Federal Energy Regulatory Commission

Office of Energy Projects

May 2017

Eastern Shore Natural Gas Company **Docket No. CP17-28-000**

2017 Expansion Project

Environmental Assessment

Washington, DC 20426

COOPERATING AGENCIES

US Army Corps of Engineers

USDA NRCS Natural Resources Conservation Service

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas Branch 4
Eastern Shore Natural Gas Company
2017 Expansion Project
Docket No. CP17-28-000

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared this environmental assessment (EA) for the 2017 Expansion Project proposed by Eastern Shore Natural Gas Company (Eastern Shore) in the above-referenced docket. Eastern Shore requests authorization to construct and operate approximately 40 miles of pipeline and appurtenant facilities located in Pennsylvania, Maryland, and Delaware to provide 61,162 dekatherms per day of additional firm transportation service to its existing customers.

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

The U.S. Army Corps of Engineers and the U.S. Department of Agriculture Natural Resources Conservation Service participated as cooperating agencies in the preparation of the EA. Cooperating agencies have jurisdiction by law or special expertise with respect to resources potentially affected by the proposal and participate in the NEPA analysis.

The proposed 2017 Expansion Project includes the following facilities:

- pipeline loop segments (10-, 16-, and 24-inch-diameter) totaling 22.7 miles;
- one 10-inch-diameter 16.9-mile-long mainline extension;
- upgrades to an existing meter and regulator station and lateral piping at the existing interconnect with Texas Eastern in Lancaster County, Pennsylvania;
- one additional 3,750 horsepower (hp) compressor unit at the existing Daleville Compressor Station in Chester County, Pennsylvania; and
- the addition of two pressure control stations in Sussex County, Delaware.

The FERC staff mailed copies of the EA to federal, state, and local government representatives and agencies; elected officials; environmental and public interest groups; Native American tribes; potentially affected landowners and other interested individuals and groups; and newspapers and libraries in the project area.

In addition, the EA 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

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 the Commission has the opportunity to consider your comments prior to making its decision on this project, it is important that we receive your comments in Washington, DC on or before **June 12, 2017**.

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 CP17-28-000 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 FercOnlineSupport@ferc.gov.

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

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

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

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

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. The Commission grants affected landowners and others with environmental concerns intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding which no other party can adequately represent. **Simply filing environmental comments will not give you intervenor status, but you do not need intervenor status to have your comments considered.**

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., CP17-28). 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 AND ABBREVIATIONS

ATWS	additional temporary workspace
CAA	Clean Air Act of 1970
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	carbon dioxide equivalents
Commission	Federal Energy Regulatory Commission
dBA	decibels on the A-weighted scale
DNREC	Delaware Department of Natural Resources and Environmental Control
EDR	Environmental Data Resources, Inc.
ERES	waters of exceptional recreational or ecological significance
ESA	Endangered Species Act
ESC Plan	Erosion and Sedimentation Control Plan
FERC	Federal Energy Regulatory Commission
FRPP	Farm and Ranchlands Preservation Program
GHG	greenhouse gas
g/hp-hr	grams per horsepower-hour
GWP	global warming potential
H&K	Hoover & Keith, Inc.
HAP	hazardous air pollutant
HCA	high consequence area
HDD	horizontal directional drill
hp	horsepower
LDAR	leak detection and reporting
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
LUST	leaking underground storage tank
MDE	Maryland Department of the Environment
MD DNR	Maryland Department of Natural Resources
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NGA	Natural Gas Act
NHPA	National Historic Preservation Act of 1966
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
N_2O	nitrous oxide
NNSR	Nonattainment New Source Review

TECHNICAL ACRONYMS AND ABBREVIATIONS

NPL	National Priority List
NPS	National Park Service
NRCS	U.S. Department of Agriculture, Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	noise-sensitive area
NSR	New Source Review
O_3	ozone
OEP	Office of Energy Projects
ORV	Outstandingly Remarkable Value
OTR	Ozone Transport Region
PADEP	Pennsylvania Department of Environmental Protection
PADCNR	Pennsylvania Department of Conservation and Natural Resources
PEM	palustrine emergent
PFBC	Pennsylvania Fish and Boat Commission
PFO	palustrine forested
PHMSA	Pipeline and Hazardous Materials Safety Administration
Plan	FERC's *Upland Erosion Control, Revegetation, and Maintenance Plan*
$PM_{2.5}$	particulate matter with a diameter less than or equal to 2.5 microns
PM_{10}	particulate matter with a diameter less than or equal to 10 microns
PNDI	Pennsylvania Natural Diversity Inventory
PSD	Prevention of Significant Deterioration
Procedures	FERC's *Wetland and Waterbody Construction and Mitigation Procedures*
PSS	palustrine scrub-shrub
PTE	potential to emit
RICE	Reciprocating Internal Combustion Engine
ROW	right-of-way
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SPCC Plan	Spill Prevention, Control, and Countermeasure Plan
SWPP Plan	Stormwater Pollution Prevention Plan
TMDL	total maximum daily load
tpy	tons per year
USACE	U.S. Army Corps of Engineers
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
VOC	volatile organic compound
WSCRP	Delaware Wildlife Species Conservation and Research Program
WWRPA	Wellhead Water Resource Protection Area

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 the 2017 Expansion Project (Project).

On May 12, 2016, Eastern Shore Natural Gas Company (Eastern Shore) submitted a request to initiate the Commission's pre-filing review procedures for the Project under Docket No. PF16-7-000. On May 17, 2016, FERC approved Eastern Shore's request to commence the pre-filing process. On December 30, 2016, Eastern Shore filed an application in Docket No. CP17-28-000 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 2017 Expansion Project in Lancaster and Chester Counties, Pennsylvania; Cecil County, Maryland; and New Castle and Sussex Counties, Delaware.

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. Consistent with its NEPA and other regulatory responsibilities, the U.S. Army Corps of Engineers (USACE) and the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) participated as cooperating agencies[2] in the preparation of this EA. Cooperating agencies have jurisdiction by law or special expertise with respect to environmental impacts involved with a proposal.

The assessment of environmental impacts is an important and integral part of FERC's decision on whether to issue Eastern Shore a Certificate to construct and operate the proposed facilities. As such, we prepared this EA to assess the environmental impacts that would likely occur as a result of the proposed 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 Project. Our principal purposes in preparing this EA are to:

- identify and assess the potential impacts on the natural and human environment that would result from the implementation of the Project;

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

[2] A cooperating agency is an agency that participates in the preparation of the NEPA document to satisfy its responsibilities related to a project or due to special expertise in the project area or resources affected by the project.

- identify and recommend reasonable alternatives and specific mitigation measures to avoid or minimize environmental impacts; and

- encourage and facilitate public involvement in the environmental review process.

This EA will be used by the Commission in its decision-making process to determine whether to authorize Eastern Shore's proposal. Approval would be granted if, after consideration of both environmental and non-environmental issues, the Commission finds the Project is in the public convenience and necessity.

2. Project Purpose and Need

Eastern Shore has provided natural gas service to the Delmarva Peninsula[3] and Pennsylvania since 1959. Eastern Shore is an interstate pipeline system operating under the jurisdiction of FERC. Eastern Shore receives natural gas at four upstream interstate pipeline interconnections for transportation to local distribution companies, industrial customers and electric power generation customers. Eastern Shore's pipeline system interconnects with Columbia Gas Transmission, LLC in Daleville, Pennsylvania; with Transcontinental Gas Pipe Line Company, LLC in Parkesburg, Pennsylvania and Hockessin, Delaware; and with Texas Eastern Transmission, LP near Honey Brook, Pennsylvania.

Eastern Shore states that it has experienced significant growth on its system over the past decade. Eastern Shore held a series of non-binding open seasons to solicit interest in additional firm natural gas transportation on its system. The proposed Project would result in incremental expansion capacity sufficient to provide 61,162 dekatherms per day of additional firm transportation service as requested to meet the needs of certain of Eastern Shore's existing shippers, with an additional 52,500 dekatherms per day of firm transportation service on Eastern Shore's northernmost Receipt Zone 1 facilities.

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] The Delmarva Peninsula consists of most of Delaware as well as the eastern shore portions of Maryland and Virginia.

3. Public Review and Comment

On March 17, 2016, FERC approved Eastern Shore's pre-filing request and assigned Docket No. PF16-7-000. As part of the FERC pre-filing process, Eastern Shore held seven public informational open houses in the Project area on June 21, 22, 28, and 29 and on July 12, 13, and 14, 2016. FERC representatives attended these meetings. On August 1, 2016, the Commission issued a *Notice of Intent to Prepare an Environmental Assessment for the Planned 2017 Expansion Project and Request for Comments on Environmental Issues* (NOI). The NOI was mailed to federal, state, and local government representatives and agencies; elected officials; Native American tribes; potentially affected landowners; and other interested individuals and groups in the Project area.

In response to the NOI, the Commission received comments from the Pennsylvania Department of Environmental Protection (PADEP), West Sadsbury Township, the Chester Water Authority, the Maryland Historical Trust, the Delaware Department of Natural Resources & Environmental Control (DNREC) - Division of Fish & Wildlife, the Franklin Township Historical Commission, and the National Park Service (NPS). The primary concerns raised were regarding wetland and waterbody impacts; the possibility of damage to water mains; impacts on the White Clay Creek National Wild and Scenic River; potential impacts on bog turtle habitat; and potential impacts on environmental, historic, scenic, or cultural resources located within the Project corridor. In addition, five private landowners filed comments expressing questions or concerns regarding the right-of-way acquisition process; overall public safety and pipeline reliability (including shut off valves); restoration efforts; and the procedures employed should future roadway widening occur where the pipeline is installed within a highway right-of-way.

This EA addresses the potential environmental impacts of the Project as proposed by Eastern Shore, as well as concerns identified in response to the NOI; and presents our independent review of the environmental issues and our recommendations to the Commission. The comments received that are within the scope of the environmental analysis are addressed in the relevant sections of the EA, as noted in table 1.

4. Proposed Facilities

The Project would consist of approximately 39.6 miles of natural gas pipeline, upgrades to an existing meter and regulator station, installation of an additional 3,750-horsepower (hp) compressor unit at an existing compressor station, and the addition of two pressure control stations.

Table 1. Concerns Identified in Comments on the 2017 Expansion Project	
Comment Type	**EA Section Addressing the Comment**
Water Transmission Facilities	A.6
Water Resources	
Impacts on waterways and wetlands	B.2
Wild and Scenic River Crossings	B.2.2
Vegetation, Aquatic Resources, and Wildlife	
Endangered species	B.3
Site restoration	B.3.1
Cultural Resources	B.5
Land Use	
Roadway relocations	A.8
Construction staging areas	B.4
Site restoration	B.4.1
Public lands	B.4.2
Reliability and Safety	
Pipeline reliability	B.7
Public safety	B.7

4.1. Pipeline Facilities

Eastern Shore proposes to construct the Project in seven pipeline segments with location and description as follows:

- **Parkesburg Loop[4] -** The 16-inch-diameter Parkesburg Loop in Chester County, Pennsylvania would commence at Eastern Shore's existing meter and regulator station along Cemetery Road and extend for about 4.5 miles southeast to tie-in to the existing Eastern Shore pipeline east of Limestone Road (State Route [SR] 10). The proposed pipeline route generally parallels or follows the existing Eastern Shore right-of-way. 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.

