

MATERIAL — 335+00 — 16" PIPELINE — 367+00

TERRAIN / ENVIRONMENTAL — 335+00 — CLEARED — 367+00

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL



GRAPHIC SCALE
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SCALE: 1" = 100'

ISSUE FOR FERC

MATERIAL SPECIFICATIONS						TEST LEAD/STATIONS				REFERENCE DRAWINGS		REVISIONS			
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.	STATION	TYPE	STATION	TYPE	DESCRIPTION	DRAWING NUMBER	NO.	DATE	DESCRIPTION	BY

MORRIS & RITCHIE ASSOCIATES, INC.
ENGINEERS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
18 BOULDEN CIRCLE, SUITE 36
NEW CASTLE, DELAWARE 19720
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WWW.MRAGTA.COM

EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

16" PROPOSED PIPELINE
DOVER LOOP
SYSTEM RELIABILITY PROJECT
KENT COUNTY, DELAWARE

PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	18 OF 19

20160425-4003 FERC PDF (Unofficial) 04/25/2016

OWNERSHIP

367+00	373+52	374+12	385+48	388+08	388+27	388+81	392+11	398+00	399+26

(98-L) N/F RAILROAD — FRONT STREET — (98-L) N/F RAILROAD — (138-R) N/F THE TOWN OF WYOMING — (98-L) N/F RAILROAD — WEST CAMDEN WYOMING AVENUE — (134-R) N/F TERRY B. WITT — (98-L) N/F RAILROAD — SOUTHERN BOULEVARD (S.R. 15)

ANGLES

PLAN VIEW 1" = 100'

STATIONS

MATERIAL

367+00 — 16" PIPELINE — 399+26

TERRAIN / ENVIRONMENTAL

367+00 — CLEARED — 399+26

CONSTRUCTION METHOD

PROFILE 1" = 50' VERTICAL

GRAPHIC SCALE
100 50 0 50 100 200
SCALE: 1" = 100'

20160425-4003 FERC PDF (Unofficial) 04/25/2016

ISSUE FOR FERC

MATERIAL SPECIFICATIONS

ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.

TEST LEAD/STATIONS

STATION	TYPE	STATION	TYPE

REFERENCE DRAWINGS

DESCRIPTION	DRAWING NUMBER

REVISIONS

NO.	DATE	DESCRIPTION	BY

MRA
MORRIS & RITCHIE ASSOCIATES, INC.
ENGINEERS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
18 BOULDEN CIRCLE, SUITE 36
NEW CASTLE, DELAWARE 19720
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16" PROPOSED PIPELINE
DOVER LOOP
SYSTEM RELIABILITY PROJECT
KENT COUNTY, DELAWARE

PROJECT NO:	18704	DATE:	05/15/2015
DESIGN BY:	JJM	SCALE:	1" = 100'
CHECKED BY:	CWB	SHEET:	19 OF 19

20160425-4003 FERC PDF (Unofficial) 04/25/2016

Appendix 3 –Aboveground Facility Construction Diagrams for the White Oak Project

20160425-4003 FERC PDF (Unofficial) 04/25/2016

LEGEND

- FENCE
- GRAVEL
- LIMITS OF CONSTRUCTION

100 50 0 50 100 200

SCALE: 1" = 100'

ISSUE FOR FERC

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ENGINEERS, ARCHITECTS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
18 BOULDEN CIRCLE, SUITE: 36, WILMINGTON, DE 19720
(302) 326-2200, FAX: (302) 326-2399

EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

EASTERN SHORE NATURAL GAS
WHITE OAK MAINLINE EXPANSION PROJECT

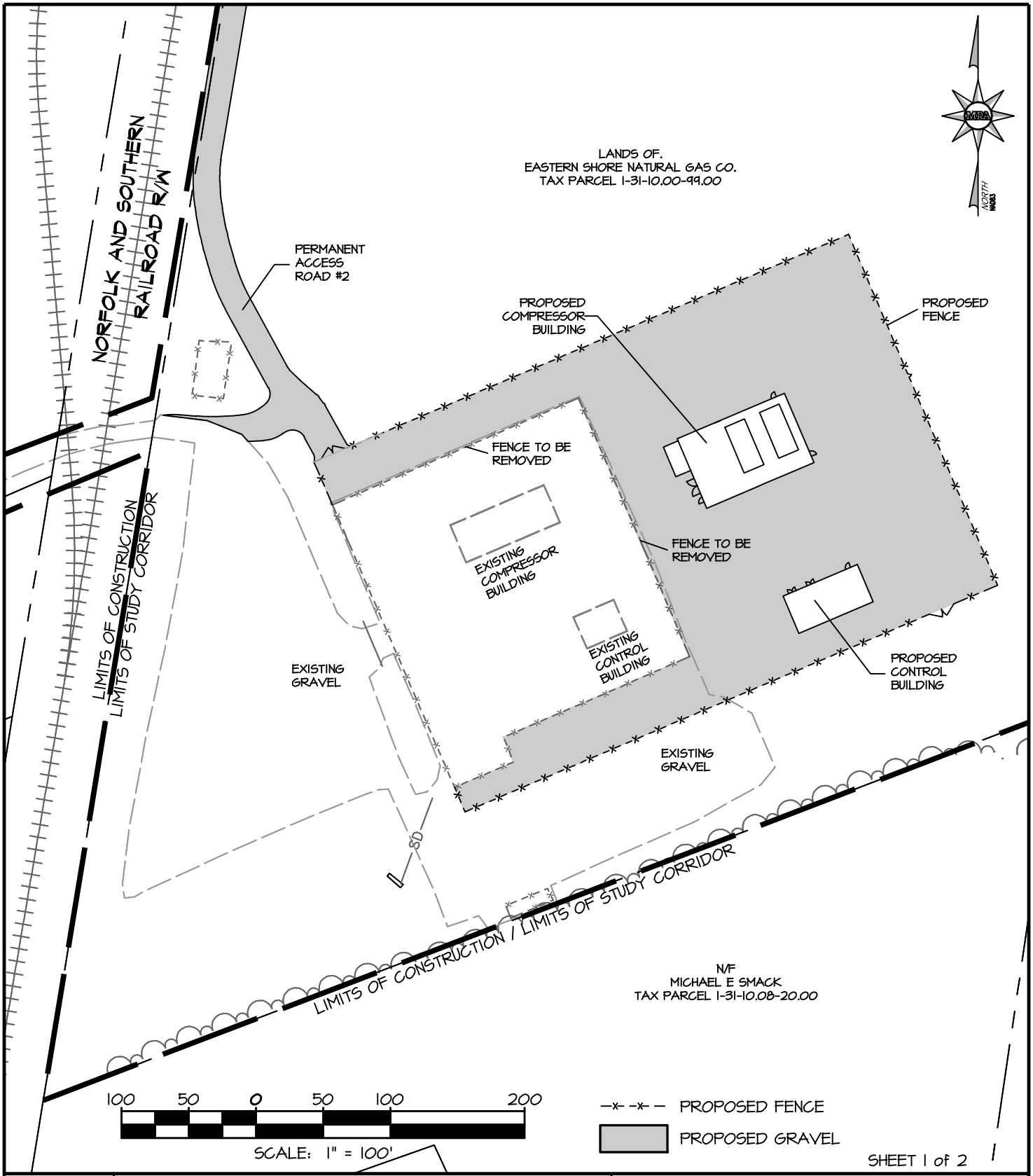
PROPOSED UPGRADES
DELAWARE CITY COMPRESSOR STATION

NEW CASTLE COUNTY, DELAWARE

SCALE: SCALE: 1"=100'	DATE: 12/15/2015	DRAWN BY: JJM	DESIGN BY: JJM	REVIEW BY: CWB	JOB NO.: 18429

20160425-4003 FERC PDF (Unofficial) 04/25/2016

Appendix 4 –Aboveground Facility Construction Diagrams for the System Reliability Project



MORRIS & RITCHIE ASSOCIATES, INC.
ENGINEERS, ARCHITECTS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
18 BOULDEN CIRCLE, SUITE: 36, WILMINGTON, DE 19720
(302) 326-2200, FAX: (302) 326-2399

EASTERN SHORE NATURAL GAS
SYSTEM RELIABILITY PROJECT

EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

ISSUE FOR FERC

PROPOSED UPGRADES
BRIDGEVILLE COMPRESSOR STATION
SUSSEX COUNTY, DELAWARE

SCALE: 1"=100'	DATE: 05/15/2015	DRAWN BY: DPS	DESIGN BY: CWB	REVIEW BY: CWB	JOB NO. : 18704

20160425-4003 FERC PDF (Unofficial) 04/25/2016

NORTH

NEWTON ROAD (S.R. 404)

N/F
O.A NEWTON & SON, CO.
TAX PARCEL 1-31-6.00-8.04

NORFOLK SOUTHERN RAILROAD R/W

N/F
NEWTON FARMS, LLC
TAX PARCEL 1-31-6.00-8.00

N/F
PERDUE GRAIN AND OILSEED, LLC
TAX PARCEL 1-31-6.00-6.00

N/F
PERDUE GRAIN AND OILSEED, LLC
TAX PARCEL 1-31-6.00-7.00

N/F
TREW R2, LLC
TAX PARCEL 1-31-6.00-7.01

PERMANENT ACCESS ROAD #2

N/F
EASTERN SHORE NATURAL GAS CO.
TAX PARCEL 1-31-10.00-99.00

LIMITS OF STUDY CORRIDOR
LIMITS OF CONSTRUCTION

ADAMS ROAD

N/F
HELENA CHEMICAL CO.
TAX PARCEL 1-31-10.08-1.00

N/F
BETTY L. MURRAY
TAX PARCEL 1-31-10.07-1.00

N/F
HOWARD THURMAN & CORETTA D. NEAL
TAX PARCEL 1-31-10.07-3.01

N/F
MAXINE NEAL-HEMMEAIN
& JAMES HEMMEAIN
TAX PARCEL 1-31-10.07-3.00

N/F
MICHAEL E. SMACK
TAX PARCEL 1-31-10.08-20.0

N/F
STATE BOARD OF EDUCATION
TAX PARCEL 1-31-10.08-3.00

N/F
POLLY'S FARM, LLC
TAX PARCEL 1-31-10.12-1.00

N. MAIN STREET

300 150 0 150 300 600
SCALE: 1" = 300'

MORRIS & RITCHIE ASSOCIATES, INC.
ENGINEERS, ARCHITECTS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
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ISSUE FOR FERC

EASTERN SHORE NATURAL GAS
SYSTEM RELIABILITY PROJECT

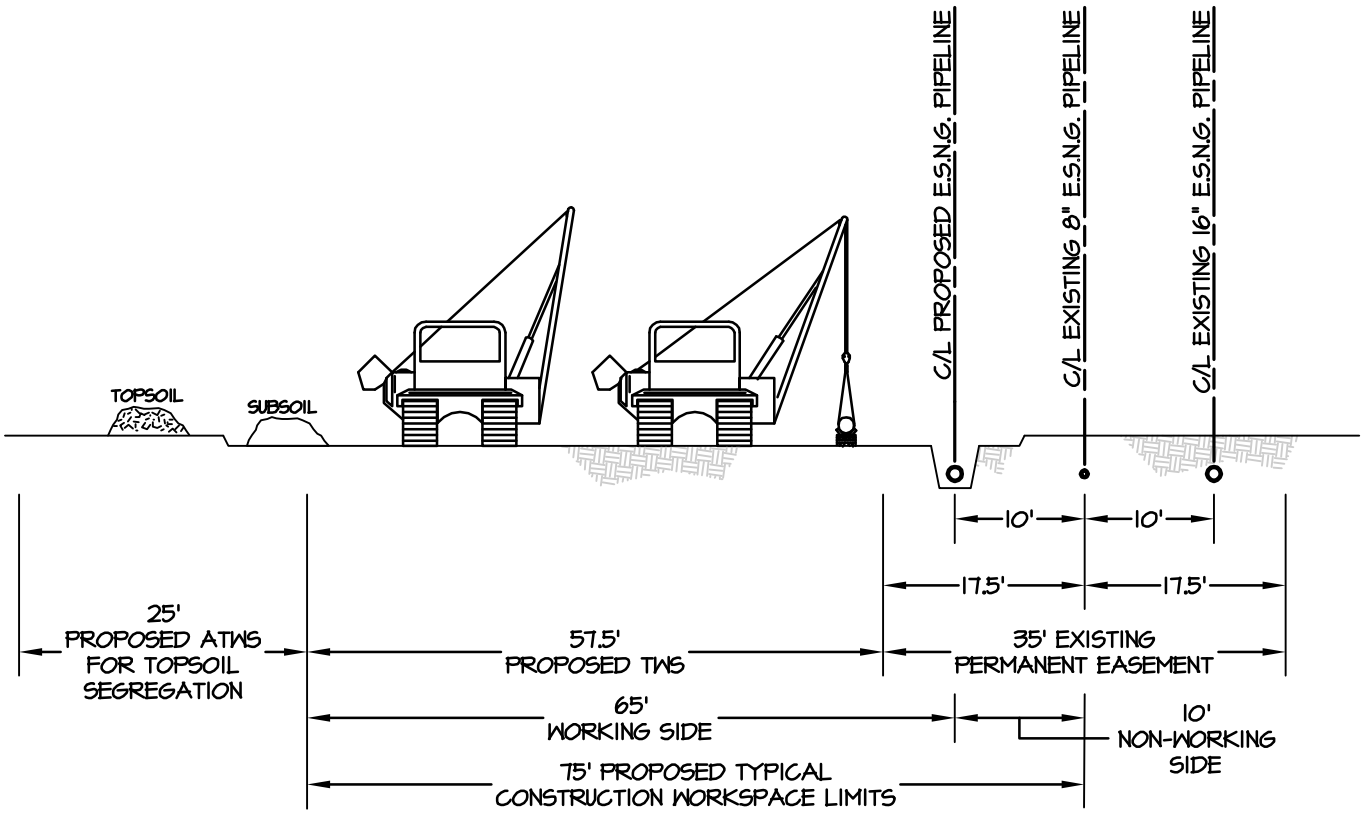
PROPOSED UPGRADES
BRIDGEVILLE COMPRESSOR STATION
SUSSEX COUNTY, DELAWARE

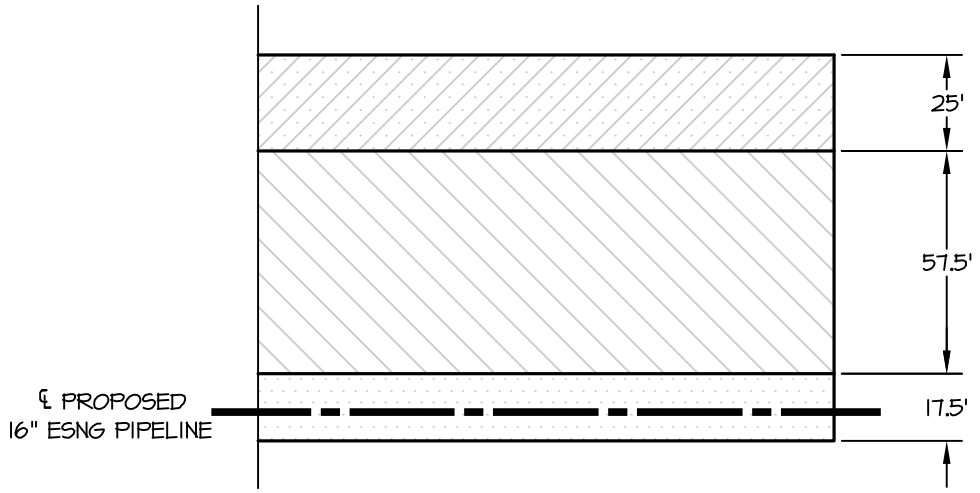
SCALE: 1"=300'	DATE: 5/15/15	DRAWN BY: DPS	DESIGN BY: CWB	REVIEW BY: CWB	JOB NO. : 18704