- **Jennersville Loop -** The 24-inch-diameter Jennersville Loop in Chester County, Pennsylvania would commence at Eastern Shore's Daleville Compressor Station along Street Road (State Route 926) and extend for about 7.3 miles southeast to tie-in to the existing Eastern Shore pipeline near the intersection of Hess Mill Road and Wingate Drive. The proposed pipeline route generally parallels or

[4] A pipeline loop is constructed parallel to an existing pipeline to increase capacity.

follows the existing Eastern Shore right-of-way, except for 1.7 miles of route in the area of the CSX Transportation railroad and Sunnyside Road where the pipeline would be located off the existing right-of-way to avoid residences and sensitive wetlands. Additional permanent right-of-way would need to be acquired from individual property owners in these areas along with temporary workspace required for necessary access and staging areas.

- **Fair Hill Loop -** The 24-inch-diameter Fair Hill Loop in Chester County, Pennsylvania and Cecil County, Maryland would commence at a valve cluster south of Walker Road and extend for about 3.6 miles southeast to tie-in to Eastern Shore's existing pipeline south of Telegraph Road (SR 273). The proposed pipeline route generally parallels or follows the Eastern Shore's existing right-of-way. Some new permanent right-of-way would need to be acquired from individual property owners along with temporary workspace required for necessary access and staging areas.

- **Summit Loop -** The 10-inch-diameter Summit Loop in New Castle County, Delaware would commence within Eastern Shore's existing right-of-way at the southern base of the Eastern Shore aerial bridge spanning the Chesapeake & Delaware Canal, and extend for about 0.5 mile southwest to tie-in at the existing Eastern Shore pipeline along Old Summit Bridge Road. The proposed pipeline route generally parallels existing road right-of-way. New permanent right-of-way would need to be acquired from one property owner along with temporary workspace required for the necessary access and staging areas.

- **Hearns Pond Loop -** The 10-inch-diameter Hearns Pond Loop in Sussex County, Delaware would commence at a point on Sussex Highway (U.S. 13), north of the intersection with Cannon Road (SR 18), and extend about 1.6 miles south to a tie-in location approximately 0.2 mile north of the intersection with Swain Road. The proposed pipeline route generally parallels an existing 6-inch-diameter Eastern Shore pipeline entirely contained within the existing road right-of-way. No new permanent right-of-way would need to be acquired from individual property owners; however, temporary workspace would be required for access and staging areas.

- **Seaford-Millsboro Connector -** The 10-inch-diameter Seaford-Millsboro Connector in Sussex County, Delaware would commence at the intersection of Sussex Highway (U.S. 13) and Airport Road and extend approximately 16.9 miles east to a tie-in location in the vicinity of the existing Millsboro Meter and Regulator Station along Hardscrabble Road (SR 20), approximately 0.2 mile west of the intersection with Sheep Pen Road. The proposed pipeline route generally parallels existing road right-of-way, and the majority of the pipeline would be

constructed within the road right-of-way; however, some additional permanent right-of-way would need to be acquired from individual property owners along with temporary workspace required for necessary access and staging areas.

- **Laurel Loop -** The 10-inch-diameter Laurel Loop in Sussex County, Delaware would commence along the eastern right-of-way of Sussex Highway (U.S. 13), approximately 0.4 mile south of the intersection with Airport Road, and extend about 5.1 miles south to a tie-in location approximately 0.3 mile south of the intersection with Trussum Pond Road. The proposed pipeline route is within existing road right-of-way. No new permanent right-of-way would need to be acquired from individual property owners; however, temporary workspace would be required for access and staging areas.

4.2. Aboveground and Appurtenant Facilities

The location and description of the proposed aboveground facilities are as follows:

- **Honey Brook Meter and Regulator Station:** Eastern Shore would modify an existing meter and regulator station and lateral piping in order to accommodate the installation of upsized mainline taps, piping, and valves at its existing interconnect with Texas Eastern near Honey Brook, Pennsylvania. All construction work would be conducted within previously disturbed areas of the existing interconnect site.

- **Daleville Compressor Station:** The Project would add one new Caterpillar 3612 (3,750-hp) natural gas-fired 4-stroke lean burn reciprocating internal combustion engine (RICE) to Eastern Shore's existing Daleville Compressor Station in Londonderry Township, Chester County, Pennsylvania. The new compressor unit would be constructed entirely on the station property. Eastern Shore proposes to construct a new building to house the new compressor, which would be located adjacent to the existing compressor station buildings.

- **Jennersville Loop Mainline Valve:** One aboveground mainline valve assembly would be installed as part of the Jennersville Loop portion of the Project.

- **Seaford-Millsboro Connector Mainline Valve:** One aboveground mainline valve assembly would be installed as part of the Seaford-Millsboro Connector portion of the Project.

- **Millsboro Pressure Control Station:** An aboveground pressure control facility is proposed at the eastern terminus of the Seaford-Millsboro Connector, adjacent to Eastern Shore's existing Millsboro Meter & Regulator Station. A pipeline

inspection tool (commonly referred to as a pig) launcher/receiver facility is proposed within the pressure control station.

- **Delmar Pressure Control Station:** An aboveground pressure control facility is proposed along the eastern side of DuPont Highway (U.S. 13) near Delmar, Sussex County, Delaware. A pig launcher/receiver facility is proposed within the pressure control station.

A general location of the Project facilities is shown in figure 1. U.S. Geological Survey (USGS)-based topographic maps showing the locations of the Project facilities are provided in appendix 1.

5. Non-jurisdictional Facilities

Under Section 7 of the NGA, 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 supporting facilities (for example, cathodic protection[5] and communications facilities). The specific facilities proposed for the Project 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 this Project.

[5] 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.

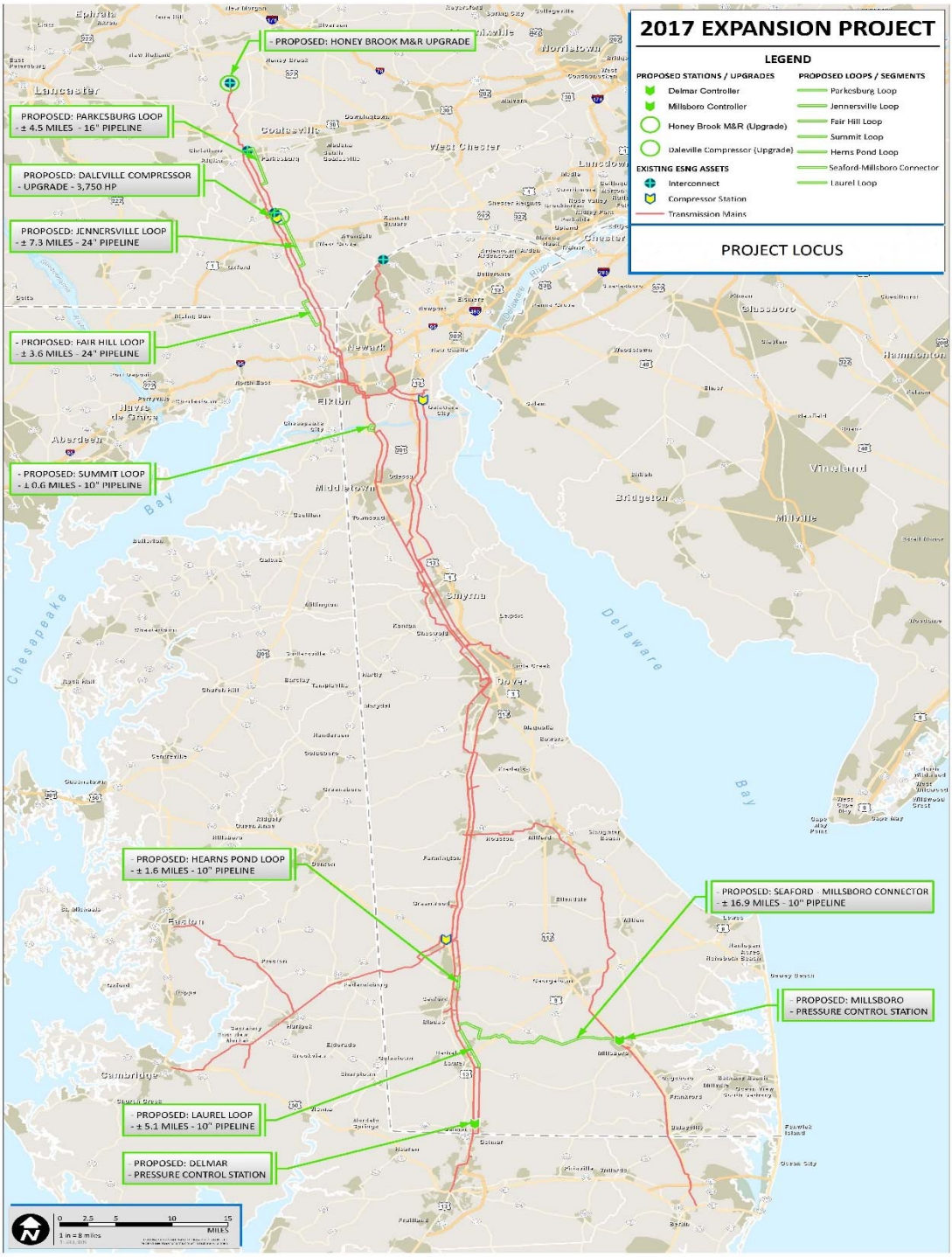


Figure 1: General Location Map

6. Construction Procedures

Eastern Shore would follow FERC's *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures)[6], without modifications; Eastern Shore's Erosion and Sedimentation Control Plan (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 Project.

On August 24, 2016, the DNREC Division of Watershed Stewardship approved Eastern Shore's ESC Plan for construction of the Hearns Pond Loop. Eastern Shore expects DNREC to approve the ESC Plans for the Summit Loop in April 2017, the Seaford-Millsboro Loop in May 2017, the Laurel Loop in April 2017, and Delmar Compressor Station in April 2017.

Eastern Shore anticipates submitting the ESC Plan for the Maryland portion of the Fair Hill Loop to the Cecil County Conservation District in April 2017, and anticipates receiving approval in May 2017. Eastern Shore submitted the ESC Plans for the Parkesburg and Fair Hill loops to the Chester County Conservation District in February, and expects to submit the ESC Plan for the Jennersville Loop in April 2017.