SHEET 2 of 2

20160425-4003 FERC PDF (Unofficial) 04/25/2016

Appendix 5 –Typical Pipeline Construction Diagrams for the White Oak Project





EXISTING PERMANENT EASEMENT (PE)

PROPOSED TEMPORARY WORKSPACE (TWS)

PROPOSED ADDITIONAL TEMPORARY WORKSPACE (ATWS)

NOTES:

1. CONFIGURATION DOES NOT INCLUDE ADDITIONAL TEMPORARY WORKSPACE FOR STAGING, CROSSINGS AND PIPE STORAGE.
2. REFER TO ENVIRONMENTAL NOTES FOR DETAILED ENVIRONMENTAL PROTECTION MEASURES

MORRIS & RITCHIE ASSOCIATES, INC.
ENGINEERS, ARCHITECTS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
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(302) 326-2200, FAX: (302) 326-2399

EASTERN SHORE NATURAL GAS
WHITE OAK MAINLINE EXPANSION PROJECT

PROPOSED DALEVILLE 16" PIPELINE
TYPICAL CONSTRUCTION
ROW CROSS SECTION & OVERVIEW
CHESTER COUNTY, PENNSYLVANIA

EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

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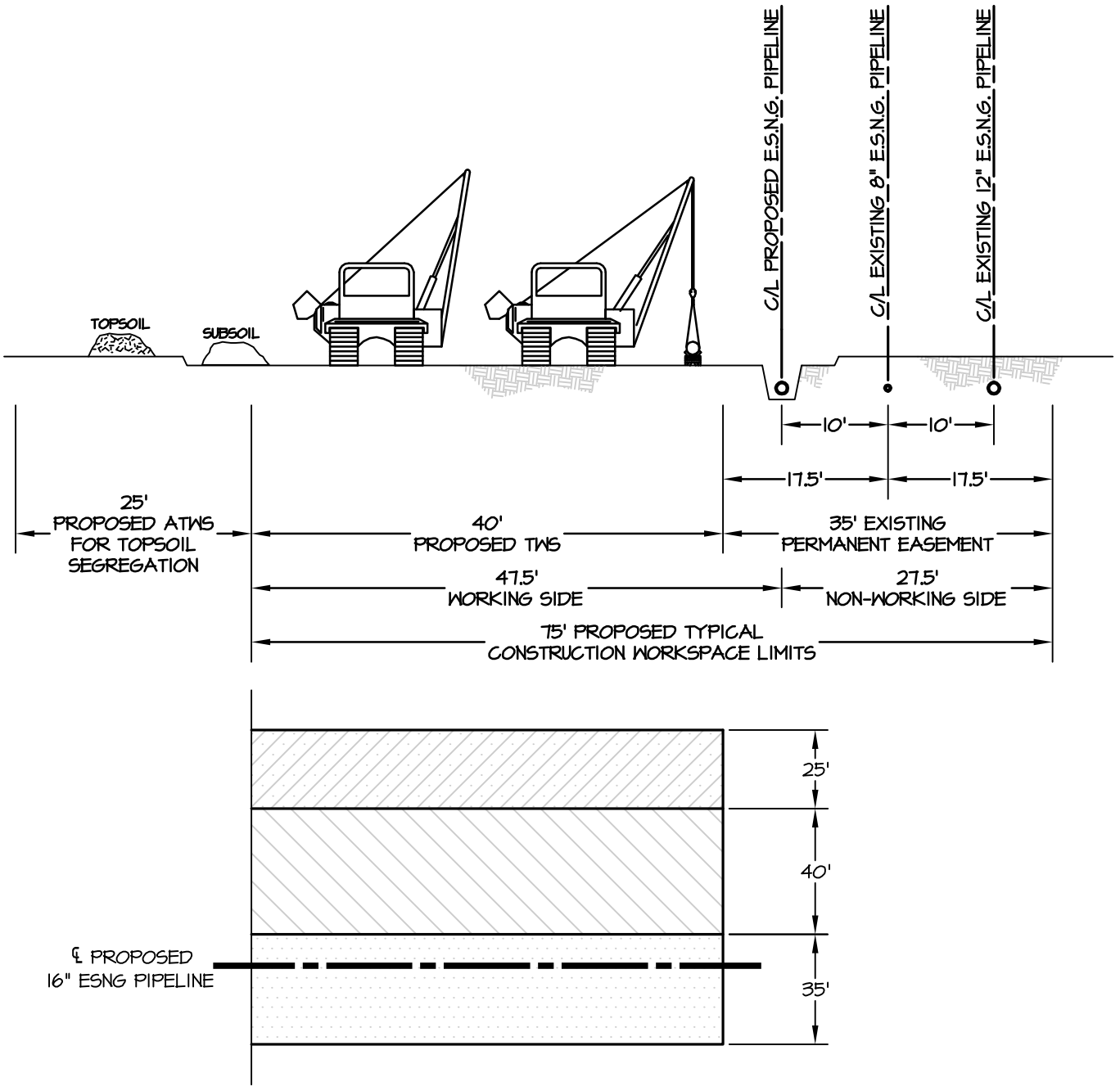
SCALE: N.T.S.	DATE: 12/15/2015	DRAWN BY: JJM	DESIGN BY: JJM	REVIEW BY: CWB	JOB NO. : 18429



EXISTING PERMANENT EASEMENT (PE)

PROPOSED TEMPORARY WORKSPACE (TWS)

PROPOSED ADDITIONAL TEMPORARY WORKSPACE (ATWS)

NOTES:

1. CONFIGURATION DOES NOT INCLUDE ADDITIONAL TEMPORARY WORKSPACE FOR STAGING, CROSSINGS AND PIPE STORAGE.
2. REFER TO ENVIRONMENTAL NOTES FOR DETAILED ENVIRONMENTAL PROTECTION MEASURES

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EASTERN SHORE NATURAL GAS
WHITE OAK MAINLINE EXPANSION PROJECT

PROPOSED KEMBLESVILLE ALTERNATIVE 2
16" PIPELINE TYPICAL CONSTRUCTION
ROW CROSS SECTION & OVERVIEW
CHESTER COUNTY, PENNSYLVANIA

EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
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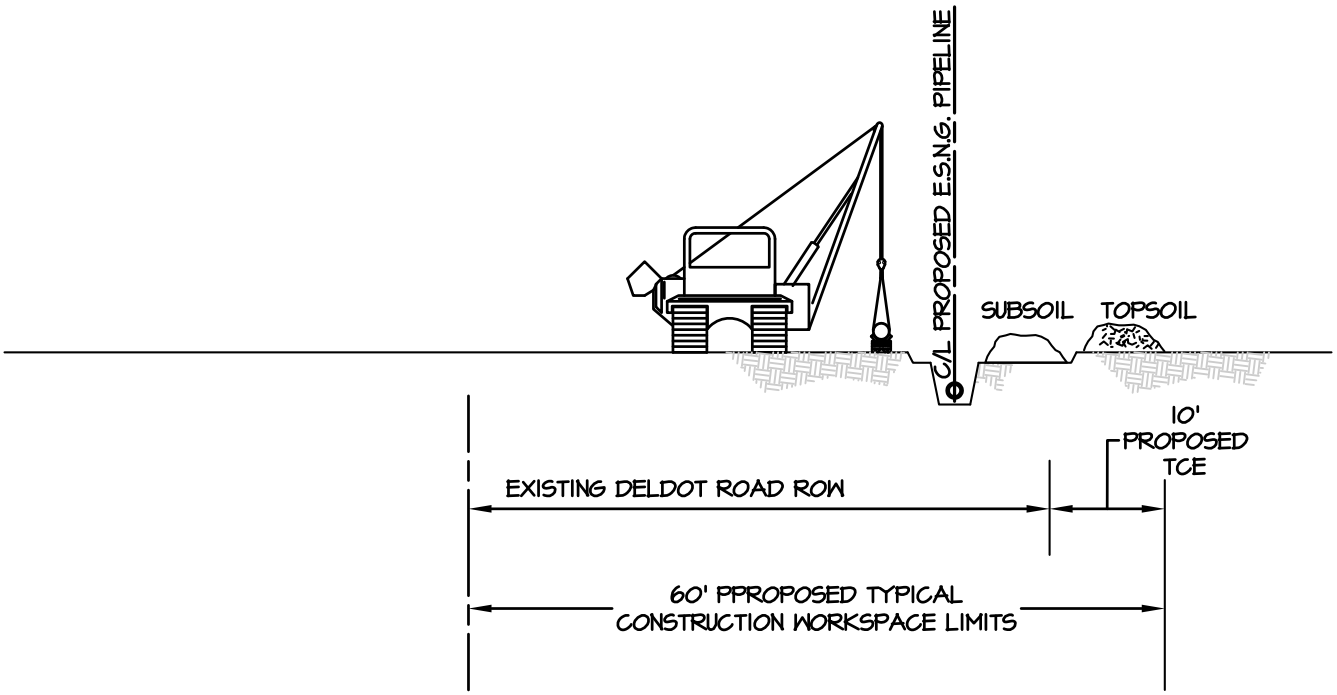
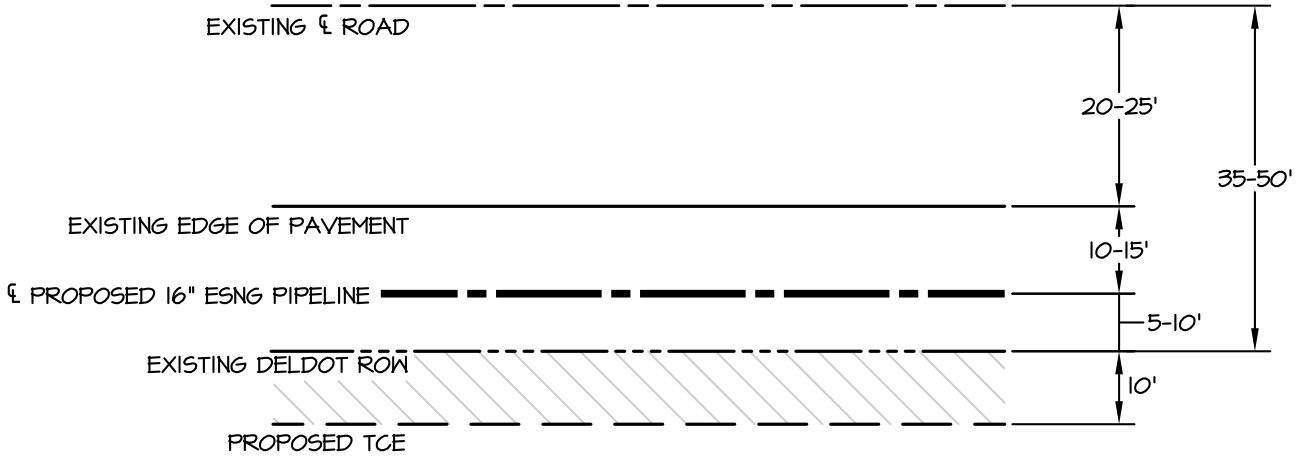
Appendix 6 –Typical Pipeline Construction Diagrams for the System Reliability Project





NOTES:

1. CONFIGURATION DOES NOT INCLUDE ADDITIONAL TEMPORARY WORKSPACE FOR STAGING, CROSSINGS AND PIPE STORAGE.
2. REFER TO ENVIRONMENTAL NOTES FOR DETAILED ENVIRONMENTAL PROTECTION MEASURES

PROPOSED TEMPORARY CONSTRUCTION EASEMENT (TCE)

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SYSTEM RELIABILITY PROJECT
PROPOSED 16" PORTER ROAD PIPELINE
TYPICAL CONSTRUCTION
ROW CROSS SECTION & OVERVIEW
NEW CASTLE & KENT COUNTIES, DELAWARE

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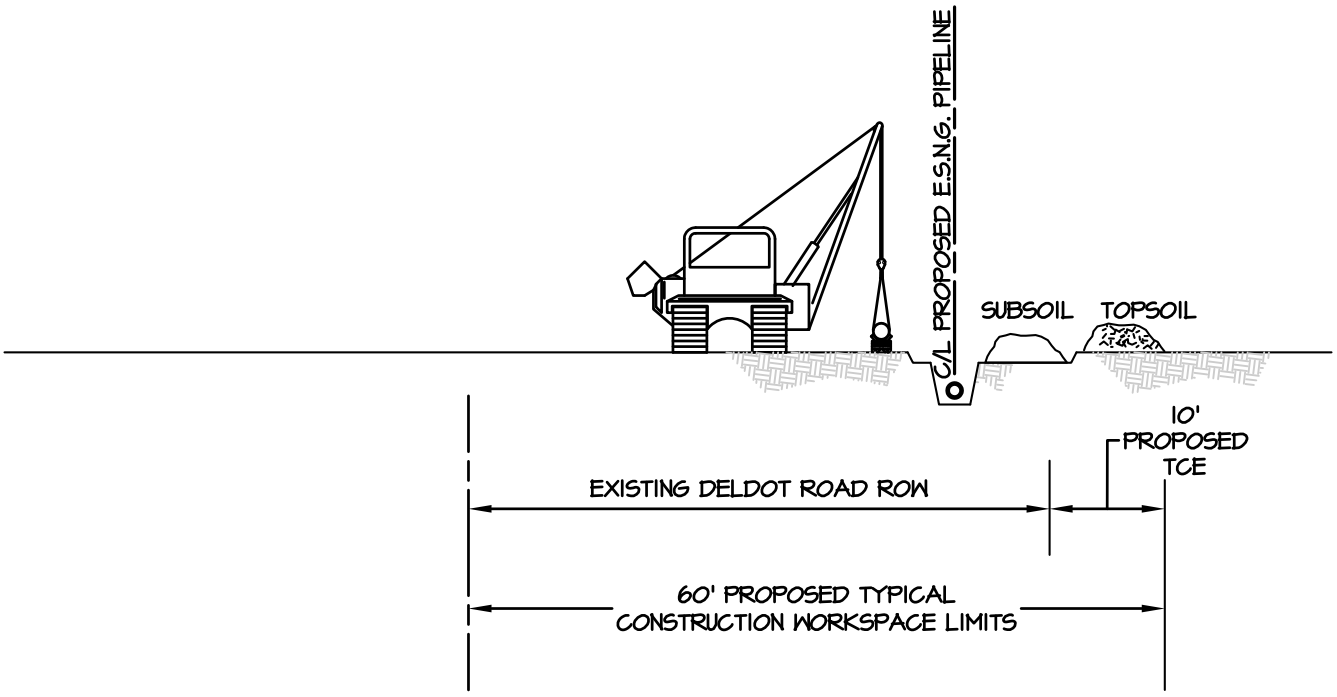

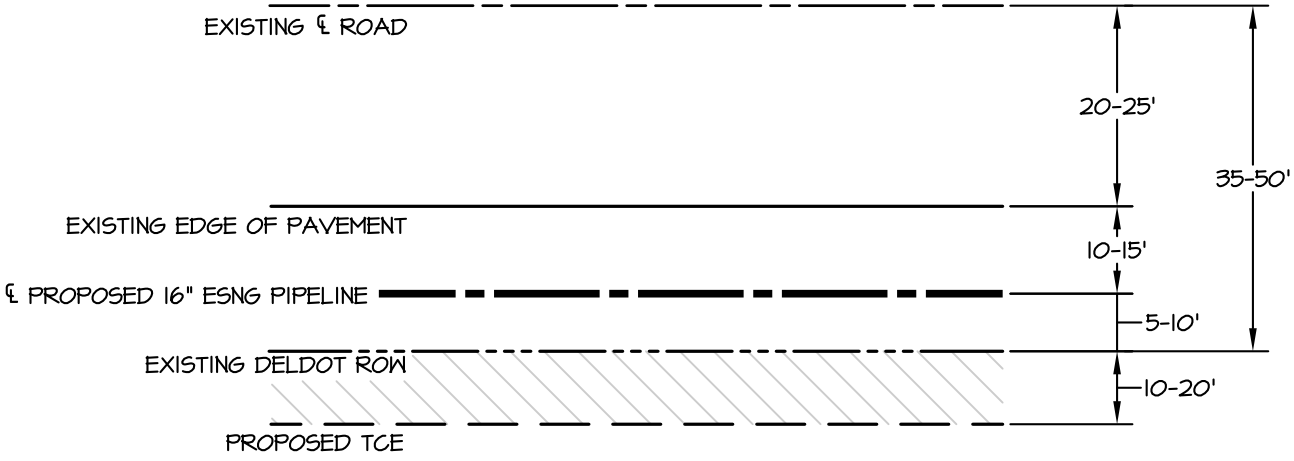

NOTES:

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2. REFER TO ENVIRONMENTAL NOTES FOR DETAILED ENVIRONMENTAL PROTECTION MEASURES

PROPOSED TEMPORARY CONSTRUCTION EASEMENT (TCE)

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PROPOSED 16" DOVER PIPELINE
TYPICAL ROADSIDE CONSTRUCTION
ROW CROSS SECTION & OVERVIEW
NEW CASTLE & KENT COUNTIES, DELAWARE

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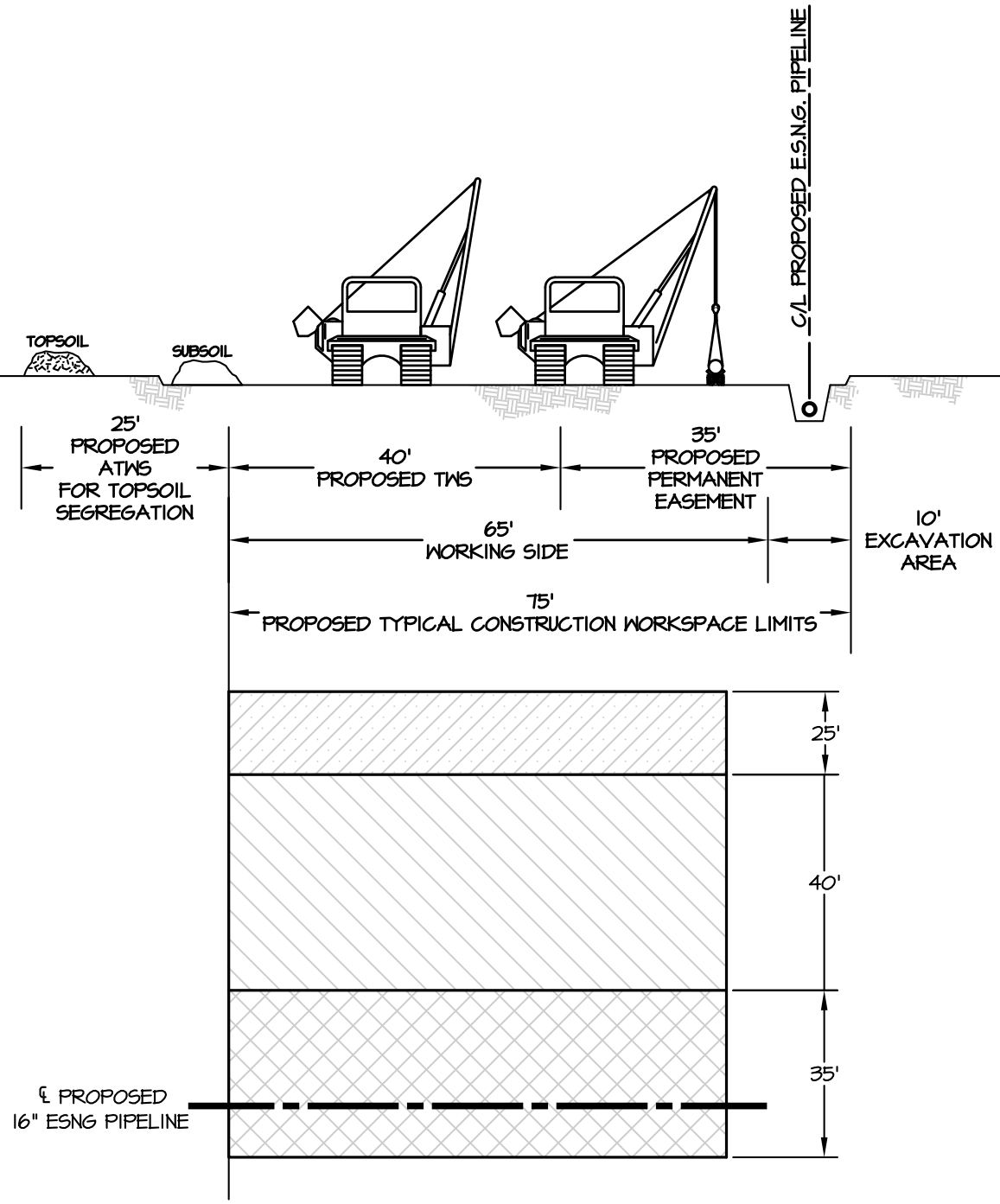

PROPOSED PERMANENT EASEMENT (PE)

PROPOSED TEMPORARY WORKSPACE (TWS)

PROPOSED ADDITIONAL TEMPORARY WORKSPACE (ATWS)

NOTES:

1. CONFIGURATION DOES NOT INCLUDE ADDITIONAL TEMPORARY WORKSPACE FOR STAGING, CROSSINGS AND PIPE STORAGE.
2. REFER TO ENVIRONMENTAL NOTES FOR DETAILED ENVIRONMENTAL PROTECTION MEASURES

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EASTERN SHORE NATURAL GAS
SYSTEM RELIABILITY PROJECT
PROPOSED 16" DOVER PIPELINE
TYPICAL OPEN LAND CONSTRUCTION
ROW CROSS SECTION & OVERVIEW
NEW CASTLE & KENT COUNTIES, DELAWARE

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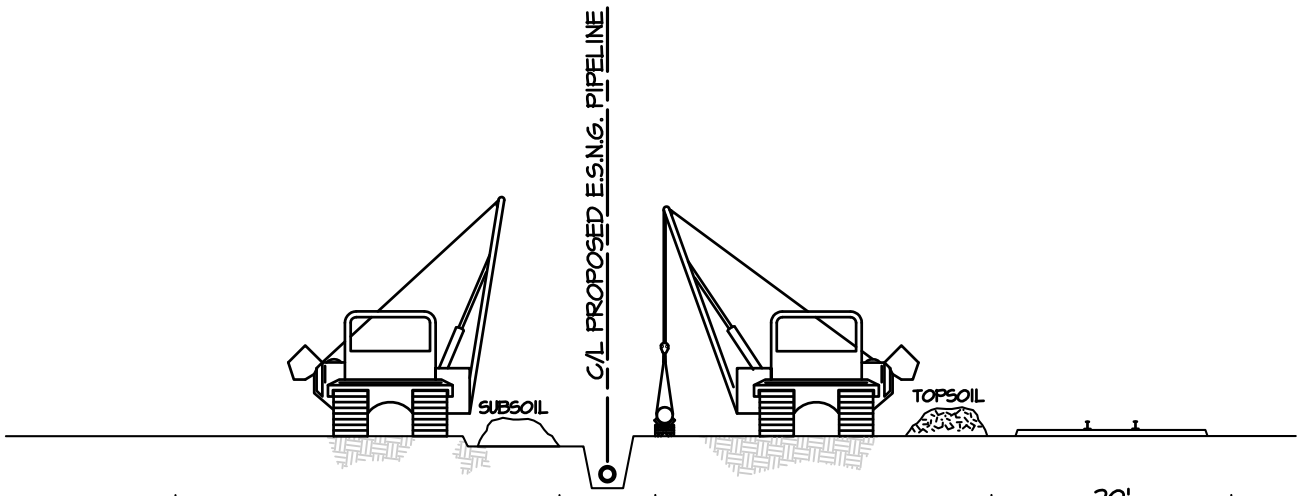

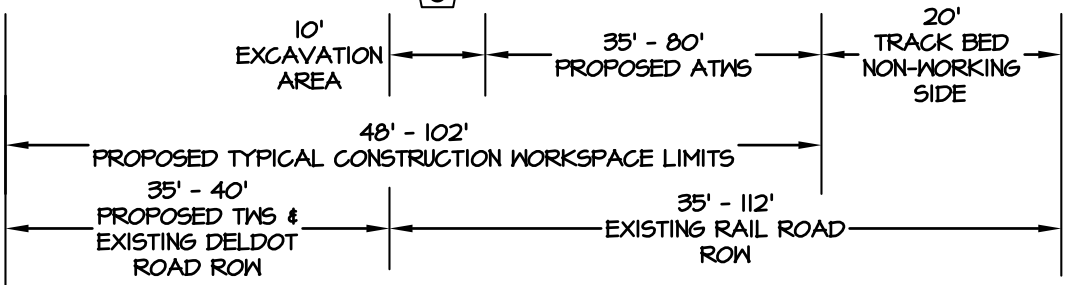

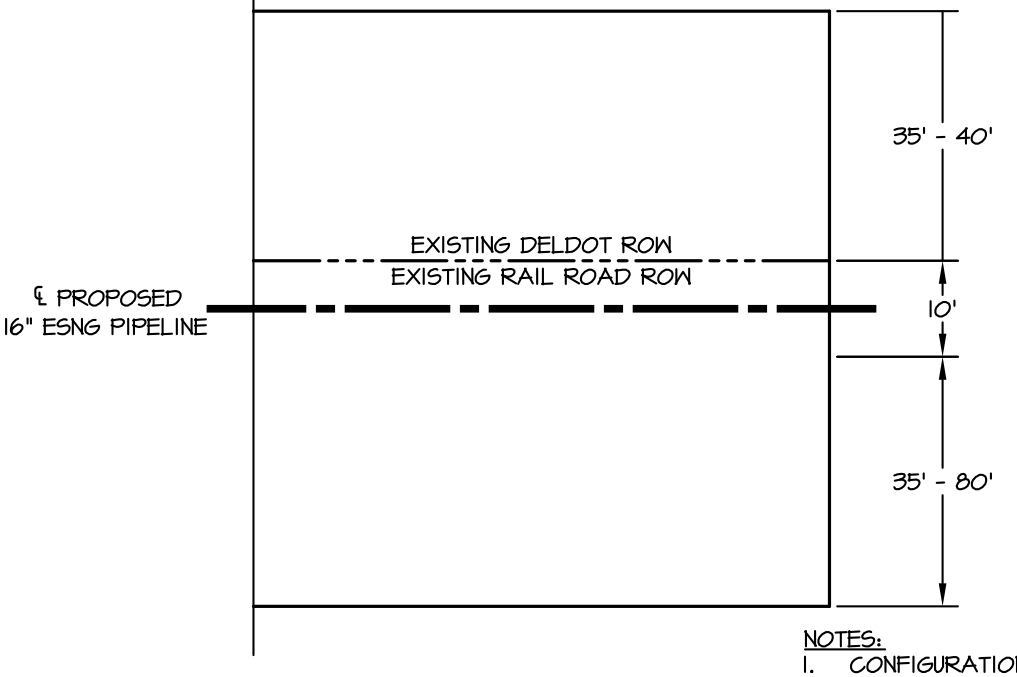

NOTES:

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2. REFER TO ENVIRONMENTAL NOTES FOR DETAILED ENVIRONMENTAL PROTECTION MEASURES

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EASTERN SHORE NATURAL GAS
SYSTEM RELIABILITY PROJECT
PROPOSED 16" DOVER PIPELINE
TYPICAL RAIL ROAD CONSTRUCTION
ROW CROSS SECTION & OVERVIEW
NEW CASTLE & KENT COUNTIES, DELAWARE

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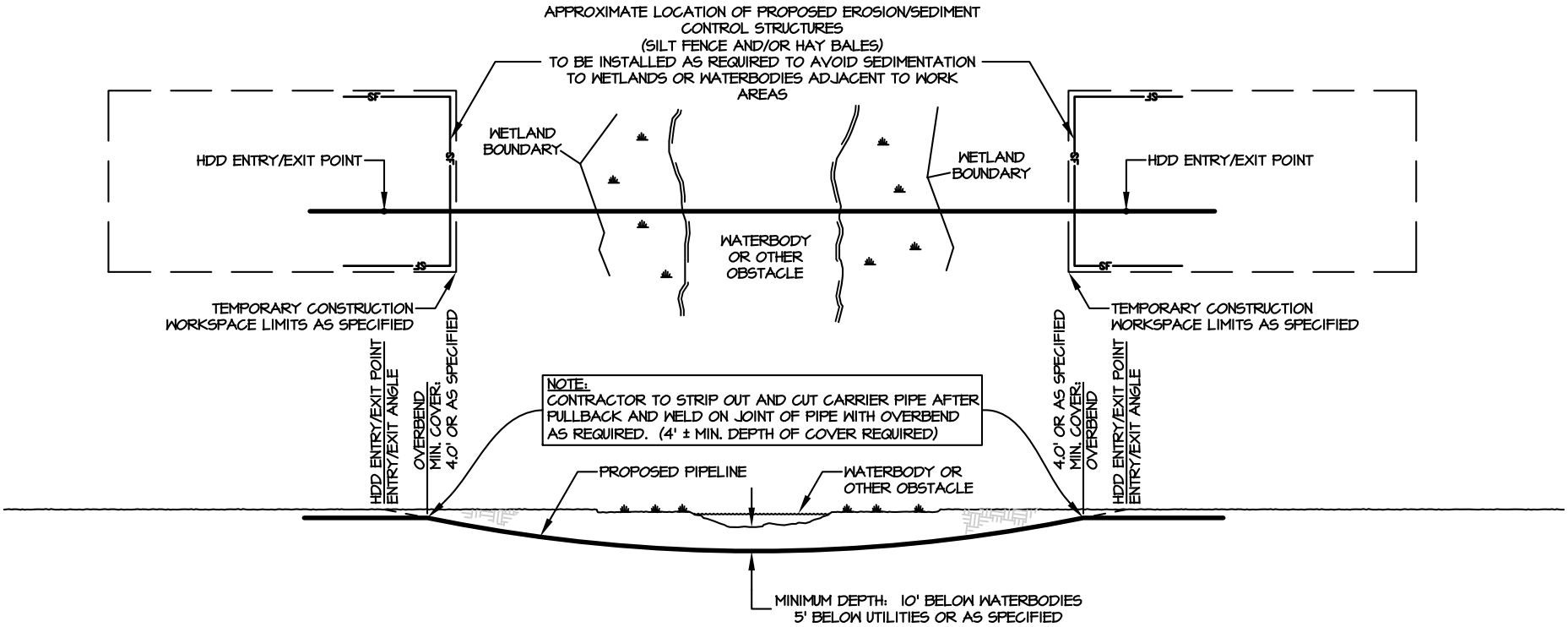

NOTES:

1. CONTRACTOR TO PERFORM SOIL BORES AND TESTS AS REQUIRED TO ASSURE FEASIBILITY OF DRILL. ONCE FEASIBILITY HAS BEEN DETERMINED, CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR ALL EXPENSES DUE TO UNFORESEEN SOIL OR BEDROCK CONDITIONS.
2. NO WETLANDS OR WATERBODIES WILL BE IMPACTED BY HORIZONTAL DIRECTIONAL DRILLING (HDD) OPERATIONS.
3. ALL DRILLING MUD TO BE CONTAINED DURING CONSTRUCTION WITH BERMS, MUD PITS, EROSION AND SEDIMENT CONTROLS DEEMED APPROPRIATE FOR THE SITE. ALL DRILLING MUD TO BE PROPERLY DISPOSED OF AT APPROVED FACILITIES.
4. CONSTRUCTION STAGING WORKSPACE FOR HDD CROSSING LIMITED TO CONSTRUCTION WORKSPACE SHOWN ON AERIAL ALIGNMENT SHEETS.
5. CONTRACTOR SHALL PROVIDE JERSEY BARRIERS AS NECESSARY TO ISOLATE TRAFFIC FROM WORK AREAS FOR HDD OPERATIONS.

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EASTERN SHORE NATURAL GAS
SYSTEM RELIABILITY PROJECT
PROPOSED 16" PIPELINE
HORIZONTAL DIRECTIONAL DRILLING
TYPICAL CROSS SECTION
NEW CASTLE & KENT COUNTIES, DELAWARE

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Appendix 7 - Existing Residences/Structures within Approximately 50 feet of White Oak Project and Site-Specific Residential Construction Plans

Milepost	Description of Structure	Distance from Pipeline Centerline (feet)	Distance from Construction Work Space (feet)	Offset Direction Right/Left
Daleville Loop				
1.73	Residence	58	48	Right
1.78	Garage	23	13	Right
2.89	Shed	85	46	Left
2.97	Residence	74	24	Right
3.02	Shed	56	17	Left
3.03	Residence	80	29	Right
3.04	Garage	94	43	Right
3.07	Residence	91	51	Left
3.09	Shed	0	0	Center
3.10	Residence	78	38	Left
3.16	Residence	200	35	Right
Kemblesville Loop				
0.89	Garage	25	0	Left
0.90	Garage	14	0	Right
0.93	Residence	21	0	Left
0.94	Residence	99	51	Right
1.37	Residence	58	10	Right
1.40	Residence	27	0	Right
1.41	Shed	18	0	Left
1.43	Shed	36	9	Left
1.44	Residence	10	0	Right
1.46	Residence	49	21	Left
1.58	Residence	90	43	Right
1.61	Residence	30	2	Left
1.65	Residence	5	0	Right
1.80	Residence	96	49	Right
1.94	Shed	37	9	Left
1.96	Residence	65	38	Left

DESCRIPTION:

THESE DRAWINGS DOCUMENT OCCUPIED BUILDINGS NEAR THE PROPOSED CONSTRUCTION WORK AREA. THE CONTRACTOR SHALL COMPLY WITH THE FOLLOWING CONSTRUCTION MITIGATION REQUIREMENTS IN ADDITION TO THOSE LISTED IN THE CONSTRUCTION SPECIFICATIONS.

CONSTRUCTION REQUIREMENTS:

1. ALL PROPOSED CONSTRUCTION WORK AREAS ARE CONFINED TO THE LIMITS OF CONSTRUCTION SHOWN ON THIS DRAWING. NO WORK SHALL OCCUR ON LANDOWNER PROPERTY WITHOUT PROPERLY EXECUTED LANDOWNER AGREEMENT.
2. CONTRACTOR SHALL ERECT AND MAINTAIN A TEMPORARY CONSTRUCTION BARRIER FENCE (SAFETY FENCE) BETWEEN THE CONSTRUCTION ZONE AND THE ADJACENT STRUCTURES (THOSE WITHIN 50' OF LIMITS OF CONSTRUCTION) DURING THE CONSTRUCTION PERIOD.
3. CONTRACTOR SHALL INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES (SILT FENCE) AS REQUIRED TO ENSURE THAT CONSTRUCTION SPOIL IS CONTAINED WITHIN THE APPROVED CONSTRUCTION WORK AREA AND DOES NOT ENTER LANDOWNER PROPERTY.
4. VEHICLE ACCESS SHALL BE MAINTAINED TO THE RESIDENCES / BUSINESSES DURING THE CONSTRUCTION PERIOD.
5. TRENCH SHALL NOT BE EXCAVATED UNTIL PIPELINE IS READY FOR INSTALLATION IN THE AREA NEAR THE RESIDENCE / BUSINESS SHOWN ON THESE PLANS. DITCH SHALL BE BACKFILLED OR PLATED IN THE SAME DAY AS PIPE INSTALLATION IN THIS AREA. ALL OPEN DITCHES SHALL BE BARRICADED / FENCED OFF WHEN CONSTRUCTION ACTIVITIES ARE NOT IN PROGRESS.
6. OTHER EXISTING PHYSICAL FEATURES THAT NEED TO BE PROTECTED WILL BE ENCLOSED IN SAFETY FENCE TO AVOID DISTURBANCE DURING CONSTRUCTION.
7. DISTURBED ITEMS SUCH AS DRIVEWAYS, LAWNS, AND LANDSCAPED AREAS SHALL BE RESTORED AS SOON AS PRACTICAL AFTER CONSTRUCTION BY A LICENSED CONTRACTOR.
8. CONTRACTOR SHALL ALLOW ROADWAY TRAFFIC FLOW TO CONTINUE DURING CONSTRUCTION IN THIS AREA, UNLESS TRAFFIC DETOURING MEASURES HAVE BEEN APPROVED IN ADVANCE BY APPLICABLE JURISDICTIONAL AGENCIES.
9. CONTRACTOR SHALL MINIMIZE NOISE FROM CONSTRUCTION ACTIVITIES NEAR RESIDENCES AND SHALL COMPLY WITH ALL LOCAL NOISE ORDINANCES.
10. CONTRACTOR SHALL TAKE APPROPRIATE MEANS TO MIMIMIZE FUGITIVE DUST FROM CONSTRUCTION ACTIVITIES NEAR RESIDENCES / BUSINESSES. CONTRACTOR SHALL PROVIDE STREET SWEEPING SERVICES IF NECESSARY DURING ROADWAY CONSTRUCTION ACTIVITIES NEAR RESIDENCES / BUSINESSES.

LEGEND

- PROPOSED PIPELINE
- EXISTING E.S.N.G. PIPELINE — ESNG—G —
- LIMITS OF CONSTRUCTION
- LIMITS OF STUDY CORRIDOR
- PROPOSED PERMANENT EASEMENT
- EXISTING PERMANENT EASEMENT
- SAFETY FENCE
- RAILROAD TRACK
- ROAD RIGHT-OF-WAY
- PROPERTY LINE
- EDGE OF PAVEMENT
- BUILDING
- FENCE
- CENTERLINE OF STREAM
- DELINEATED WETLAND BOUNDARY — NW — NW —
- DELINEATED WATERS OF U.S. — US — US —
- OVERHEAD UTILITY LINE — OHE — OHE —
- STORM DRAIN — SD — SD —
- WATER LINE — W — W —
- SEWER LINE — SAN — SAN —
- FORCE MAIN —FM—FM—FM—

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50 25 0 25 50 100
SCALE: 1" = 50'

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DALEVILLE / KEMBLESVILLE ALTERNATIVE 2 LOOPS
RESIDENTIAL MAP
WHITE OAK MAINLINE EXPANSION PROJECT
HIGHLAND, LONDONDERRY & FRANKLIN TOWNSHIPS
CHESTER COUNTY, PENNSYLVANIA

PROJECT NO:	18429	DATE:	12/11/2015
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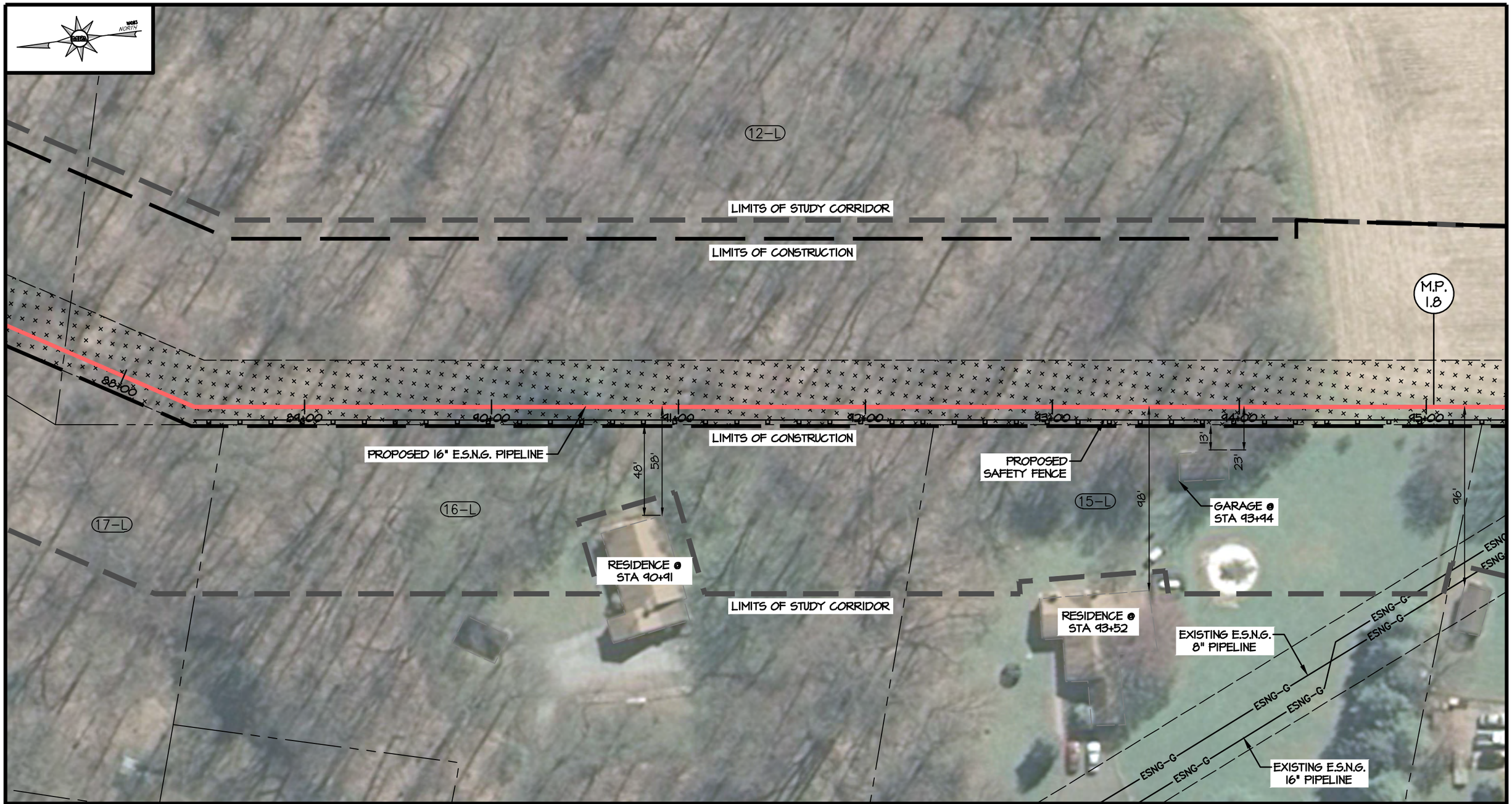

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SCALE: 1" = 50'

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DALEVILLE LOOP
RESIDENTIAL MAP
WHITE OAK MAINLINE EXPANSION PROJECT
HIGHLAND/LONDONDERRY TOWNSHIPS
CHESTER COUNTY, PENNSYLVANIA

PROJECT NO:	18429	DATE:	12/11/2015
DESIGN BY:	JJM	SCALE:	1" = 50'
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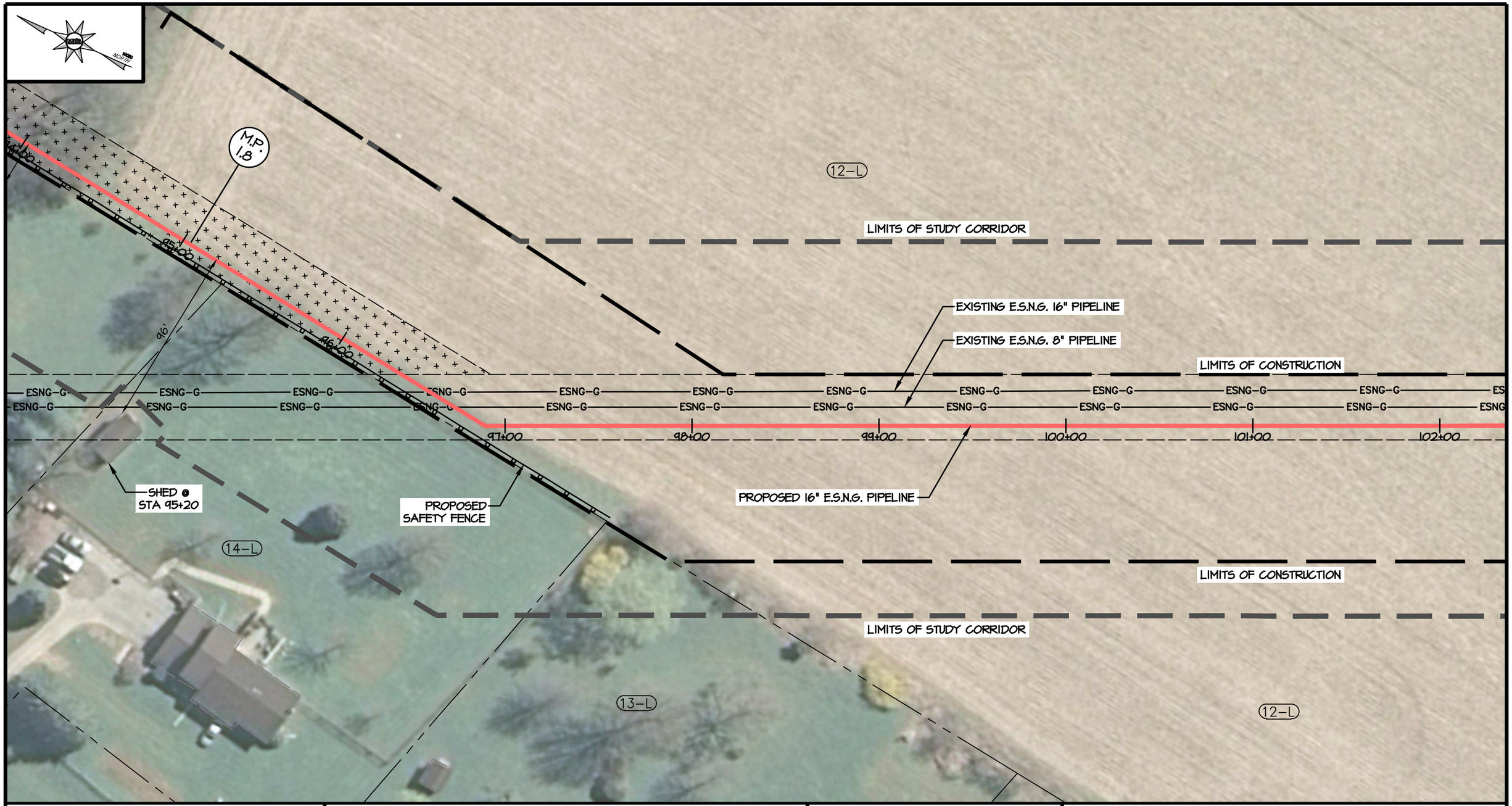

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DALEVILLE LOOP
RESIDENTIAL MAP
WHITE OAK MAINLINE EXPANSION PROJECT
HIGHLAND/LONDONDERRY TOWNSHIPS
CHESTER COUNTY, PENNSYLVANIA