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 permits required for the Project.

In order to monitor for environmental compliance during construction, as specified in FERC's Plan, Eastern Shore would employ at least one Environmental Inspector (EI) per construction spread.

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 the FERC Plan and Procedures; environmental conditions of the Certificate; mitigation measures proposed by Eastern Shore; and the requirements of any other environmental permits and approvals.

[6] 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.

The EI would also be responsible for identifying, documenting, and overseeing any corrective actions to bring an activity back into compliance.

The proposed construction right-of-way for the seven pipeline portions of this Project is typically 100 feet wide, consisting of a 35-foot-wide permanent easement and 65-foot-wide temporary workspace.

Construction of the proposed pipeline facilities would incorporate conventional overland construction techniques and standard sequences of activities. Specifically, construction of the Project would consist of: surveying and staking the workspace limits; clearing vegetation and debris; grading 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 cleaning up 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 component. Therefore, activities associated with construction of the aboveground facilities would occur as part of a single construction effort. 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 preceding crew to minimize the size of the active construction spread and begin the restoration as soon as possible.

Eastern Shore anticipates that two construction spreads would be required for construction of the Project. One construction spread would be responsible for the aboveground and pipeline facilities in Lancaster and Chester Counties, Pennsylvania, in Cecil County, Maryland, and in New Castle County, Delaware. A second construction spread would handle the remaining portions of the Project in Sussex County, Delaware. Construction is expected to take approximately 6 months to complete with between 50 – 60 total on-site workers per construction spread. Construction on the pipelines and aboveground facilities would commence shortly after receipt of all required authorizations and would be performed in unison by the same crews. Eastern Shore would develop a final schedule of anticipated construction activities once contractors are selected.

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 revegetated 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, and the topsoil and subsoil from the trench would be temporarily stockpiled in separate windrows on the construction right-of-way. Unless the landowner or land management agency approves otherwise, topsoil segregation methods would be used in annually cultivated and rotated agricultural lands and in hayfields. Topsoil from the trench and adjacent work spaces would be segregated unless otherwise approved. Topsoil would be placed as the final backfill layer at the completion of construction. Appendix 2 shows the right-of-way cross-section diagrams, including the topsoil segregation methods for different configurations and topsoil segregation methods along the pipeline routes for the Project.

Consistent with the U.S. Department of Transportation (USDOT) 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 state “Call Before You Dig” or “One Call” system to verify and mark all existing 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. The Chester County Water Authority submitted a comment in response to the NOI stating that a 48-inch-diameter transmission main and a 12-inch-diameter distribution main may be affected by the Project. The Water Authority provided Eastern Shore with its requirements for construction in proximity to Authority facilities and Eastern Shore agreed to provide detailed plans for Project work near the water transmission and distribution facilities to the Authority prior to initiating construction.

Within 20 days of completion of backfilling the trench, 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 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.

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. Table 20 in section B.4.1 contains a list of the proposed road crossings for the Project along with the anticipated crossing technique. 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 would 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 would 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

Approximately 63 percent (222 acres) of the land that would be impacted by the Project is characterized as agricultural land. Eastern Shore would segregate topsoil in croplands, pasturelands, and hayfields as described above. 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 states it 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 or 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 residential construction is detailed in section B.4.1 of this EA.

Waterbodies

Eastern Shore would adhere to the FERC Procedures to limit water quality and aquatic resource impacts during and following construction. 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 crossing under the waterbody 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 for smaller waterbody crossings where pumps can adequately transfer the stream flow volume around the work area, and where there are no concerns about the passage of sensitive aquatic species.

HDD entry and exit locations would be located outside of the waterbody and any surrounding wetlands. Eastern Shore has developed an HDD Inadvertent Release

Contingency Plan to identify procedures to follow during an inadvertent surface release of drilling fluids, which we have reviewed and found acceptable. Included in Eastern Shore's HDD Inadvertent Surface Release Contingency Plan is consideration for bog turtle habitats identified by the U.S. Fish and Wildlife Service (USFWS).

To facilitate pipeline construction across waterbodies, additional temporary workspace areas (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 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), or as otherwise approved by FERC. The size of the ATWS would vary based on site-specific conditions and 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, 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. Further details regarding waterbody crossing impacts and mitigation are discussed in section B.2.2.

Blasting

No blasting is anticipated in association with the Project due to the nature of the soils in the Project area. If an area of shallow bedrock is encountered and blasting becomes necessary, Eastern Shore would develop a site-specific Blasting Plan and comply with any required permits.

Wetlands

Wetlands would be crossed 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, 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, or the pipeline would be installed using a push-pull method. 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 pipeline would be maintained in an herbaceous state over the course of Project operation.

7. Operation and Maintenance

Each Project component would be designed, constructed, tested, operated, and maintained in accordance with the USDOT *Minimum Federal Safety Standards* in 49 CFR 192. These 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'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 right-of-way 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 pipeline. 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 USDOT regulations.

8. Land Requirements

Eastern Shore would use existing rights-of-way for approximately 87 percent of the Project route. The pipeline loops would parallel and partially utilize its existing

rights-of-way for 29 percent and other existing utility rights-of-way or public roadways for approximately 58 percent of the Project route. 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).

In Delaware, much of the Hearns Pond Loop, Seaford-Millsboro Connector, and Laurel Loop would be within the state highway layout. In response to a comment received during scoping about the possible impact of a planned widening project for SR 20 (Hardscrabble Road), Eastern Shore stated that pipeline facilities within the road right-of-way would be controlled by the provisions of the Master Franchise Agreement between Eastern Shore and the Delaware Department of Transportation. This agreement includes provisions that address compliance with future Delaware Department of Transportation projects, including the potential relocation of pipeline facilities.

The Project pipeline facilities would affect a total of 346.3 acres during construction and 11.85 acres during operation. Additionally, the Project would utilize about 4.5 acres for the construction of the proposed aboveground facilities. Land requirements for the construction and operation of the Project facilities are summarized in table 2.

Pipeline Rights-of-Way

The typical construction workspace for the 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 temporary workspaces would be used in agricultural, residential, and forested lands for staging areas.

Additional Temporary Workspaces

Eastern Shore would use 61 ATWS along the construction of the Project to provide adequate workspace. The total amount of ATWS totals about 76 acres along the right-of-way. Locations, dimensions, and existing land use for these workspaces are provided in table 3. Although Eastern Shore has identified areas where extra workspace would be required, additional or alternative areas could be identified in the future due to changes in site-specific construction requirements. Eastern Shore would be required to file information on each of those areas for review and approval prior to use.

Table 2. Land Requirements for the 2017 Expansion Project		
Facility	**Land Affected During Construction (acres)**	**Land Affected During Operation (acres)**
Pipeline Facilities		
Parkesburg Loop		
Construction Workspace	52.88	1.79
Extra Workspace Areas	17.93	0
Access Roads	3.86	0
Pipe Storage/Contractor Yards	0	0
Jennersville Loop		
Construction Workspace	78.88	6.15
Extra Workspace Areas	6.30	0
Access Roads	5.36	0.06
Pipe Storage/Contractor Yards	0	0
Fair Hill Loop		
Construction Workspace	32.98	0.21
Extra Workspace Areas	10.35	0
Access Roads	6.43	0
Pipe Storage/Contractor Yards	0	0
Summit Loop		
Construction Workspace	1.45	0.23
Extra Workspace Areas	0.99	0
Access Roads	0	0
Pipe Storage/Contractor Yards	0	0
Hearns Pond Loop		
Construction Workspace	5.18	0
Extra Workspace Areas	1.18	0
Access Roads	0	0
Pipe Storage/Contractor Yards	0	0
Seaford-Millsboro Connector		
Construction Workspace	69.07	3.41
Extra Workspace Areas	33.71	0
Access Roads	0	0.005
Pipe Storage/Contractor Yards	0	0
Laurel Loop		
Construction Workspace	14.33	0
Extra Workspace Areas	5.41	0
Access Roads	0	0
Pipe Storage/Contractor Yards	0	0
Total Pipeline	**346.29**	**11.86**

Table 2. Land Requirements for the 2017 Expansion Project		
Facility	**Land Affected During Construction (acres)**	**Land Affected During Operation (acres)**
Aboveground Facilities		
Honey Brook M&R Station		
Construction Workspace	0.11	0.07
Access Roads	0	0
Daleville Compressor Station		
Construction Workspace	1.88	0.98
Access Roads	0	0
Jennersville Loop Mainline Valve		
Construction Workspace	0	0.05
Access Roads	0	0
Seaford-Millsboro Connector Mainline Valve		
Construction Workspace	0	0.01
Access Roads	0	0
Millsboro Pressure Control Station		
Construction Workspace	1.85	0.05
Access Roads	0	0
Delmar Pressure Control Station		
Construction Workspace	0.78	0.10
Access Roads	0	0
Total Aboveground Facilities	**4.62**	**1.26**
Project Total	**350.91**	**13.12**

Pipe Storage/Contractor Yards

Eastern Shore has not identified any pipe storage/contractor yards for use during construction of the Project. Eastern Shore states that the pipe storage/contractor yards would be located within the construction right-of-way. 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 3. Additional Temporary Work Space Areas for the 2017 Expansion Project

Project Facility	Milepost	Description	Dimensions[1] (feet)	Acreage	Land Use	Acreage of Forest to be Cleared
Parkesburg Loop	0.00	Staging	325 x 319	2.61	Agricultural	0
	0.47	Staging	Irregular	0.83	Open Space	0
	0.79	Staging	Irregular	1.12	Agricultural	0
	1.52	Staging	300 x 290	2.02	Agricultural	0
	2.12	Staging	451 x 310	2.70	Agricultural	0
	2.90	Staging	Irregular	1.42	Agricultural	0
	2.93	Staging	Irregular	1.07	Agricultural	0
	3.37	Staging	293 x 222	1.25	Agricultural	0
	3.86	Staging	414 x 249	3.04	Agricultural; Open Space	0
	4.40	Staging	Irregular	1.87	Agricultural	0
Jennersville Loop	0.60	Staging	185 x 425	0.86	Open Space	0
	2.95	Staging	167 x 134	0.26	Agricultural	0
	3.57	Staging	324 x 275	1.97	Agricultural	0
	5.71	Staging	Irregular	1.96	Agricultural	0
	6.12	Staging	76 x 68	0.17	Agricultural	0
	7.27	Staging	179 x 356	1.08	Agricultural	0
Fair Hill Loop	0.60	Staging	Irregular	1.56	Agricultural	0
	2.05	Staging	Irregular	1.09	Open Space	0
	N/A	Staging	250 x 250	1.48	Open Space	0
	2.55	Staging	275 x 361	2.34	Open Space	0
	N/A	Staging	346 x 228	1.68	Open Space	0
	3.54	Staging	250 x 304	2.20	Open Space	0
Summit Loop	0.52	Staging	Irregular	0.99	Agricultural	0
Hearns Pond Loop	0.0	Staging	Irregular	0.55	Open Space	0
	1.57	Staging	Irregular	0.63	Open Space; Wooded	0.17
Seaford-Millsboro Connector	0.00	Staging	217 x 175	0.86	Agricultural	0
	0.42	Staging	250 x 170	1.05	Agricultural	0