PROJECT NO:	18429	DATE:	12/11/2015
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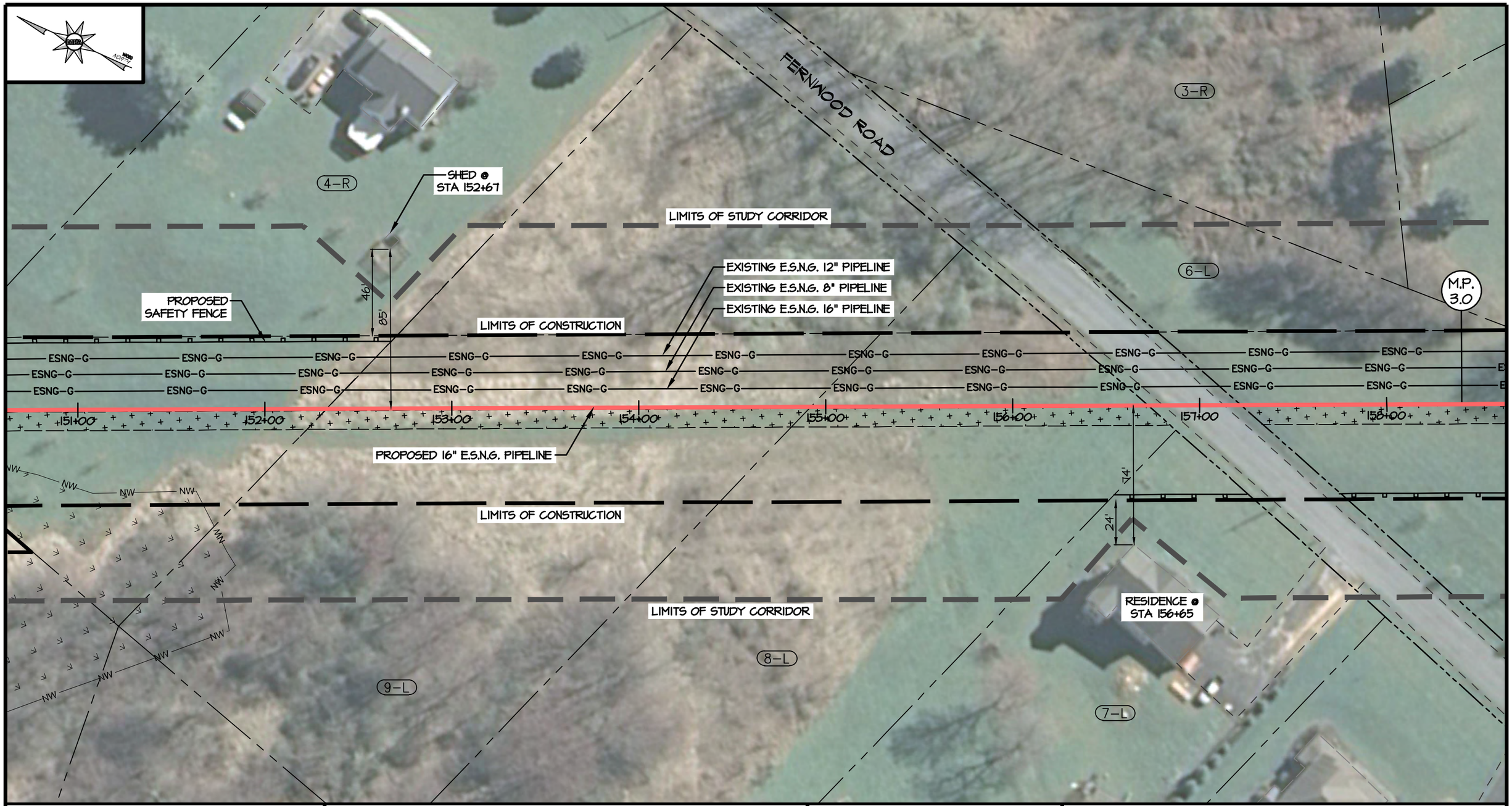

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50 25 0 25 50 100
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DALEVILLE LOOP
RESIDENTIAL MAP
WHITE OAK MAINLINE EXPANSION PROJECT
HIGHLAND/LONDONDERRY TOWNSHIPS
CHESTER COUNTY, PENNSYLVANIA

PROJECT NO:	18429	DATE:	12/11/2015
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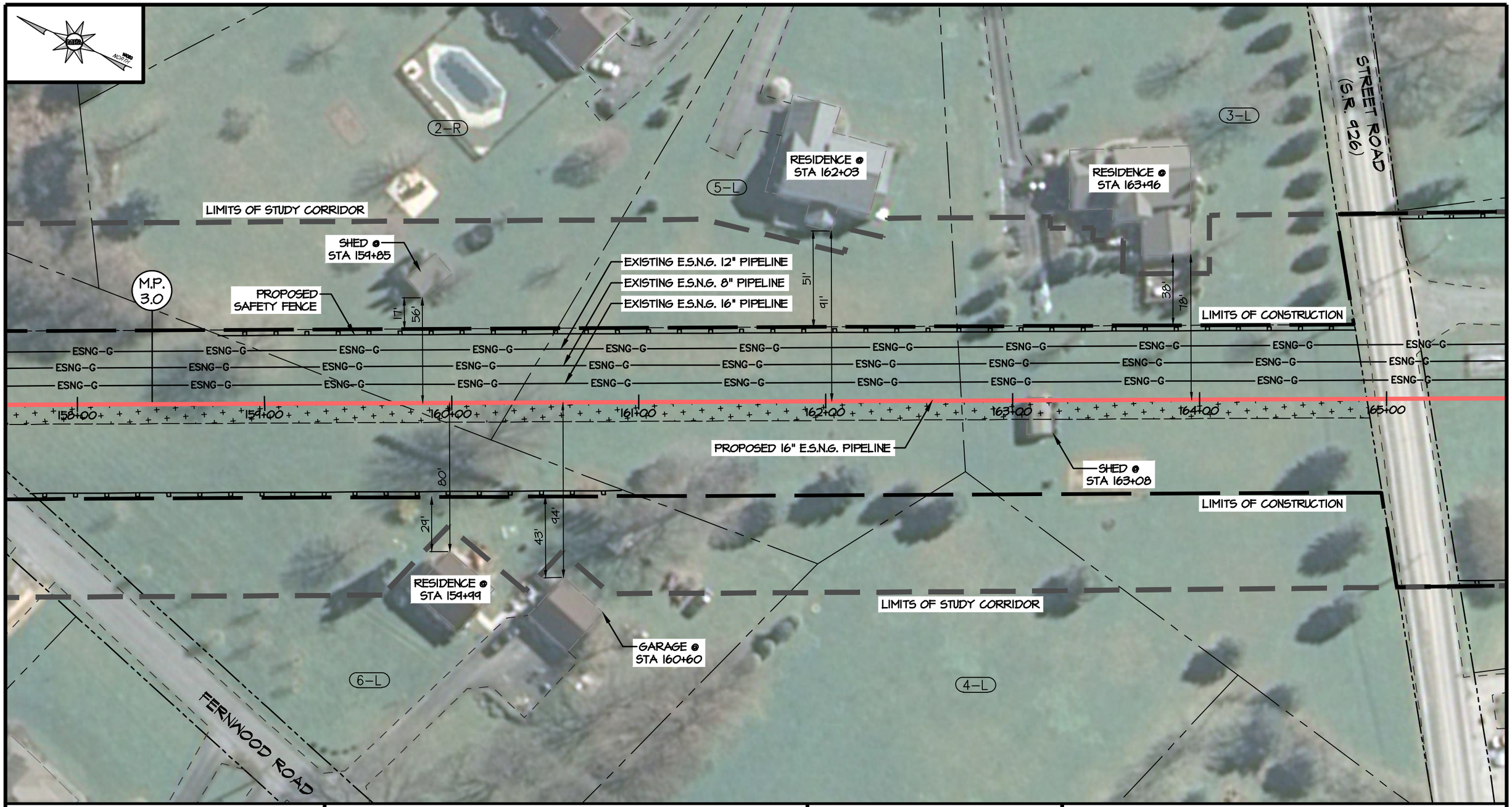

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DALEVILLE LOOP
RESIDENTIAL MAP
WHITE OAK MAINLINE EXPANSION PROJECT
HIGHLAND/LONDONDERRY TOWNSHIPS
CHESTER COUNTY, PENNSYLVANIA

PROJECT NO:	18429	DATE:	12/11/2015
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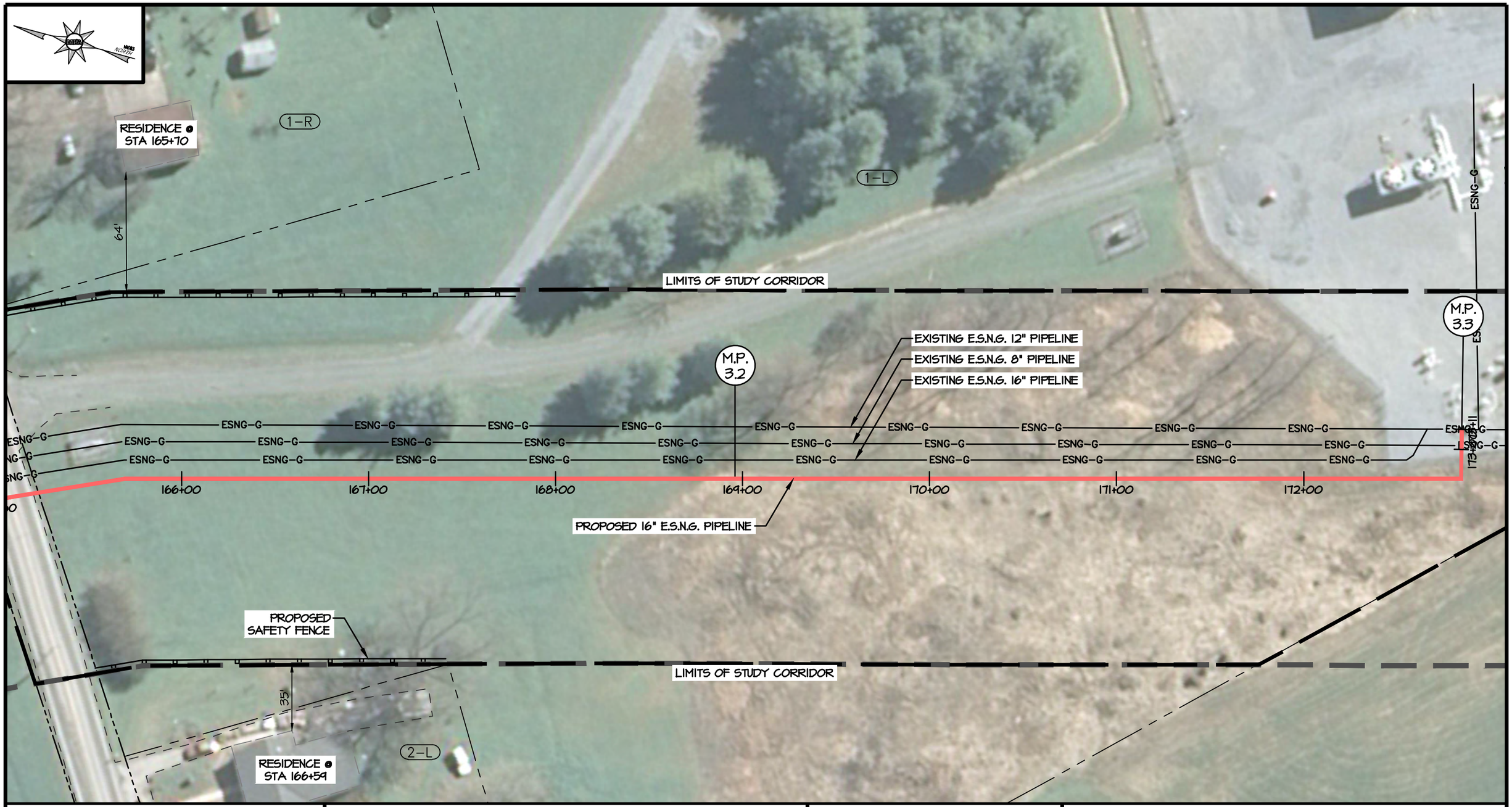

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DALEVILLE LOOP
RESIDENTIAL MAP
WHITE OAK MAINLINE EXPANSION PROJECT
HIGHLAND/LONDONDERRY TOWNSHIPS
CHESTER COUNTY, PENNSYLVANIA

PROJECT NO:	18429	DATE:	12/11/2015
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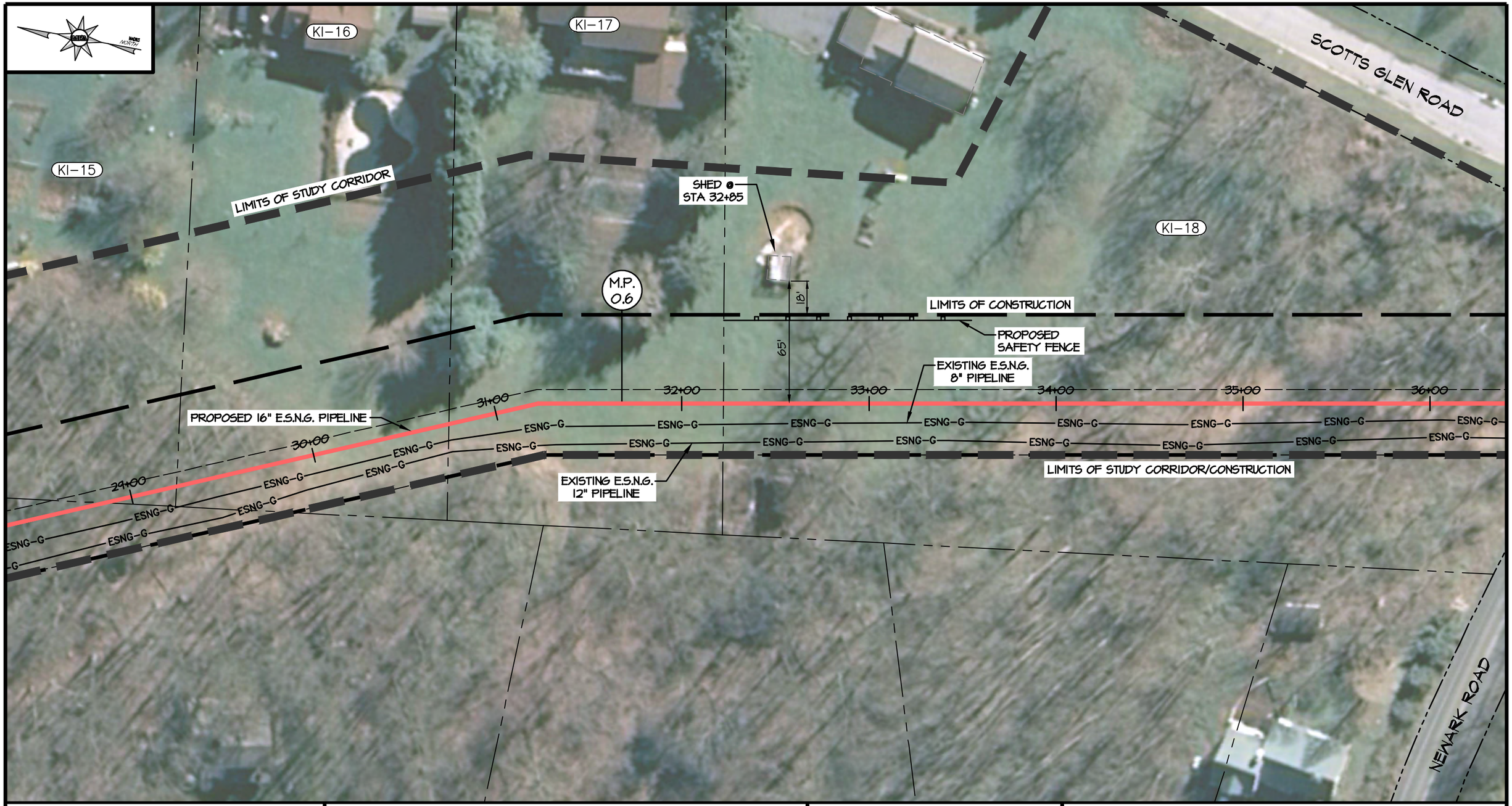

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TEL: (302) 326-2200 FAX: (302) 326-2399
MRAGTA.COM

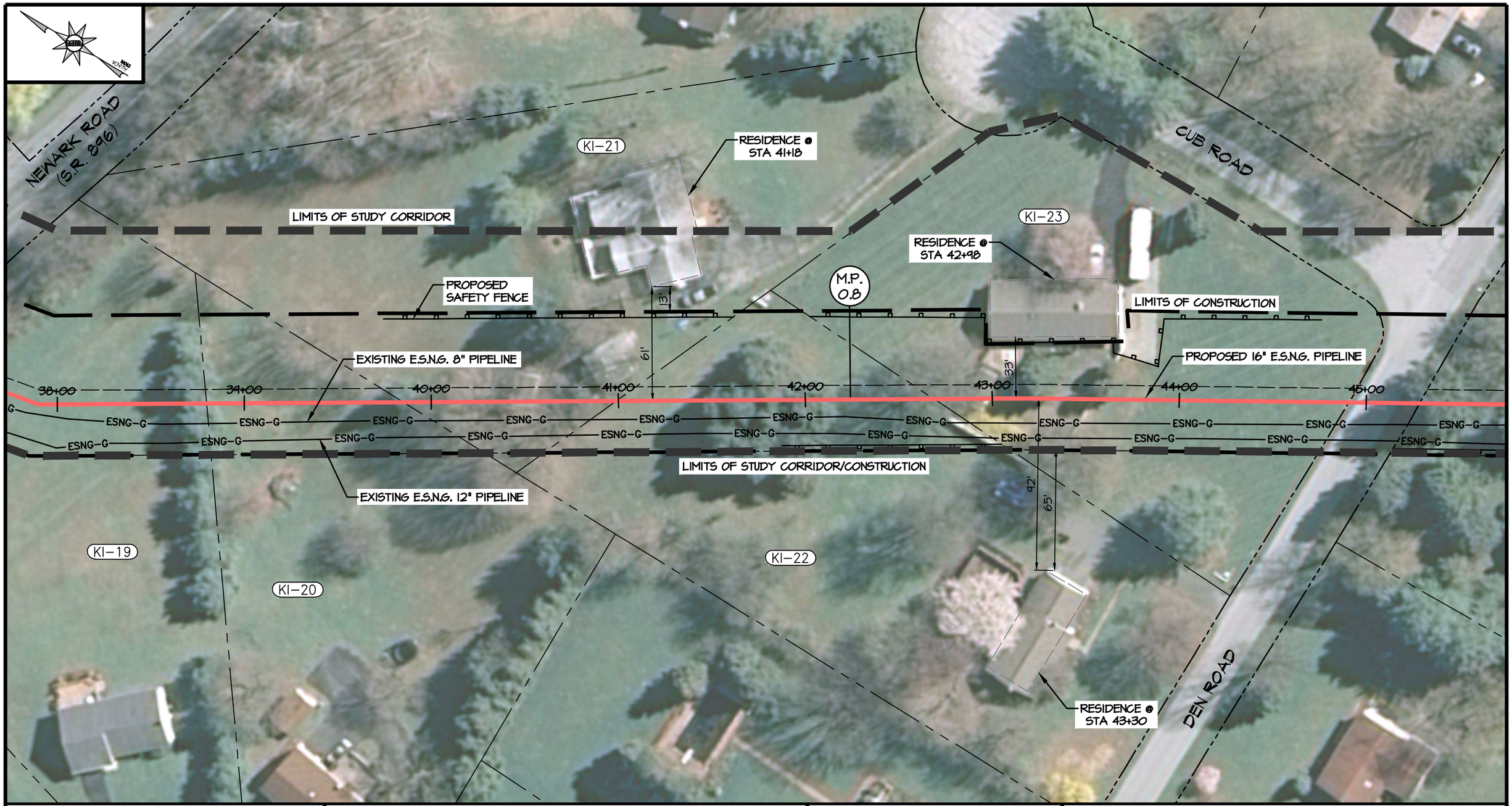
50 25 0 25 50 100
SCALE: 1" = 50'

EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

ISSUE FOR FERC

KEMBLESVILLE ALTERNATIVE 2 LOOP
RESIDENTIAL MAP
WHITE OAK MAINLINE EXPANSION PROJECT
FRANKLIN TOWNSHIP
CHESTER COUNTY, PENNSYLVANIA

PROJECT NO:	18429	DATE:	12/11/2015
DESIGN BY:	JJM/BKS	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	7 OF 13



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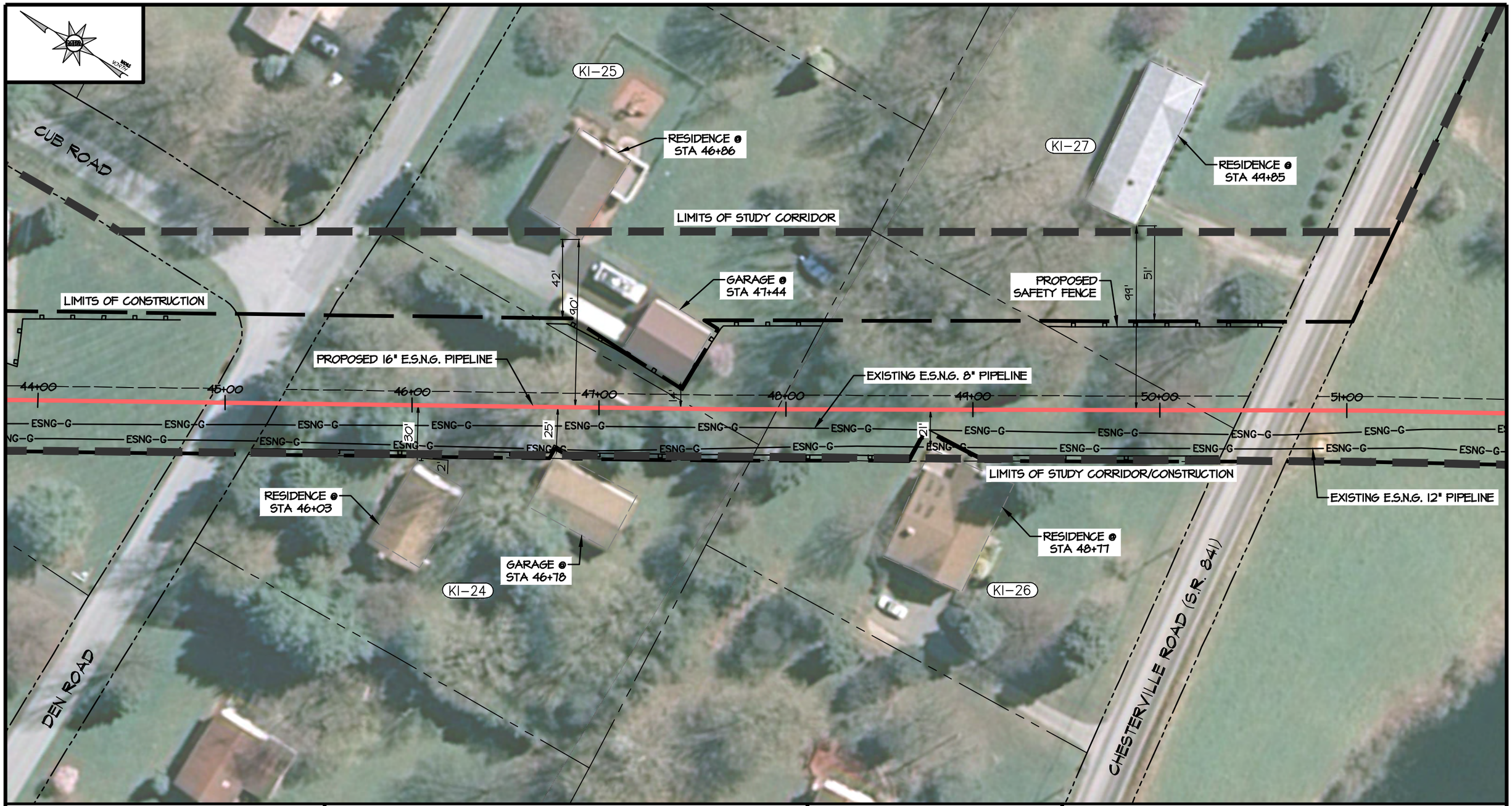

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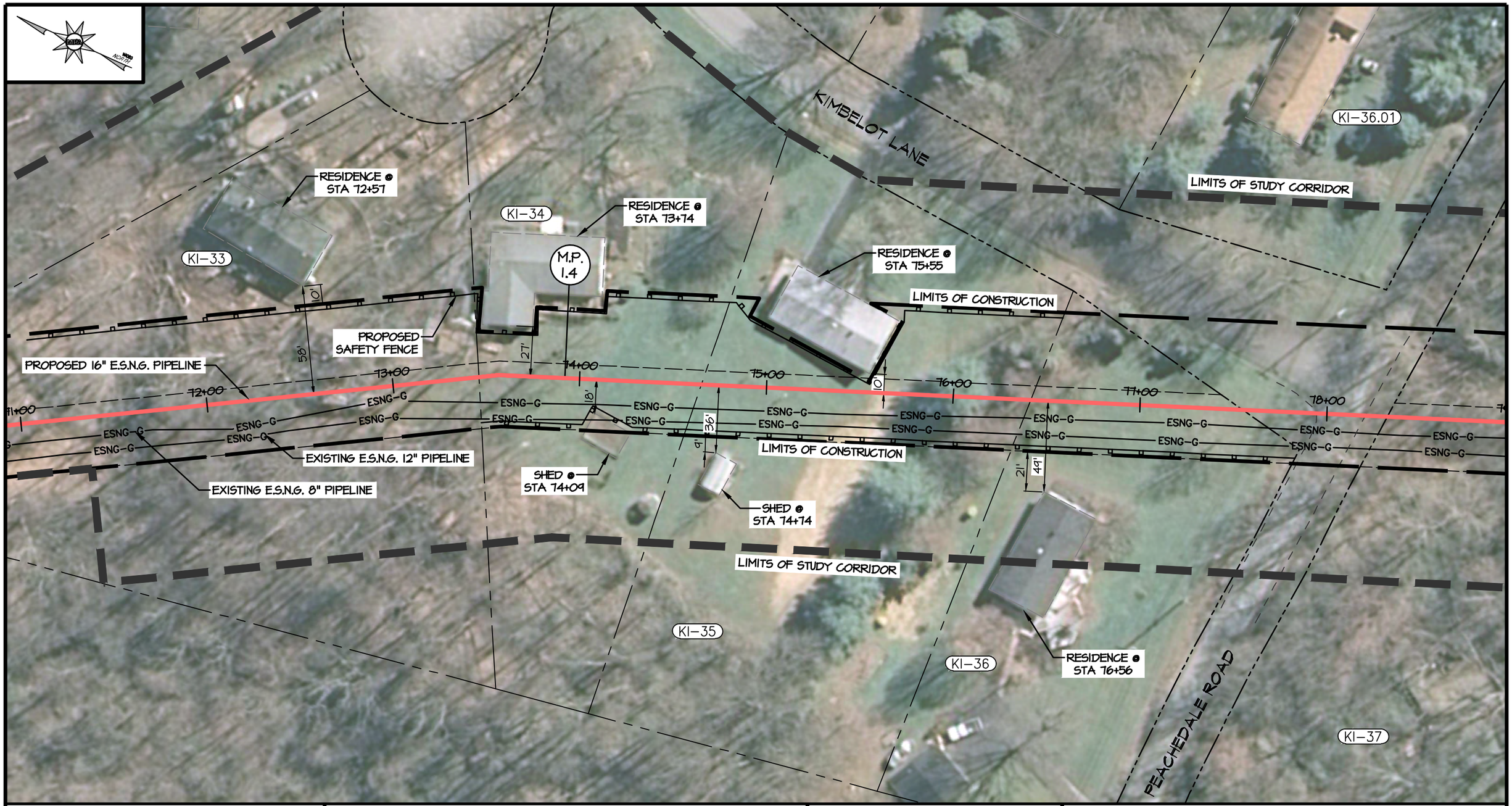

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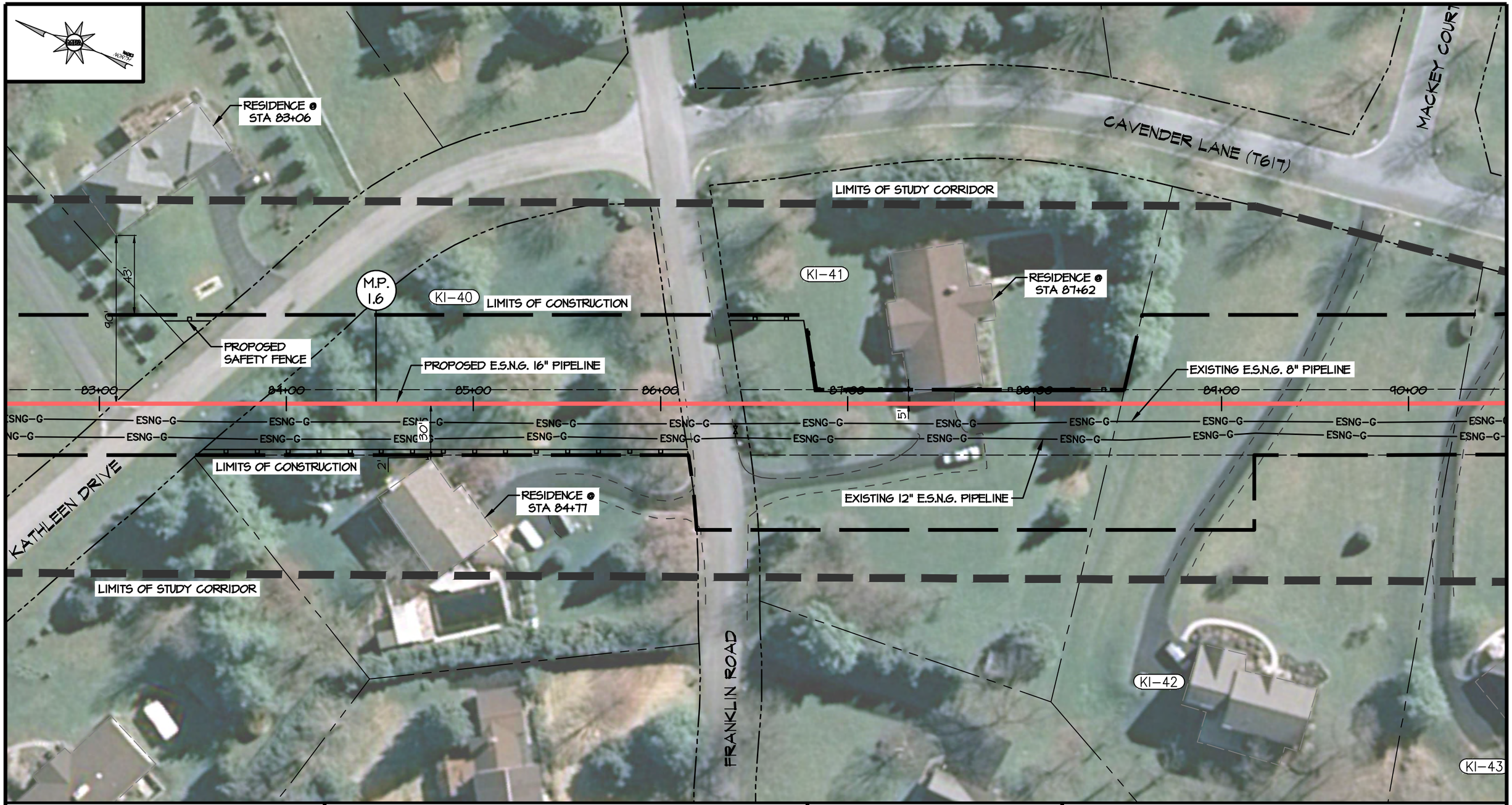