Table 3. Additional Temporary Work Space Areas for the 2017 Expansion Project

Project Facility	Milepost	Description	Dimensions[1] (feet)	Acreage	Land Use	Acreage of Forest to be Cleared
Seaford-Millsboro Connector	1.13	Staging	195 x 185	1.01	Agricultural	0
	1.63	Staging	220 x 225	1.14	Agricultural	0
	1.90	Staging	250 x 215	1.23	Agricultural; Road ROW	0
	2.52	Staging	215 x 240	1.21	Agricultural	0
	3.34	Staging	290 x 265	1.62	Agricultural	0
	3.40	Staging	260 x 250	1.49	Agricultural	0
	5.12	Staging	225 x 185	1.16	Agricultural	0
	5.51	Staging	250 x 200	1.45	Agricultural	0
	5.90	Staging	250 x 250	1.66	Agricultural	0
	6.53	Staging	250 x 220	1.21	Agricultural	0
	6.88	Staging	250 x 250	1.48	Agricultural	0
	7.02	Staging	180 x 115	0.48	Agricultural	0
	7.27	Staging	240 x 210	1.16	Agricultural	0
	8.41	Staging	215 x 240	1.18	Agricultural	0
	9.01	Staging	145 x 165	0.56	Agricultural	0
	9.92	Staging	160 x 170	0.62	Agricultural	0
	11.77	Staging	250 x 210	1.21	Agricultural	0
	12.00	Staging	Irregular	0.48	Agricultural	0
	12.24	Staging	260 x 235	1.35	Agricultural	0
	13.11	Staging	240 x 215	1.18	Agricultural	0
	14.05	Staging	Irregular	1.39	Agricultural	0
	14.09	Staging	Irregular	2.32	Agricultural	0
	15.02	Staging	265 x 200	1.38	Agricultural	0
	15.65	Staging	260 x 180	1.15	Agricultural	0
	16.93	Staging	285 x 140	0.92	Agricultural	0
	16.93	Staging	325 x 235	1.75	Agricultural	0
Laurel Loop	0.48	Staging	Irregular	0.29	Commercial	0
	0.74	Staging	190 x 248	1.08	Agricultural	0

Table 3. Additional Temporary Work Space Areas for the 2017 Expansion Project

Project Facility	Milepost	Description	Dimensions[1] (feet)	Acreage	Land Use	Acreage of Forest to be Cleared
	1.18	Staging	200 x 230	1.06	Agricultural	0
	2.20	Staging	Irregular	1.61	Agricultural	0
Laurel Loop	5.11	Staging	Irregular	1.37	Agricultural	0
Project Total				**75.86**		**0.17**

[1] ATWS dimensions are approximate for work spaces with irregular shapes. Acreage column is based on actual work space area.

Aboveground Facilities

As shown in table 2, the proposed aboveground facilities would affect 4.62 acres of land during construction and 1.26 acres during operation.

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 using public roads, Eastern Shore proposes to construct 13 new access roads for the Project. Ten of these would be temporary roads constructed on private lands, and 3 would provide permanent access for the Jennersville Loop Mainline Valve, the Millsboro Pressure Control Station, and the Delmar Pressure Control Station. These permanent access roads would be located on the newly acquired or existing Eastern Shore permanent easement and would be used for the future access and maintenance of those facilities. Locations, lengths, and use of the proposed new access roads are provided in table 4.

Table 4. New Access Roads for the 2017 Expansion Project

Access Road ID	Milepost	Use	Existing Condition	Upgrade Requirements	Approximate Length (Feet)
Parkesburg Loop					
TAR-PP-1	3.56 - 3.78	Temporary	Crop / Grass	Clear, Grade, Apply Geotextile and Stone	1,335
TAR-PP-2	3.87	Temporary	Crop / Grass	Clear, Grade, Apply Geotextile and Stone	1,940
Jennersville Loop					
TAR-DS-1	1.76	Temporary	Grass	Clear, Grade, Apply Geotextile and Stone	720
TAR-DS-2	3.12	Temporary	Gravel / Grass	Clear, Grade, Apply Geotextile and Stone As Necessary	870
TAR-DS-3	3.58	Temporary	Bituminous / Gravel	Grade, Apply Stone As Necessary	2,400
PAR-DS-1	4.17	Permanent	Crop / Grass	Clear, Grade, Apply Geotextile and Stone	85
TAR-DS-4	6.45	Temporary	Gravel	Clear, Grade, Apply Geotextile and Stone	860
Fair Hill Loop					
TAR-FH-1	0.16 - 0.57	Temporary	Crop / Grass	Clear, Grade, Apply Geotextile and Stone	3,000
TAR-FH-2	2.04	Temporary	Crop / Grass / Gravel	Clear, Grade, Apply Geotextile and Stone	2,540
TAR-FH-3	2.62	Temporary	Crop / Grass	Clear, Grade, Apply Geotextile and Stone	2,120
TAR-FH4	3.47	Temporary	Crop / Grass	Clear, Grade, Apply Geotextile and Stone	300
Seaford-Millsboro Connector					
PAR-SM-1	3.52	Permanent	Crop / Grass	Clear, Grade, Apply Geotextile and Stone	25
Delmar Pressure Control Station					
PAR-DPCS-1	N/A	Permanent	Crop / Grass	Clear, Grade, Apply Geotextile and Stone	85

Table 4. New Access Roads for the 2017 Expansion Project
TAR = Temporary Access Road PAR = Permanent Access Road N/A = Not applicable

9. Permits and Approvals

A number of federal, state, and local regulatory agencies have permit or approval authority for portions of the 2017 Expansion Project. Table 5 provide a list of permits and consultations relevant to the Project; applicable local, state, and federal agencies; and the status of consultations or permit applications. Eastern Shore would be responsible for obtaining all project-specific permits and approvals prior to construction and operation of the Project, regardless of whether they appear in the table.

Table 5. Notifications, Permits, Consultations, and Approvals for the 2017 Expansion Project		
Agency	**Permit/Approval**	**Status**
Federal		
Federal Energy Regulatory Commission	Certificate of Public Convenience and Necessity	• Application filed on December 30, 2016
U.S. Army Corps of Engineers • Baltimore District Regulatory Branch • Philadelphia District Regulatory Branch	• Section 404 of the Clean Water Act • Section 408 (33 U.S. Code [USC] 408)	• Pre-Application meeting held April 19, 2016 • Permit applications submitted in January, February, and March 2017 • Section 404 Permit authorizations anticipated in June 2017 • Section 408 authorization for Summit Loop expected in June 2017
U.S. Fish and Wildlife Service	• Section 7 Endangered Species Act (ESA) • Migratory Bird Consultation under Migratory Bird Treaty Act 16 US Code 703-711 and Section 3 of Executive Order 13186, and Bald & Golden Eagle Protection Act	• Consultation ongoing for Jennersville and Fair Hill loops regarding bog turtles • Listed species concurrence from USFWS received for Parkesburg Loop, Daleville Compressor Station, Summit Loop, Hearns Pond Loop, Seaford-Millsboro Connector, Laurel Loop, Honey Brook M&R, and Delmar Controller
National Park Service	Wild and Scenic Rivers Act of 1968	• Project notification for Jennersville Loop submitted on May 18, 2016. • Concurrence expected in June 2017
National Oceanic and Atmospheric Administration– National Marine Fisheries Service	Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 16 USC 1801	• Determination of no jurisdiction received August 3, 2016
Pennsylvania State Historic Preservation Office (SHPO) Maryland SHPO Delaware SHPO	Consultation under Section 106 of the National Historic Preservation Act	• Pennsylvania Survey reports submitted in July, September, October, and December 2016 and February 2017. Consultation ongoing. • Maryland Survey report submitted 11/16. Consultation ongoing. • Delaware Survey reports submitted June, September, October, November, and December 2016 and February 2017. Concurrence received for Hearns Pond Loop and Delmar Controller. Consultation ongoing.
Natural Resources Conservation Service	Consultation regarding conservation easements crossed by the Parkesburg and Jennersville loops	• Project notification letters submitted May 18, 2016 • Consultation ongoing

Table 5. Notifications, Permits, Consultations, and Approvals for the 2017 Expansion Project

Agency	Permit/Approval	Status
Delaware River Basin Commission	Approval under the Delaware River Basin Compact	• Project notification letter submitted May 18, 2016 • Application submitted September 15, 2016 • Authorization for Parkesburg, Jennersville, Fair Hill, and Summit loops issued on March 15, 2017
Susquehanna River Basin Commission	Approval under the Susquehanna River Basin Compact	• Project notification letter submitted May 18, 2016 • Determination of no jurisdiction issued on March 2, 2017
State		
Pennsylvania Fish and Boat Commission	State listed rare, candidate, threatened or endangered fish, reptiles, amphibians, and aquatic invertebrates consultation	• Consultation ongoing regarding Bog Turtles at Jennersville Loop
Pennsylvania Department of Conservation of Natural Resources	State listed rare, threatened or endangered plants and terrestrial invertebrates, natural communities, and geologic features consultation	• Consultation completed on July 9, 2015, December 11, 2015, and November 15, 2016
Pennsylvania Game Commission	ESA; Interagency Cooperation	• Consultation completed on June 9, 2015 and April 13, 2016
Pennsylvania Department of Environmental Protection	• Chapter 105 Dam Safety and Waterways Management • Section 401 Water Quality Certification • PAG-10 National Pollutant Discharge Elimination System (NPDES) General Permit for Hydrostatic Test Discharges from Tanks and Pipeline • Air Plan Approval	• Chapter 105 and Section 401 permit applications submitted in January 2017 • Authorizations anticipated May 2017 • Existing NPDES general permit to be used for Hydrostatic Test Discharges • Air Plan Approval issued on April 13, 2017
Pennsylvania Department of Transportation	Highway Occupancy Permit - Utilities PA Code Title 67 Chapter 459	• Anticipate submitting permit application in March 2017
Maryland Department of the Environment (MDE) – Wetlands and Waterways Program	Nontidal Wetlands Protection Act, Annotated Code of Maryland, Section 5-901 – Nontidal Wetlands Joint Permit	• Permit application submitted February 2017 • Authorization anticipated May 2017
MDE Coastal Zone Consistency Division	Coastal Zone Management Act	• Consistency determination anticipated May 2017
Maryland Department of Natural Resources	• ESA, Interagency Cooperation	• Species concurrence received June 22, 2016

Table 5. Notifications, Permits, Consultations, and Approvals for the 2017 Expansion Project