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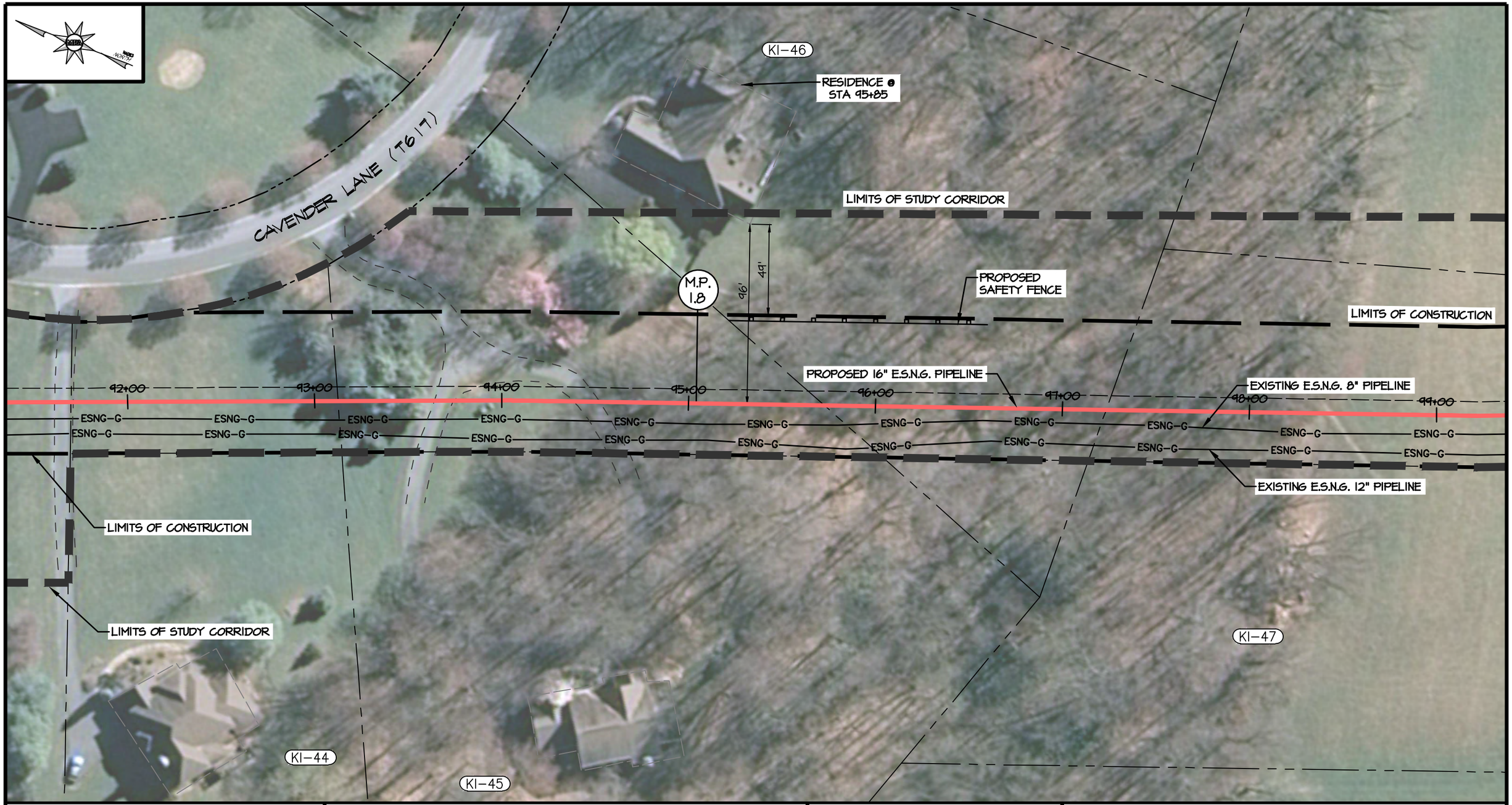

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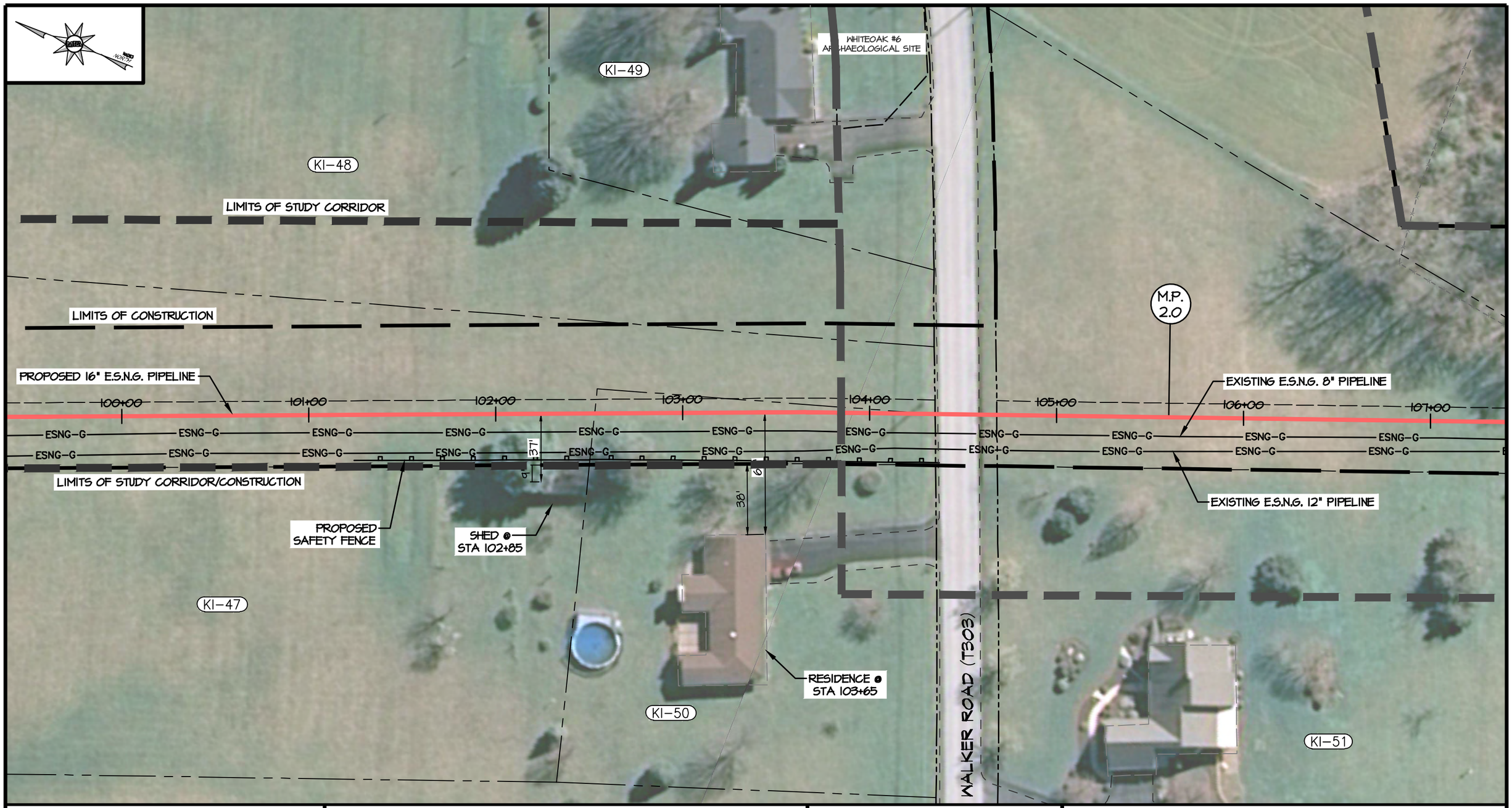

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20160425-4003 FERC PDF (Unofficial) 04/25/2016

Appendix 8 - Existing Residences/Structures within 50 feet of System Reliability Project and Site-Specific Residential Construction Plans

Delaware County	Milepost	Description of Structure	Distance from Pipeline Centerline (feet)	Distance from Construction Work Space (feet)	Offset Direction Right/Left
Porter Road Loop					
New Castle	0.19	Residence	73	46	Left
New Castle	0.19	Shed	48	22	Left
New Castle	0.21	Residence	70	46	Left
New Castle	0.24	Residence	63	43	Left
New Castle	0.26	Shed	23	7	Left
New Castle	0.36	Residence	72	37	Left
New Castle	0.36	Shed	33	0	Left
New Castle	0.37	Shed	34	0	Left
New Castle	0.38	Residence	72	35	Left
New Castle	0.39	Shed	40	5	Left
New Castle	0.41	Shed	36	0	Left
New Castle	0.41	Residence	82	44	Left
New Castle	0.42	Shed	73	33	Left
New Castle	0.43	Shed	46	5	Left
New Castle	0.44	Shed	31	5	Left
New Castle	0.48	Residence	119	31	Right
New Castle	0.52	Residence	83	36	Left
New Castle	0.56	Residence	61	16	Left
New Castle	0.60	Residence	130	31	Right
New Castle	0.62	Residence	135	37	Right
New Castle	0.68	Residence	123	31	Right
New Castle	0.71	Residence	133	43	Right
New Castle	0.72	Residence	135	43	Right
New Castle	0.75	Garage	126	38	Right
New Castle	0.76	Residence	131	43	Right

Delaware County	Milepost	Description of Structure	Distance from Pipeline Centerline (feet)	Distance from Construction Work Space (feet)	Offset Direction Right/Left
New Castle	0.78	Residence	55	48	Left
New Castle	0.79	Shed	49	42	Left
New Castle	0.83	Shed	56	48	Left
New Castle	1.07	Residence	125	45	Right
New Castle	1.34	Residence	135	47	Right
New Castle	1.41	Residence	132	46	Right
New Castle	1.44	Residence	128	46	Right
New Castle	1.46	Residence	134	50	Right
New Castle	1.54	Residence	130	39	Right
New Castle	1.55	Residence	51	39	Left
New Castle	1.61	Residence	40	29	Left
New Castle	1.74	Shed	46	34	Left
New Castle	1.75	Shed	12	0	Left
New Castle	1.82	Shed	48	34	Left
New Castle	1.84	Shed	13	0	Left
New Castle	1.87	Shed	23	9	Left
New Castle	2.00	Residence	65	48	Left
New Castle	2.03	Residence	56	41	Left
New Castle	2.05	Residence	49	36	Left
New Castle	2.06	Residence	100	50	Right
New Castle	2.11	Residence	56	45	Left
New Castle	2.13	Residence	56	45	Left
New Castle	2.16	Residence	95	41	Right
New Castle	2.17	Residence	50	41	Left
New Castle	2.17	Residence	97	42	Right
New Castle	2.19	Residence	100	41	Right
New Castle	2.21	Residence	48	40	Left

Delaware County	Milepost	Description of Structure	Distance from Pipeline Centerline (feet)	Distance from Construction Work Space (feet)	Offset Direction Right/Left
New Castle	2.22	Residence	105	37	Right
New Castle	2.23	Residence	97	30	Right
New Castle	2.26	Residence	51	48	Left
New Castle	2.28	Residence	110	34	Right
New Castle	2.30	Residence	74	46	Left
New Castle	2.37	Garage	59	50	Left
New Castle	2.41	Residence	117	40	Right
New Castle	2.45	Residence	105	33	Right
New Castle	2.48	Residence	108	30	Right
New Castle	2.50	Residence	115	34	Right
New Castle	2.51	Residence	113	30	Right
Dover Loop					
Kent	0.07	Residence	91	48	Right
Kent	0.15	Residence	18	4	Left
Kent	0.15	Residence	87	43	Right
Kent	0.22	Residence	28	5	Left
Kent	0.24	Barn	100	10	Left
Kent	0.24	Residence	63	5	Left
Kent	0.29	Shed	35	25	Right
Kent	0.75	Garage	120	49	Right
Kent	0.75	Residence	76	26	Right
Kent	0.78	Residence	28	5	Left
Kent	0.78	Garage	52	26	Left
Kent	1.26	Residence	77	29	Left
Kent	1.27	Residence	61	16	Left
Kent	1.30	Residence	87	45	Left
Kent	1.34	Garage	64	42	Right

Delaware County	Milepost	Description of Structure	Distance from Pipeline Centerline (feet)	Distance from Construction Work Space (feet)	Offset Direction Right/Left
Kent	1.34	Residence	71	17	Left
Kent	1.34	Residence	42	27	Right
Kent	1.36	Residence	43	28	Right
Kent	1.36	Garage	54	40	Right
Kent	1.37	Residence	72	15	Left
Kent	1.42	Residence	81	18	Left
Kent	1.42	Residence	41	24	Right
Kent	1.44	Residence	34	18	Right
Kent	1.46	Residence	33	16	Right
Kent	1.46	Residence	85	49	Left
Kent	1.47	Residence	31	14	Right
Kent	1.50	Residence	23	7	Right
Kent	1.60	Residence	56	34	Right
Kent	1.73	Residence	57	27	Right
Kent	1.80	Garage	65	37	Right
Kent	1.80	Residence	56	27	Right
Kent	1.83	Residence	58	30	Right
Kent	1.92	Residence	61	34	Right
Kent	1.95	Residence	34	7	Right
Kent	1.96	Residence	35	8	Right
Kent	2.01	Residence	50	24	Right
Kent	2.02	Residence	64	38	Right
Kent	2.04	Residence	16	5	Right
Kent	2.08	Residence	99	37	Right
Kent	2.08	Garage	52	5	Right
Kent	2.13	Residence	78	28	Right
Kent	2.28	Residence	97	47	Right

Delaware County	Milepost	Description of Structure	Distance from Pipeline Centerline (feet)	Distance from Construction Work Space (feet)	Offset Direction Right/Left
Kent	2.37	Residence	96	46	Right
Kent	2.40	Residence	95	46	Right
Kent	2.51	Residence	86	39	Right
Kent	2.54	Shed	74	23	Right
Kent	2.63	Utility Building	51	12	Left
Kent	2.85	Residence	49	44	Right
Kent	5.00	Barn	526	5	Right
Kent	5.90	Residence	80	13	Right
Kent	5.92	Residence	83	13	Right
Kent	5.94	Residence	87	17	Right
Kent	5.96	Residence	92	17	Right
Kent	5.98	Residence	88	18	Right
Kent	6.00	Residence	74	4	Right
Kent	6.02	Residence	74	7	Right
Kent	6.04	Residence	74	4	Right
Kent	6.05	Residence	67	5	Right
Kent	6.06	Garage	119	49	Right
Kent	7.07	Residence	48	18	Left
Kent	7.09	Residence	66	18	Left
Kent	7.13	Residence	68	38	Left
Kent	7.15	Residence	60	21	Left
Kent	7.16	Residence	39	2	Left
Kent	7.18	Residence	43	3	Left
Kent	7.26	Residence	50	3	Left
Kent	7.30	Residence	74	6	Left
Kent	7.30	Residence	73	9	Left
Kent	7.31	Pavilion	40	15	Right

Delaware County	Milepost	Description of Structure	Distance from Pipeline Centerline (feet)	Distance from Construction Work Space (feet)	Offset Direction Right/Left
Kent	7.31	Residence	72	8	Left
Kent	7.33	Commercial	64	1	Left
Kent	7.33	Commercial	25	1	Right
Kent	7.35	Residential	81	17	Left
Kent	7.38	Shed	76	19	Left
Kent	7.40	Commercial	59	1	Left
Kent	7.43	Commercial	72	13	Left
Kent	7.50	Residence	174	47	Right
Kent	7.50	Residence	170	45	Right
Kent	7.50	Residence	166	41	Right
Kent	7.51	Residence	90	30	Left
Kent	7.53	Residence	88	27	Right
Kent	7.54	Commercial	71	17	Left
Kent	7.55	Commercial	52	15	Left
Kent	7.55	Residence	119	42	Right
Kent	7.56	Residence	106	18	Right

DESCRIPTION:

THESE DRAWINGS DOCUMENT OCCUPIED BUILDINGS NEAR THE PROPOSED CONSTRUCTION WORK AREA. THE CONTRACTOR SHALL COMPLY WITH THE FOLLOWING CONSTRUCTION MITIGATION REQUIREMENTS IN ADDITION TO THOSE LISTED IN THE CONSTRUCTION SPECIFICATIONS.