Agency	Permit/Approval	Status
	• Forest Conservation Act of 1992, Code of Maryland Regulations Title 08, Subtitle 19 • General Permit for Stormwater Associated with Construction Activity Notice of Intent	• Forest Stand Delineation Plan approved January 2017 • NPDES Notice of Intent to be submitted in March 2017
MDE Water Management Administration	• Code of Maryland Regulations 26.08.04, NPDES General Discharge Permit - Hydrostatic Testing Discharge • Section 401 Water Quality Certification	• Anticipate submitting NPDES application in March 2017 • Section 401 project notification letter submitted May, 2016
Maryland State Highway Administration	Utility Permit for work within state roads	• Anticipate submitting permit application in March 2017
Delaware Department of Natural Resources and Environmental Control (DNREC) Division of Fish & Wildlife – Natural Heritage Program	State listed rare, candidate, threatened or endangered species consultation.	• Consultation completed in February and August, 2016
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 submitted May 18, 2016 • Determination of no jurisdiction for Summit Loop issued March 13, 2017 • Authorizations anticipated in April 2017
DNREC Division of Soil and Water Conservation	Coastal Zone Management Act, 1972, Title 7, Chapter 70	• Project notification submitted May 18, 2016 • Concurrence anticipated April 2017
Delaware Department of Transportation	Utility Construction Permit under Delaware Code Title 2 2400	• Anticipate submitting permit application in April 2017
DNREC Division of Watershed Stewardship	• NPDES General Stormwater Permit • Review and Approve ESC Plan	• Anticipate submitting NPDES permit application in March 2017 • Anticipate submitting ESC Plans for review in March 2017 • Hearns Pond NPDES approved July 21, 2016 and ESC Plan approved August 24, 2016
County, Local, Municipal, Other Affected Parties		
Chester County Conservation District	• Review and approval of ESC Plan • Erosion and Sediment Control General Permit	• Anticipate submitting permit application in April 2017
West Sadsbury Township Municipal Engineer	Pipeline Construction Plan Review and Approval	• Permit pending

Table 5. Notifications, Permits, Consultations, and Approvals for the 2017 Expansion Project

Agency	Permit/Approval	Status
Highland Township Municipal Engineer	Pipeline Construction Plan Review and Approval	• Permit pending
Londonderry Township Municipal Engineer	Pipeline Construction Plan Review and Approval	• Permit pending
Penn Township Municipal Engineer	Pipeline Construction Plan Review and Approval	• Permit pending
New London Township Municipal Engineer	Pipeline Construction Plan Review and Approval	• Permit pending
Franklin Township Municipal Engineer	Pipeline Construction Plan Review and Approval	• Permit pending
Cecil County Department of Planning and Zoning	Forest Conservation Act of 1992, Code of Maryland Regulations Title 08, Subtitle 19	• Exemption determination issued in January 2017.
Cecil County Department of Public Works	• Grading Permit • County Road Utility Permit	• Anticipate submittal in March 2017
Cecil County Conservation District	Erosion and Sediment Control Plan Review and Approval for Pipeline Construction	• Anticipate submittal in March 2017

B. ENVIRONMENTAL ANALYSIS

When considering the environmental consequences of constructing and operating the proposed Project, 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.

1. Geology and Soils

1.1. Geology

The Parkesburg Loop, Jennersville Loop, parts of the Fair Hill Loop, and the Daleville Compressor Station are located within the Piedmont physiographic province. The Piedmont is comprised of Paleozoic marine and volcanic sediments folded and faulted into crystalline metamorphic rock. The remaining portions of the Project, are located within the Atlantic Coastal Plain physiographic province. The coastal plain is comprised of Cretaceous-aged and younger sediments, which overlie the Piedmont crystalline basement. These sediments are comprised of varying mixtures of clay, silt, sand, and gravel, which are derived from the erosion of the adjacent Piedmont and Appalachian Mountains, transported by streams and deposited in fluvial, estuarine, lagoonal, nearshore, and inner- and outer-shelf environments.

The Parkesburg Loop crosses granitic gneiss, the Chickies Formation, the Antietam and Harpers Formation, the Conestoga Formation, the Wissahickon Formation (Albite-chlorite schist), and the Peters Creek Schist. The Daleville Compressor Station is underlain by the Wissahickon Formation (Albite-chlorite schist). The Jennersville Loop portion of the Project crosses the Wissahickon Formation (Albite-chlorite schist) and mafic gneiss.

The Fair Hill Loop crosses the Wissahickon Formation (Albite-chlorite schist), politic gneiss, the James Run Formation - Big Elk Creek, the James Run Formation - Gilpins Falls Member, the James Run Formation - Frenchtown Member, the James Run Formation - Principio Furnace Member, gneiss at Rolling Mill, and gneiss near Elkton Alluvium;

The entire Project area of the Summit Loop is located within the Columbia Formation. The Hearns Pond Loop crosses the Beaverdam Formation, Naticoke Deposits, and Swamp Deposits. The Millsboro-Seaford Connector crosses the Turtle

Branch Formation, Beaverdam Formation, Dune Deposits, and the Lynch Heights Formation. The Laurel Loop crosses the Beaverdam Formation, Dune Deposits, the Turtle Branch Formation, and Swamp Deposits. The Delmar Pressure Control Station is underlain by the Walston Formation and the Beaverdam Formation.

The Parkesburg Loop portion of the Project area generally ranges topographically between 500 and 730 feet above sea level, while the Jennersville Loop portion of the Project area generally ranges between 325 and 600 feet above sea level and the Fair Hill Loop ranges between 210 and 380 feet above sea level. The Summit Loop portion of the Project area generally ranges between 65 and 82 feet above sea level, while the Hearns Pond Loop generally ranges between 30 and 40 feet above sea level and the Seaford-Millsboro Connector ranges between 30 and 50 feet above sea level. The Laurel Loop portion of the Project area generally ranges between 5 and 40 feet above sea level.

Mineral Resources

Extraction of mineral resources in southeastern Pennsylvania is limited to non-fuel resources such as sand and gravel, limestone, iron, chrome, and lead. The USGS 7.5-minute series topographic maps for the areas of Parkesburg, Pennsylvania; West Grove, Pennsylvania-Delaware; and Oxford, Pennsylvania; and an evaluation of aerial photos in the vicinity of the proposed pipelines, did not indicate active mineral resource extraction within 1,000 feet of the Parkesburg Loop, Daleville Compressor Station, Jennersville Loop, or the Pennsylvania portion of the Fair Hill Loop.

According to the Maryland Department of the Environment (MDE) Bureau of Mines, coal mines and non-coal surface mines are located throughout Maryland, but none are in the Project area in Maryland. Portland cement represents the leading nonfuel commodity in the Maryland portion of the Project area, followed by crushed stone and sand and gravel. USGS and aerial photos of the vicinity of the proposed pipeline did not indicate active mineral resource extraction within 1,000 feet of the Maryland portion of the Fair Hill Loop.

The Delaware Geologic Society has identified sand and gravel as the most important mineral resource for the state of Delaware. USGS maps did not indicate active mineral resource extraction within 1,000 feet of the pipeline alignment in Delaware. There is a mineral resource extraction area within 1,500 feet of the pipeline alignment at milepost 10; however this area would not be affected by construction or operation of the Project.

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.

The USGS reports that there is very little seismicity in the region, with only 69 recorded or suspected earthquakes having occurred between 1871 and 2000. During this 129-year period, the greatest earthquake magnitude measured was 3.8 on the Richter Scale in 1973.

The 1996 National Earthquake Hazard Reduction Program seismic hazards map demonstrates peak ground-shaking accelerations as "percent g" (where "g" is the gravitational acceleration at the Earth's surface [9.80 meters per second squared]) with a 2-percent probability of exceedance in 50 years for the central and eastern United States.

The regional centers of seismic activity where the greatest shaking accelerations are expected are in New Jersey and Virginia. According to the USGS Earthquake Hazards Program website[7], the August 23, 2011 Virginia Magnitude 5.8 earthquake produced slight damage to structures in the vicinity of the Project, where the perceived shaking was classed as "moderate," which is defined as peak acceleration between 3.2 and 9.2 percent of "g." Shaking associated with Virginia earthquakes is a relatively rare event. The Parkesburg Loop, Daleville Compressor Station, Jennersville Loop, and the northern portion of the Fair Hill Loop are in the area with a 2-percent chance of exceeding 8 to 10 percent of "g" during a period of 50 years. The Summit Loop is in the area with a 2-percent chance of exceeding 6 to 8 percent of "g" during a period of 50 years. The Hearns Pond Loop, Seaford-Millsboro Connector, Millsboro Pressure Control Station, Laurel Loop, and Delmar Pressure Control Station are in an area with a 2-percent chance of exceeding 2 to 4 percent of "g" during a period of 50 years. These are comparable to the Virginia earthquake accelerations, which indicate that seismic activity of that magnitude can be expected to be a very rare event.

Because the earthquake hazard for this region is relatively low, the Project does not require any special seismic design.

A review of the Federal Emergency Management Agency's Flood Insurance Rate Maps for the Project area indicate that portions of the Parkesburg Loop, Jennersville Loop, Fair Hill Loop, Hearns Pond Loop, and Laurel Loop Project areas fall within the 100-year flood boundary. According to the Flood Insurance Rate Maps, there are no 100-year flood boundaries located within the Summit Loop and Seaford-Millsboro Connector Project areas. The area within the boundary has a 1-percent chance being subjected to flooding in any given year, which therefore is designated as having a special flood hazard. Project facilities within the 100-year floodplain are subject to flooding more frequently than other areas. Eastern Shore would account for these potential issues in its design and installation of the proposed facilities. Eastern Shore would cross waterbodies

[7] http://earthquake.usgs.gov/earthquakes/shakemap/global/shake/ 082311a/

in accordance with the Procedures and work within the 100-year floodplain would take place during periods when significant precipitation is not forecasted.

The landslide overview map for the coterminous United States (Godt, 2003) does not show landslide hazards in the area of the Project. Due to the generally low relief, slope stability is not normally considered among the geological hazards of Delaware or eastern Maryland. Additionally, Delano and Wilshusen (2001) indicate that landslides are not likely to occur in Chester County, Pennsylvania. However, it should be noted that for every one of the soil types crossed by the Project, trench wall instability was considered a potential hazard for shallow excavations. This is due to the general lack of cohesion between sand and silt grains, especially in the presence of water. Consequently, where the alignment crosses streams and the banks are relatively steep and soil water pressure is relatively high, the potential for slope failure increases. Therefore, safety precautions (including dewatering and shoring of the trench walls) would be employed to stabilize the sides of excavations during construction. Dewatering, excavation, and shoring would be performed in accordance with applicable safety regulations.

Due to the relatively low levels of seismic activity and possible ground motion estimated for the Project area, there is little risk for liquefaction of the loose sand layers underlying the Project area. A compendium of seismic-related liquefaction and other hazards for the United States (Crone and Wheeler, 2000), includes examples of hazards related to seismic activity in surrounding states, including liquefaction, but lists no cases for Delaware or Pennsylvania. Therefore, we conclude that soil liquefaction is not considered a potential hazard to the Project.

According to the USGS U.S. Volcanoes and Current Activity Alerts website[8] no active volcanoes or igneous thermal activity are present in New Castle, Kent, and Sussex Counties, Delaware; Cecil County, Maryland; or Chester County, Pennsylvania; or neighboring counties.

Because there is no known history of underground mining in the areas of the pipeline construction, we conclude that there is very low potential for ground subsidence. Additionally, the nature of the topographic relief is likely inadequate to result in major slope movement, either along the pipeline routes or affecting regions along the route from a higher location.

Karst areas in Delaware are confined to the Piedmont, where two small valleys are underlain by carbonate rocks of the Cockeysville Formation. These areas occur in northwestern New Castle County along the Pennsylvania border. Additionally, karst areas are present in central Chester County, Pennsylvania. There are no mapped karst areas in Cecil County, Maryland. According to Weary and Doctor (2014), no portions of

[8] http://volcanoes.usgs.gov

the Project are in areas underlain by soluble rocks, volcanic rocks, or sedimentary deposits that have potential for karst or pseudokarst development. Therefore, risk of subsidence related to collapse of karst structures is not anticipated.

Blasting

With the exception of an area adjacent to approximately milepost 0.2 of the Parkesburg Loop, no exposed bedrock was observed along the proposed pipeline routes or in the vicinity of the Daleville Compressor Station and Delmar Pressure Control Station during Eastern Shore's visual field reviews of the pipeline alignments, compressor station area, and pressure control station areas. Based on Eastern Shore's prior experience in the area, the Parkesburg Loop is not expected to cross exposed or shallow bedrock. In addition, the NRCS on-line soil database[9] does not show conditions that would indicate the need for blasting.

Any presence of shallow rock would likely be in the form of suspended boulders or rock fragments. A backhoe-mounted hydraulic hammer or equivalent would be used to break the rock within the trench and allow for excavation. Blasting would only be considered if this method is ineffective.

If an area of shallow bedrock is encountered and blasting becomes necessary, 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.

Any blasting would be planned, permitted, inspected, executed, and documented in accordance with applicable state regulations.

1.2. Soils

Soils crossed by the Project were compiled from the NRCS' Web Soil Survey.[10] Slopes on the Parkesburg and Jennersville Loops range from 0 to 25 percent. Slopes on the Fair Hill Loop range from 0 to 45 percent. The Summit Loop ranges from 0 to 30 percent, and the Hearns Pond loop ranges from 0 to 5 percent. Slopes on the Seaford-Millsboro Connector and Laurel Loop range from 0 to 15 percent. The Laurel Loop ranges from 0-15 percent. Slopes within the Daleville Compressor Station site range from 3 to 8 percent, and slopes within the Delmar Pressure Control Station range from 0

[9] http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx
[10] http://websoilsurvey.nrcs.usda.gov

to 2 percent. Erosion potential is severe where slopes exceed 8 percent. Characteristics of problematic soils crossed by the Project are included in table 6.

Table 6. Problematic Soils Crossed the 2017 Expansion Project

Project Component	Soil Series	Milepost	Wind Erodibility Group[1]	K Factor
Parkesburg Loop	Edgemont channery loam, 8-15% slopes	0.00-0.05, 0.23-0.37	6	0.15
	Edgemont channery loam, 15-25% slopes	0.37-0.42	6	0.15
	Glenelg silt loam, 8-15% slopes	3.86-3.94, 4.10-4.12	6	0.37
	Manor loam, 8-15% slopes	1.03-1.29, 1.42-1.46, 2.94-2.96, 3.06-3.10	5	0.28
	Manor loam, 15-25% slopes	1.2-1.24	5	0.28
Jennersville Loop	Glenelg silt loam, 8-15% slopes	0.42-0.55, 3.38-3.41, 3.71-3.76, 5.21-5.28, 5.73-5.77, 7.03-7.20	6	0.37
	Manor loam, 8-15% slopes	6.05-6.12, 6.16-6.18, 6.43-6.67, 6.71-6.81	5	0.28
	Manor loam, 15-25% slopes	6.04-6.10, 6.83-7.03	5	0.28
Fair Hill Loop	Gaila loam, 15-25% slopes	0.78-0.79, 3.09-3.18	5	0.37
	Glenelg loam, 8-15% slopes	1.85-1.9, 1.99-2.14, 3.18-3.26	6	0.37
	Manor loam, 8-15% slopes	0.09-0.16, 0.21-0.27, 0.44-0.51, 2.61-2.62, 2.69-2.78, 2.85-2.93	5	0.28
	Manor loam, 15-25% slopes	0.07-0.09, 0.16-0.18, 1.12-1.16, 2.19-2.23, 2.25-2.28, 2.36-2.47, 2.65-2.71,2.78-2.81, 2.97-3.04	5	0.28
Summit Loop	Udorthents, 10-30% slopes	0.0-0.21	3	0.32

[1]Wind Erodibility Group designations range from 1 (most susceptible to wind erosion) to 8 (least susceptible to wind erosion).

Soils Impacts and Mitigation

Potential soil impacts caused by the Project 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 Project. The FERC Plan and ESC Plans would reduce the potential for adverse impacts on 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 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 in accordance with the Plan 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.

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 testing determines that the right-of-way is compacted. Any drain tiles damaged during construction would be repaired to preconstruction condition or landowner specifications. Agricultural areas disturbed by the Project would be allowed to return to active cropland after completion of construction.

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

seed mix. In developing plans for revegetating the right-of-way, seed mixes would be chosen for both cool weather and warm weather revegetation, as appropriate. Seed mixes would be chosen according to the appropriate temperature zone and in consultation with the landowners and the NRCS.

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 Project. Therefore, impacts on soils would be minor and not significant.

2. Water Resources and Wetlands

2.1. Groundwater

Mapping by the U.S. Environmental Protection Agency (USEPA) indicates that the Parkesburg Loop, the Jennersville Loop, the Daleville Compressor Station, and the Fair Hill Loop are within the Piedmont Physiographic Province, which is immediately west of the Northern Atlantic Coastal Plain Physiographic Province. The boundary between the Piedmont Province and the Coastal Plain Province 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 Province.

The Summit Loop, the Hearns Pond Loop, the Seaford-Millsboro Connector, the Millsboro Pressure Control Station, the Laurel Loop, and the Delmar Pressure Control Station are located over the Northern Atlantic Coastal Plain Aquifer System. This aquifer System consists primarily of a series of semi-consolidated sand aquifers separated by clay confining units.

The USEPA 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. According to the USEPA, no aquifers within the Project areas are designated as sole source aquifers.

The Parkesburg Loop, the Jennersville Loop, the Daleville Compressor Station, and the Fair Hill Loop are located above the Crystalline-rock aquifers within the Piedmont Province. Crystalline-rock aquifers consist primarily of metamorphic and igneous rocks, but include small areas of sedimentary rocks.

Chester County, Pennsylvania public water supply in the vicinity of the Project comes from the Octoraro Reservoir 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 Water Authority, 2014). In Pennsylvania, major uses of groundwater included public supply systems, household wells, industry, and mining (National Groundwater Association, 2012). Water quality

tends to be fairly good; however, increases in various compounds as well as total water hardness indicate a recent decrease in water quality. Nonpoint sources of pollution, such as road salting and runoff from paved developments, are the most likely potential sources for increased levels of contaminants.

The Summit Loop, the Hearns Pond Loop, the Seaford-Millsboro Connector, the Millsboro Pressure Control Station, the Laurel Loop, and the Delmar Pressure Control Station are located above the Surficial Aquifer. The Surficial Aquifer is the uppermost aquifer in the Northern Atlantic Coastal Plain Aquifer System, and is above the Chesapeake Aquifer, Castle Hayne-Aquia Aquifer, the Severn-Magothy Aquifer, and the Potomac Aquifer. 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 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 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).

The Castle Hayne-Aquia Aquifer, the Severn-Magothy Aquifer, and the Potomac Aquifer are located at depths deeper than the proposed excavations for the 2017 Expansion Project and are not expected to be impacted.

Public and Private Water Supply Wells and Surface Water Intakes

The Delaware Environmental Navigator[11] and reports of well searches performed by Environmental Data Resources, Inc. (EDR) on July 12, 27, 29, and August 2, 2016, were used to identify the locations of water well locations and Wellhead Water Resource Protection Area (WWRPA) near the Project area. Wellhead Protection Areas are designed to protect a public of community water supply well from contamination to maintain groundwater quality.

According to 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.

[11] http://maps.dnrec.delaware.gov/navmap/

According to the Maryland Geological Survey, approximately 33 percent of Maryland's population utilizes freshwater from groundwater sources. Groundwater is nearly the sole source of drinking water in Maryland's coastal plain. In Maryland, major uses of groundwater included public supply systems, household wells, and irrigation (National Groundwater Association, 2016). In Cecil County, the Susquehanna River, the Octoraro River, the North East River, and the Elk River are the major sources of water. Most of the flow from the Octoraro is diverted to the north for use by the Chester Water Authority.

About 80 percent of freshwater used in Delaware comes from surface water sources and the remaining 20 percent is obtained from groundwater sources (DNREC, 2012). 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.

The Project crosses one WWRPA near the central portion of the Seaford-Millsboro Connector Project area, and five WWRPAs along the Laurel Loop. The location of these WWRPAs is summarized in table 7.

Table 7. Wellhead Water Resource Protection Areas in the Vicinity of the 2017 Expansion Project

Project Component	Milepost	Direction from Construction Work Areas
Seaford-Millsboro Connector	6.55	Within Construction Work Area
Laurel Loop	1.85	Within Construction Work Area
	2.00	Within Construction Work Area
	3.50	Within Construction Work Area
	3.95	Within Construction Work Area
	4.15	Within Construction Work Area

The Delaware Wellhead Protection Program does not state specific restrictions related to the construction of pipelines. The Wellhead Protection Program does specify limits on new impervious surface within a WWRPA. However, none of the Project's proposed aboveground facilities would be within any WWRPAs.

Information collected to date indicates that no known public wells exist within 0.5 mile of the Parkesburg Loop. Four public wells are within 0.5 mile of the Jennersville Loop. There are no public or private wells within 150 feet of the Daleville Compressor Station. No public wells are within 0.5 mile of the Fair Hill Loop, the Summit Loop, or the Hearns Pond Loop. One public well is listed within 0.5 mile of Seaford-Millsboro

Connector. No public wells are within 0.5 mile of the Millsboro Pressure Control Station. Four public wells are within 0.5 mile of the Laurel Loop Project area. No known public wells are within the vicinity of the Delmar Pressure Control Station.