CONSTRUCTION REQUIREMENTS:

1. ALL PROPOSED CONSTRUCTION WORK AREAS ARE CONFINED TO THE LIMITS OF CONSTRUCTION SHOWN ON THIS DRAWING. NO WORK SHALL OCCUR ON LANDOWNER PROPERTY WITHOUT PROPERLY EXECUTED LANDOWNER AGREEMENT.
2. CONTRACTOR SHALL ERECT AND MAINTAIN A TEMPORARY CONSTRUCTION BARRIER FENCE (SAFETY FENCE) BETWEEN THE CONSTRUCTION ZONE AND THE ADJACENT STRUCTURES (THOSE WITHIN 50' OF LIMITS OF CONSTRUCTION) DURING THE CONSTRUCTION PERIOD.
3. CONTRACTOR SHALL INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES (SILT FENCE) AS REQUIRED TO ENSURE THAT CONSTRUCTION SPOIL IS CONTAINED WITHIN THE APPROVED CONSTRUCTION WORK AREA AND DOES NOT ENTER LANDOWNER PROPERTY.
4. VEHICLE ACCESS SHALL BE MAINTAINED TO THE RESIDENCES / BUSINESSES DURING THE CONSTRUCTION PERIOD.
5. TRENCH SHALL NOT BE EXCAVATED UNTIL PIPELINE IS READY FOR INSTALLATION IN THE AREA NEAR THE RESIDENCE / BUSINESS SHOWN ON THESE PLANS. DITCH SHALL BE BACKFILLED OR PLATED IN THE SAME DAY AS PIPE INSTALLATION IN THIS AREA. ALL OPEN DITCHES SHALL BE BARRICADED / FENCED OFF WHEN CONSTRUCTION ACTIVITIES ARE NOT IN PROGRESS.
6. OTHER EXISTING PHYSICAL FEATURES THAT NEED TO BE PROTECTED WILL BE ENCLOSED IN SAFETY FENCE TO AVOID DISTURBANCE DURING CONSTRUCTION.
7. DISTURBED ITEMS SUCH AS DRIVEWAYS, LAWNS, AND LANDSCAPED AREAS SHALL BE RESTORED AS SOON AS PRACTICAL AFTER CONSTRUCTION BY A LICENSED CONTRACTOR.
8. CONTRACTOR SHALL ALLOW ROADWAY TRAFFIC FLOW TO CONTINUE DURING CONSTRUCTION IN THIS AREA, UNLESS TRAFFIC DETOURING MEASURES HAVE BEEN APPROVED IN ADVANCE BY APPLICABLE JURISDICTIONAL AGENCIES.
9. CONTRACTOR SHALL MINIMIZE NOISE FROM CONSTRUCTION ACTIVITIES NEAR RESIDENCES AND SHALL COMPLY WITH ALL LOCAL NOISE ORDINANCES.
10. CONTRACTOR SHALL TAKE APPROPRIATE MEANS TO MIMIMIZE FUGITIVE DUST FROM CONSTRUCTION ACTIVITIES NEAR RESIDENCES / BUSINESSES. CONTRACTOR SHALL PROVIDE STREET SWEEPING SERVICES IF NECESSARY DURING ROADWAY CONSTRUCTION ACTIVITIES NEAR RESIDENCES / BUSINESSES.

LEGEND

- PROPOSED PIPELINE
- EXISTING E.S.N.G. PIPELINE — ESNG—G —
- LIMITS OF CONSTRUCTION
- LIMITS OF STUDY CORRIDOR
- PROPOSED PERMANENT EASEMENT
- EXISTING PERMANENT EASEMENT
- SAFETY FENCE
- RAILROAD TRACK
- ROAD RIGHT-OF-WAY
- PROPERTY LINE
- EDGE OF PAVEMENT
- BUILDING
- FENCE
- CENTERLINE OF STREAM
- DELINEATED WETLAND BOUNDARY — NW — NW —
- DELINEATED WATERS OF U.S. — US — US —
- OVERHEAD UTILITY LINE — OHE — OHE —
- STORM DRAIN — SD — SD —
- WATER LINE — W — W —
- SEWER LINE — SAN — SAN —
- FORCE MAIN —FM—FM—FM—

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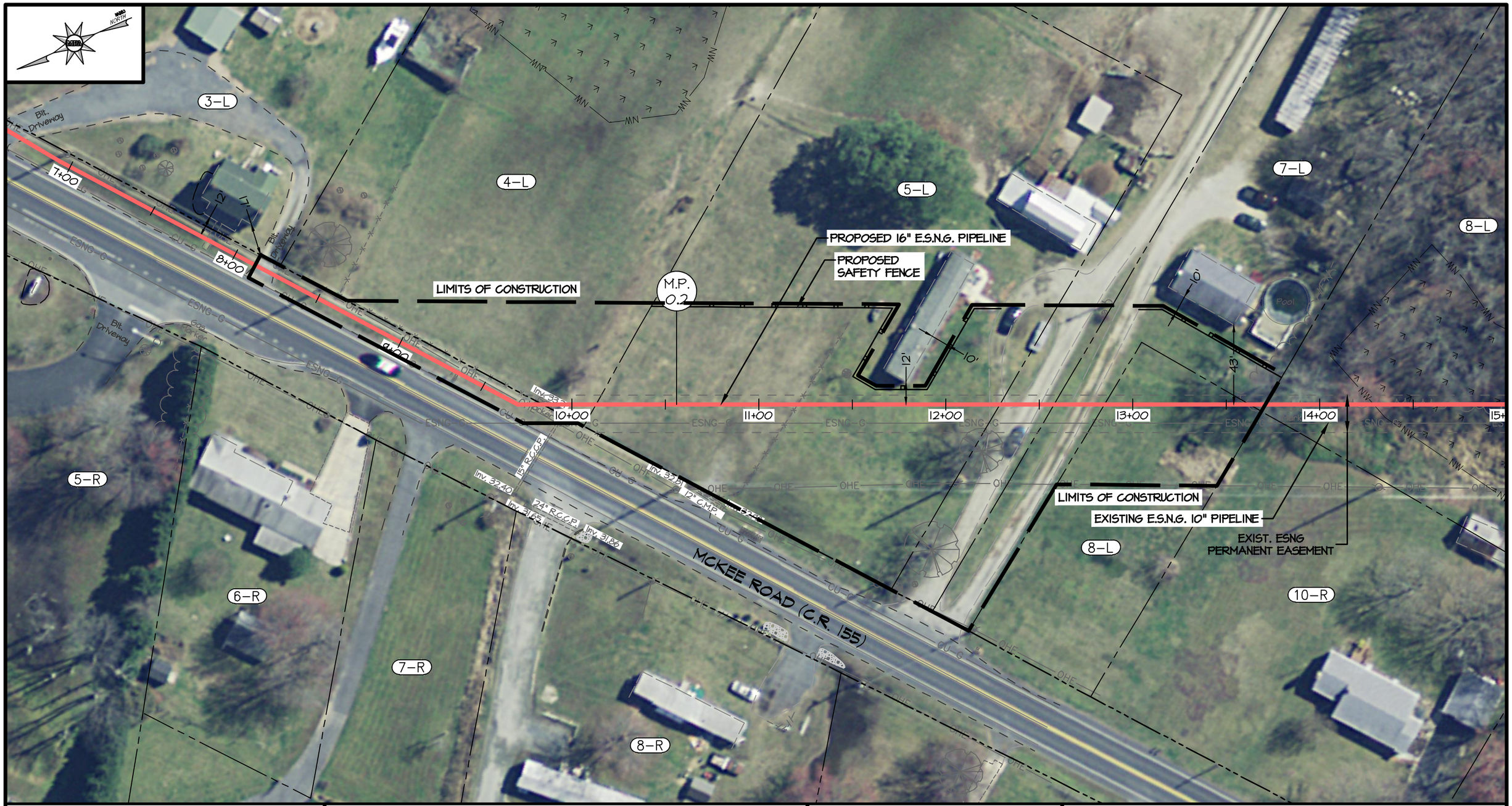

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SYSTEM RELIABILITY PROJECT
KENT COUNTY, DELAWARE

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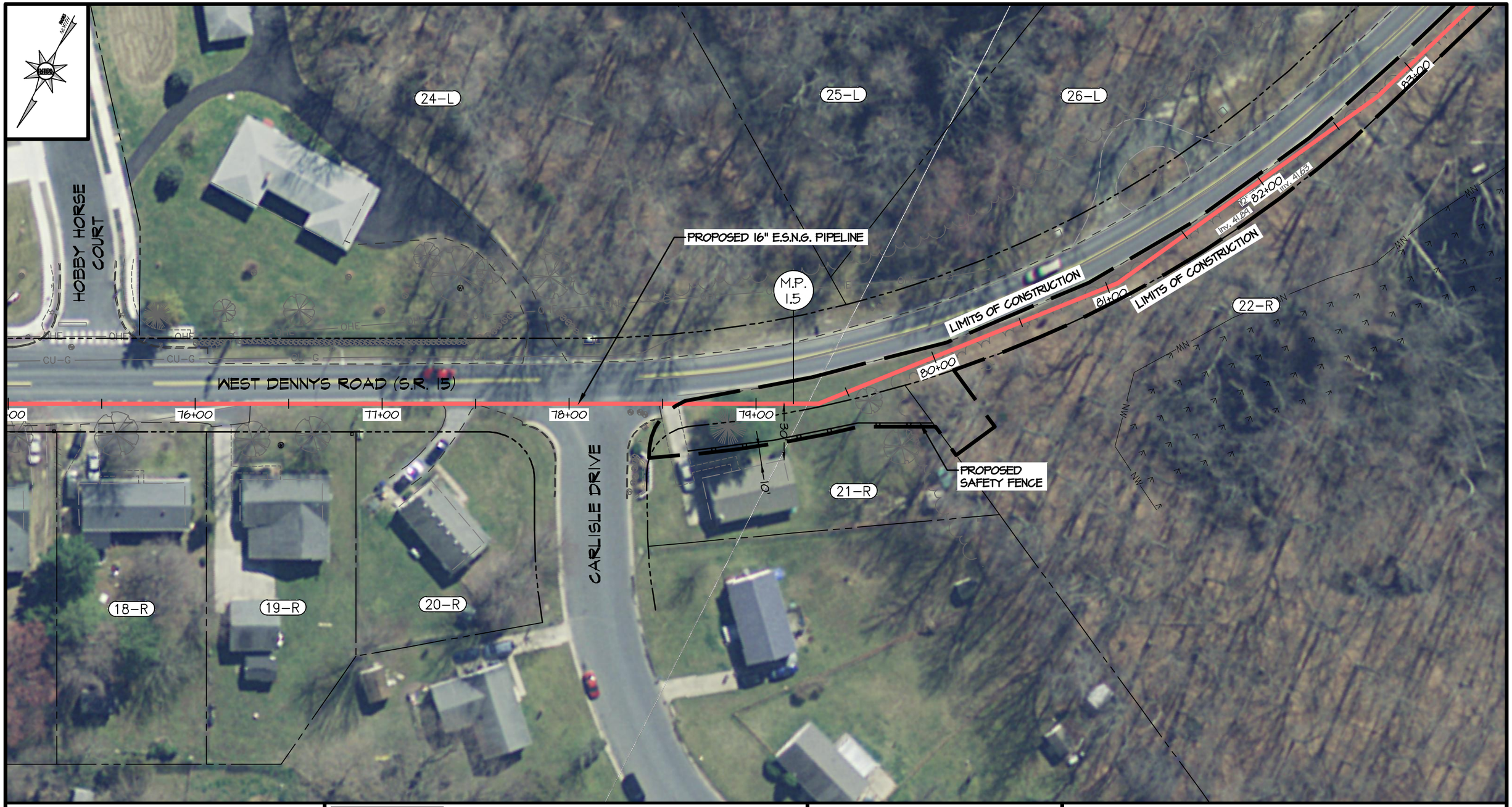

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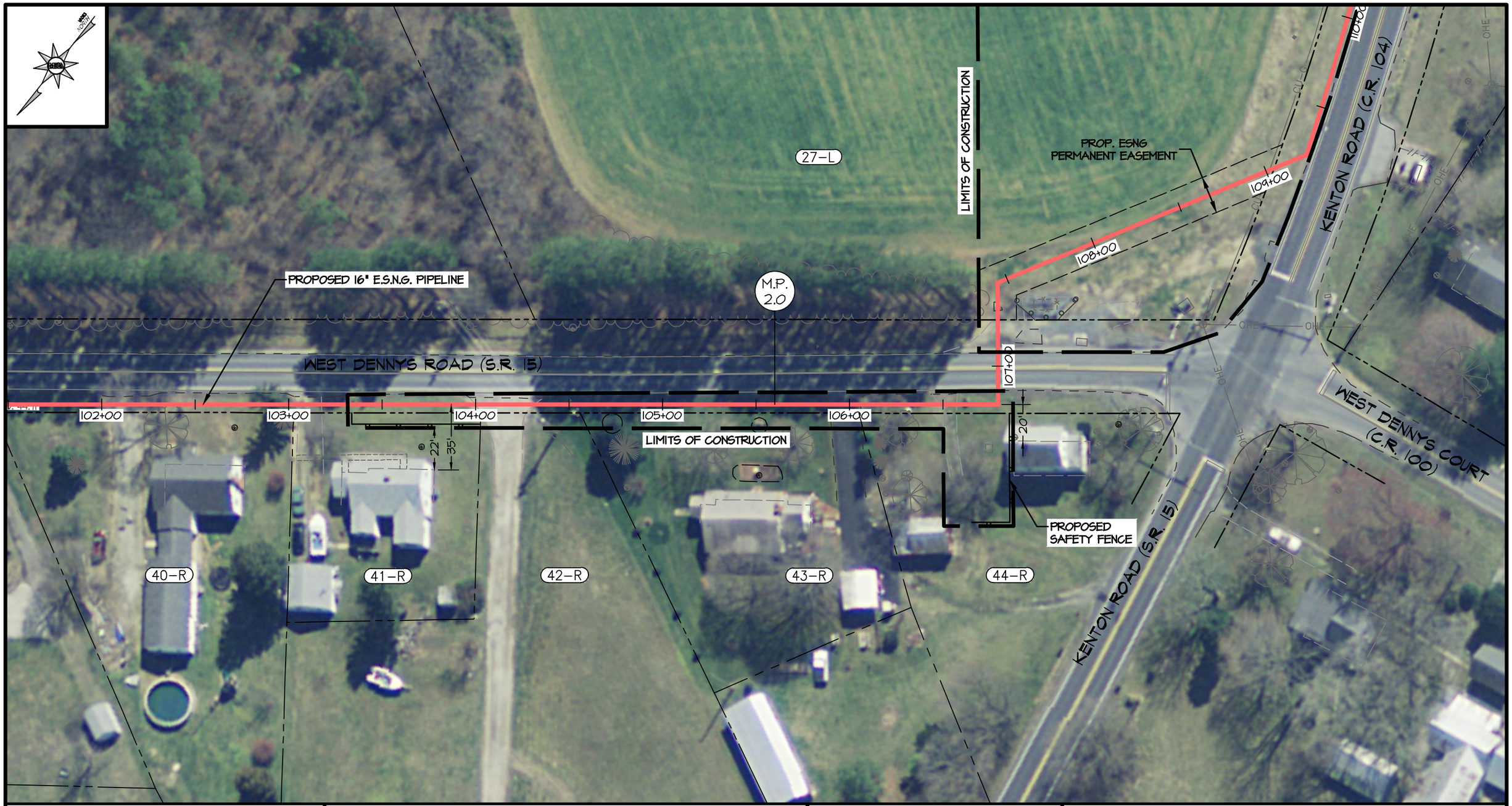

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KENT COUNTY, DELAWARE

PROJECT NO:	18704	DATE:	2/25/2016
DESIGN BY:	JJM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	1 OF 1

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Document Content(s)