The EDR well search reports and Eastern Shore's field surveys identified private wells within 150 feet of the Project area. Table 8 identifies the private wells and their approximate distance from construction work areas.

Groundwater Impacts and Mitigation Measures

Clearing and grading of the 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 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. Pipeline construction, including HDD and trenching, and other excavations for the Project would not exceed 25 feet deep. Therefore, the aquifer most likely to occur within or near the excavation depth is the Surficial Aquifer.

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 Plan 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 Plans (SWPP Plan) 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.

Table 8. Private Water Supply Wells within 150 feet of the 2017 Expansion Project

Project Component	Milepost	Approximate Distance from Construction Work Areas[1]
Parkesburg Loop	0.15	150 feet East
	0.86	150 feet East
Jennersville Loop	0.52	150 feet West
	0.65	150 feet West
	3.82	Within Construction Work Area
	5.89	150 feet East
	6.12	150 feet East
	6.22	150 feet West
Fair Hill Loop	0.14	150 feet East
	0.30	70 feet West
	0.98	50 feet West
	1.88	50 feet East
	2.04	150 feet West
	2.04	Within Construction Work Area
	2.75	150 feet East
Summit Loop	0.29	20 feet East
	0.34	Within Construction Work Area
	0.41	10 feet East
	0.47	30 feet East
	0.49	20 feet West
	0.54	150 feet South
Hearns Pond Loop	0.08	Within Construction Work Area
	0.21	40 feet West
	0.38	30 feet West
	0.52	Within Construction Work Area
	0.66	80 feet East
	1.01	70 feet East
	1.19	50 feet West
	1.38	10 feet East
	1.58	20 feet East
	1.70	150 feet South
Seaford-Millsboro Connector	0.00	Within Construction Work Area
	0.26	40 feet South

Table 8. Private Water Supply Wells within 150 feet of the 2017 Expansion Project

Project Component	Milepost	Approximate Distance from Construction Work Areas[1]
	0.46	120 feet South
	0.72	50 feet South
	0.94	30 feet North
	1.14	150 feet North
	1.30	120 feet North
	1.47	Within Construction Work Area
	1.57	120 feet North
	1.63	40 feet West
	1.71	Within Construction Work Area
	1.85	Within Construction Work Area
	2.06	50 feet North
	2.20	80 feet North
	3.37	130 feet West
	3.40	Within Construction Work Area
	3.87	60 feet South
	4.18	100 feet North
	4.36	Within Construction Work Area
	4.60	140 feet North
	4.68	Within Construction Work Area
	4.72	110 feet North
	5.20	Within Construction Work Area
	5.31	Within Construction Work Area
	5.40	30 feet West
	5.47	70 feet West
	5.47	Within Construction Work Area
	5.47	110 feet South
	5.58	100 feet North
	5.98	Within Construction Work Area
	6.11	Within Construction Work Area
	6.23	150 feet North
	6.23	30 feet South
	6.32	150 feet North
	6.68	150 feet East
	6.74	150 feet West

Table 8. Private Water Supply Wells within 150 feet of the 2017 Expansion Project

Project Component	Milepost	Approximate Distance from Construction Work Areas[1]
	7.20	110 feet South
	7.25	110 feet North
	7.44	Within Construction Work Area
	7.78	60 feet North
	8.64	Within Construction Work Area
	9.83	Within Construction Work Area
	9.89	80 feet West
	9.94	120 feet North
	10.15	50 feet North
	10.47	140 feet South
	11.65	110 feet South
	12.55	Within Construction Work Area
	12.68	Within Construction Work Area
	12.92	50 feet North
	13.15	80 feet North
	13.26	Within Construction Work Area
	13.36	Within Construction Work Area
	13.59	140 feet North
	14.27	60 feet South
	14.55	90 feet North
	15.27	Within Construction Work Area
	15.50	100 feet North
	15.55	Within Construction Work Area
	15.72	80 feet North
	15.72	130 feet South
	15.81	120 feet South
	16.74	50 feet North
	16.92	150 feet North
	16.92	70 feet South
Laurel Loop	0.05	Within Construction Work Area
	1.10	120 feet West
	1.76	150 feet East
	1.99	140 feet West
	2.87	150 feet East

Table 8. Private Water Supply Wells within 150 feet of the 2017 Expansion Project

Project Component	Milepost	Approximate Distance from Construction Work Areas[1]
	3.14	100 feet East
	3.45	Within Construction Work Area
	4.50	Within Construction Work Area
	4.63	Within Construction Work Area
	4.89	150 feet West
	5.09	80 feet East
Delmar Pressure Control Station	N/A	140 feet South
	N/A	150 feet Southeast

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 and reporting protocols 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. Additionally, Eastern Shore would place safety fences around wells located within construction work spaces to avoid damage to the wells during construction.

Eastern Shore has identified a large number of private water supply wells located within 150 feet of the proposed construction work area. Eastern Shore has stated that, with landowner approval, they would perform pre- and post-construction well yield and water quality testing for potable water wells within 150 feet of the construction work area. These tests would include pump inspection, flow rate measurement, and chemical testing to federal and state standards. If it is determined that a well is impacted from the construction of the Project, Eastern Shore would repair the well and provide a temporary source of water until the damaged well is restored to its original capacity and/or quality.

The need for blasting is not anticipated; therefore, no impacts on groundwater from blasting are expected. If blasting does become necessary, Eastern Shore would develop mitigation measures for groundwater wells and springs.

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 Project.

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 streams, rivers, and eventually the ocean. Many smaller watersheds (also known as sub-basins) are contained within larger watersheds. Watersheds associated with the Project components are shown in table 9.

Table 9. Watersheds Associated with the 2017 Expansion Project

Project Component	Sub-basin	Basin
Parkesburg Loop	Octoraro Creek	Chesapeake Bay
Daleville Compressor Station	Elk Creek	Chesapeake Bay
Jennersville Loop	Elk Creek	Chesapeake Bay
	White Clay Creek	Delaware River
Fair Hill Loop	Elk Creek	Chesapeake Bay
	Christina River	Delaware River
Summit Loop	Chesapeake and Delaware Canal	Delaware River
Hearns Pond Loop	Nanticoke River	Chesapeake Bay
Laurel Loop	Broad Creek	Chesapeake Bay
Seaford-Millsboro Connector	Nanticoke River	Chesapeake Bay
	Deep Creek	Chesapeake Bay
	Broad Creek	Chesapeake Bay
	Indian River	Inland Bays/Atlantic Ocean
Millsboro Pressure Control Station	Indian River	Inland Bays/Atlantic Ocean
Delmar Pressure Control Station	Broad Creek	Chesapeake Bay

As shown in table 10, the Parkesburg Loop would cross six waterbodies using a dry-ditch open-cut method. The Jennersville Loop would cross 16 waterbodies, 3 of which would be crossed using HDD and 13 by dam-and-pump. The Fair Hill Loop would cross 13 waterbodies, 2 of which would be crossed using HDD and the other 11 by dam-and-pump. No waterbody crossings are proposed for the Summit Loop pipeline, and one waterbody greater than 100 feet in width would be crossed by the Hearns Loop using HDD. The Seaford-Millsboro Connector would cross 12 waterbodies, all of which would be crossed using HDD. The Laurel Loop would cross six waterbodies, all of which would be crossed using HDD.

The Daleville Compressor Station upgrades, the Millsboro Pressure Control Station, and the Delmar Pressure Control Station would not involve a crossing of any waterbodies.

Table 10. Waterbodies Crossed by the 2017 Expansion Project					
Milepost[1]	**Waterbody Width (Feet)**	**Waterbody Name[2]**	**Waterbody Class[3]**	**Crossing Method[4,5]**	**Distance from Construction Work Area (Approximate)**
Parkesburg Loop					
0.67 – 0.70	12	Unnamed tributary of Valley Creek	Intermediate	Dry-ditch	Within Construction Work Area
0.96	3	Valley Creek	Minor	Dry-ditch	Within Construction Work Area
3.06	8	Knight Run	Minor	Dry-ditch	Within Construction Work Area
3.60 – 3.71	9	Unnamed tributary of Knight Run	Minor	Dry-ditch	Within Construction Work Area
3.83	8	Unnamed tributary of Knight Run	Minor	Dry-ditch	Within Construction Work Area
3.91 - 3.97	7	Unnamed tributary of Knight Run	Minor	Dry-ditch	Within Construction Work Area
Jennersville Loop					
0.25 – 0.32	9	Unnamed tributary of East Branch Big Elk Creek	Minor	Dry-ditch	Within Construction Work Area
1.15	5	Unnamed tributary of East Branch Big Elk Creek	Minor	Dry-ditch	Within Construction Work Area
1.17	4	Unnamed tributary of East Branch Big Elk Creek	Minor	Dry-ditch	Within Construction Work Area
1.72	4	Unnamed tributary of East Branch Big Elk Creek	Minor	HDD	200 Feet from HDD Work Space
2.50	11	Unnamed tributary of East Branch Big Elk Creek	Intermediate	HDD	50 Feet from HDD Work Space
5.17	11	Unnamed Tributary of West Branch White Clay Creek	Intermediate	Dry-ditch	Within Construction Work Area
5.34	5	Unnamed Tributary of West Branch White Clay Creek	Minor	Dry-ditch	Within Construction Work Area

Table 10. Waterbodies Crossed by the 2017 Expansion Project					
Milepost[1]	**Waterbody Width (Feet)**	**Waterbody Name[2]**	**Waterbody Class[3]**	**Crossing Method[4,5]**	**Distance from Construction Work Area (Approximate)**
6.13	15	West Branch White Clay Creek	Intermediate	Dry-ditch	Within Construction Work Area
6.41	3	Unnamed Tributary of West Branch White Clay Creek	Minor	Dry-ditch	Within Construction Work Area
6.49	5	Unnamed Tributary of West Branch White Clay Creek	Minor	Dry-ditch	Within Construction Work Area
6.41	5	Unnamed Tributary of West Branch White Clay Creek	Minor	Dry-ditch	Within Construction Work Area
6.49	8	Unnamed Tributary of West Branch White Clay Creek	Minor	Dry-ditch	Within Construction Work Area
3.79	7	West Branch White Clay Creek	Minor	Dry-ditch	Within Construction Work Area
2.60 – 2.70	6	Unnamed tributary of East Branch Big Elk Creek	Minor	Dry-ditch	Within Construction Work Area
2.61	8	Unnamed tributary of East Branch Big Elk Creek	Minor	Dry-ditch	Within Construction Work Area
3.30	4	Unnamed Tributary of West Branch White Clay Creek	Minor	HDD	Crossed by Construction Access Road
Fair Hill Loop					
0.05	7	Unnamed tributary of Big Elk Creek	Minor	Dry-ditch	Within Construction Work Area
0.76	5	Unnamed tributary of Big Elk Creek	Minor	Dry-ditch	Within Construction Work Area
3.50	5	Unnamed tributary of Christina River	Minor	HDD	130 feet from HDD Work Space
1.95	9	Unnamed tributary of Christina River	Minor	Dry-ditch	Within Construction Work Area
2.16	6	Unnamed tributary of Christina River	Minor	Dry-ditch	Within Construction Work Area

Table 10. Waterbodies Crossed by the 2017 Expansion Project					
Milepost[1]	**Waterbody Width (Feet)**	**Waterbody Name[2]**	**Waterbody Class[3]**	**Crossing Method[4,5]**	**Distance from Construction Work Area (Approximate)**
2.36 – 2.40	6	Unnamed tributary of Christina River	Minor	Dry-ditch	Within Construction Work Area
2.45 – 2.49	17	Unnamed tributary of Christina River	Intermediate	Dry-ditch	Within Construction Work Area
2.63 – 2.67	5	Unnamed tributary of Christina River	Minor	Dry-ditch	Within Construction Work Area
3.04 – 3.05	2	Unnamed tributary of Christina River	Minor	Dry-ditch	Within Construction Work Area
Hearns Pond Loop					
1.55	47	Clear Brook	Intermediate	HDD	100 feet from HDD Work Space
Seaford-Millsboro Connector					
13.70 - 13.75	7	Long Drain Ditch	Minor	HDD	50 feet from HDD Work Space
12.56	11	Shoals Branch	Intermediate	HDD	50 feet from HDD Work Space
8.9	9	Unnamed tributary of Asketum Branch	Minor	HDD	60 feet from HDD Work Space
6.95	14	Dukes and Jobs Ditch	Intermediate	HDD	50 feet from HDD Work Space
2.13	6	Unnamed tributary of Graham Branch	Minor	HDD	30 feet from HDD Work Space
1.69	10	Graham Branch	Minor	HDD	60 feet from HDD Work Space
0.96	12	Unnamed tributary of Morgan Branch	Intermediate	HDD	130 feet from HDD Work Space
0.68	14	Morgan Branch	Intermediate	HDD	400 feet from HDD Work Space

Table 10. Waterbodies Crossed by the 2017 Expansion Project

Milepost[1]	Waterbody Width (Feet)	Waterbody Name[2]	Waterbody Class[3]	Crossing Method[4,5]	Distance from Construction Work Area (Approximate)
0.38	7	Unnamed tributary of Morgan Branch	Minor	HDD	70 feet from HDD Work Space
0.13 – 0.20	4	Unnamed tributary of Morgan Branch	Minor	HDD	20 feet from HDD Work Space
3.60	5	Unnamed tributary of Elliott Pond Branch	Minor	HDD	100 feet from HDD Work Space
4.05	6 – 10	Unnamed tributary of Elliott Pond Branch	Minor	HDD	35 feet from HDD Work Space
4.05 – 4.24	9	Unnamed tributary of Elliott Pond Branch	Minor	HDD	45 feet from HDD Work Space
Laurel Loop					
4.38 - 4.40	102	Records Pond	Major	HDD	850 feet from HDD Work Space
4.88	8	Unnamed tributary of Copper Branch	Minor	HDD	175 feet from HDD Work Space
2.51 – 2.52	4	Unnamed tributary of Broad Creek	Minor	HDD	420 feet from HDD Work Space
1.38 – 1.39	12	Gum Branch	Intermediate	HDD	100 feet from HDD Work Space
1.27 – 1.28	3	Unnamed tributary of Gum Branch	Minor	HDD	75 feet from HDD Work Space
1.00 – 1.01	8	Unnamed tributary of Gum Branch	Minor	HDD	275 feet from HDD Work Space

[1] Milepost at waterbody centerline or adjacent to waterbody, if waterbody parallels the alignment.
[2] As identified on USGS maps.
[3] Refers to FERC-defined widths. 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; and major waterbodies are greater than 100 feet wide.
[4] Dry-ditch method includes use of flume and/or dam and pump.
[5] Waterbodies listed as “not crossed” but “Within Construction Work Area” would not be directly crossed by the pipeline or other project component but would be temporarily impacted by clearing activities.

Consultation with the Chester County Water Resources Authority (Thomas, 2016) indicated that public potable water intakes are not present within 3 miles downstream of the Parkesburg Loop or Jennersville Loop pipeline crossings. The Jennersville Loop crosses West Branch 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.

According to the Chester County Water Resources Authority and the Cecil County Department of Public Works, public potable water intakes are present within the Elk Creek watershed. However, these intakes are not within 3 miles downstream of the Fair Hill Loop crossings.

According to the Delaware Administrative Code regarding stream basins and designated uses, the Chesapeake and Delaware Canal East, Nanticoke River, Deep Creek, Indian River, and Broad Creek watersheds are not listed as public water supply sources.

Impaired Waterbody Crossings

According to the Chester County Water Resources Authority, PADEP, DNREC, and the USEPA "My Waters Mapper," three waterbodies crossed by the Parkesburg Loop and nine waterbodies crossed by the Jennersville Loop are listed as impaired due to siltation, pathogens, excess nutrients, high mercury levels, and unknown causes. Waterbodies crossed by the Parkesburg Loop contribute to Valley Creek and Knight Run, which are within the Octoraro Creek watershed. Total maximum daily load (TMDL) is the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards. Draft TMDL's for the Octoraro Creek watershed were proposed on March 31, 2013, and as of October 26, 2016, the proposed TMDL's were awaiting USEPA approval. Valley Creek TMDL for polychlorinated biphenyls were approved by the USEPA in 2001.

Seven streams crossed by the Jennersville Loop contribute to Big Elk Creek, which is included in TMDL's for the Chesapeake Bay and was approved by the USEPA in 2010. The other nine streams, crossed by the Jennersville Loop contribute to White Clay Creek, in the Christina River Basin. Nutrient and bacteria TMDL's for the Christina River Basin were approved by the USEPA in 2006. Several waterbodies crossed by the Hearns Pond Loop, Seaford-Millsboro Connector, and Laurel Loop are listed by DNREC as impaired on DNREC's 2012 Section 303(d) list due to low levels of dissolved oxygen, bacteria, and biology and habitat degradation. Nonpoint sources are listed as contributing to these impairments.

Sensitive Waterbody Crossings

According to PADEP and the Chester County Water Resources Authority, Valley Creek and Knight Run, and their larger subwatershed, the Octoraro Creek watershed, are

listed as Trout Stocking-Migratory Fishes. The West Branch White Clay Creek sub-watershed is listed as Trout Stocking-Migratory Fishes. The Elk Creek watershed is designated with a Special Protection use of "High Quality," and the aquatic life designation use is Trout Stocking-Migratory Fishes.

Each waterbody in Maryland is assigned a designated use class. Section 26.08.02.08 of the Code of Maryland Regulations lists the use class of each stream located throughout Maryland. The streams within the vicinity of the Fair Hill Loop are listed as either Use I or Use I-P waters. Specifically, the tributaries to Big Elk Creek are listed as Use I-P waters and the tributaries to the Christina River are listed as Use I waters. Use I waters are defined as "Water Contact Recreation, and Protection of Nontidal Warmwater Aquatic Life." Use I-P waters are defined as "Water Contact Recreation, Protection of Aquatic Life, and Public Water Supply." Impacts to the recreational values, warmwater fisheries, and public water supplies of these streams are expected to be temporary and minor.

According to the Delaware Administrative Code, the Chesapeake and Delaware Canal in the vicinity of the Summit Loop is not listed as waters of exceptional recreational or ecological significance (ERES). The Nanticoke River, Deep Creek, Indian River, and Broad Creek stream basins are designated as ERES in the vicinity of the Hearns Pond Loop, Seaford-Millsboro Connector, and Laurel Loop area. The Broad Creek stream basin is designated as an ERES water in the vicinity of Delmar Pressure Control Station. Of the 21 streams crossed by the Hearns Pond Loop, Seaford-Millsboro Connector, and the Laurel Loop pipelines, all would be crossed using HDD. The Project is not expected to impact the ERES designation of these watersheds.

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 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 (FERC Docket No. CP15-18-001) 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 USACE Section 404 permits, which would trigger NPS review of the permits under Section 7 of the Wild and Scenic Rivers 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.

Several stream segments in the White Clay Creek watershed are designated as National Wild and Scenic Rivers by the NPS, including three locations crossed by the Jennersville Loop. These tributaries 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. Eastern Shore submitted a project notification letter to initiate consultation with the NPS on May 18, 2016. In a response letter dated August 31, 2016, the NPS requested additional information to assess potential impacts. Eastern Shore provided this information to the NPS in September and October 2016. A field meeting with NPS, FERC, and Eastern Shore to review the stream crossings was held on November 10, 2016. Consultation with the NPS is ongoing.

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 Jennersville Loop, Eastern Shore should complete its consultation with the NPS and the USACE and file with the Secretary of the Commission (Secretary), for review and written approval by the Director of the Office of Energy Projects (OEP), its final construction and restoration plan for the crossings of the tributaries of White Clay Creek and NPS comments on that plan.**

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 where HDD is not proposed.

Clearing and grading of vegetation cover could increase erosion into waterbodies. Compaction of soils by heavy equipment near waterbodies may accelerate erosion and the transportation of sediment carried by stormwater runoff. The potential for increased silt loads and turbidity may temporarily degrade water quality in certain waterbodies, including streams identified as impaired by siltation. 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 (unless the proposed ATWS consists of cultivated or rated cropland, or other disturbed land), 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 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;
- where 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.

Eastern Shore proposes to use the HDD crossing method at specific locations along the Jennersville Loop, Fair Hill Loop, Hearns Pond Loop, Seaford-Millsboro Connector, and the Laurel Loop. HDD is proposed as the method to cross Records Pond, a major waterbody, along the Laurel Loop. Where subsurface conditions are appropriate, HDD can be used to avoid impacts on the waterbody by eliminating any disturbance to the streambed or banks. Although the HDD method is typically effective at protecting the resource, an inadvertent return of drilling fluid (a mixture of nontoxic bentonite clay and water) could occur if the fluid seeps from the drill hole to the ground surface or into the waterbody. In general, the potential for inadvertent surface returns is highest near the HDD entry and exit locations when the drill bit is working nearest the surface. However,

an inadvertent return is dependent on numerous factors including substrate characteristics, head pressure of the drilling fluid, topography, elevation, and subsurface hydrology.

To minimize the potential impacts of an inadvertent return of drilling fluid, Eastern Shore would implement measures identified in its HDD Inadvertent Surface Release Contingency Plan, which describes procedures to monitor, prevent, contain, and clean up any inadvertent drilling fluid return. HDD operations would be suspended immediately upon evidence of a drop in drilling pressure, lack of drilling mud returns at the entrance pit, or other evidence of a surface release. Clean-up of all surface releases would begin immediately. If needed, the hole may be abandoned and sealed and a new drill location established. The plan also contains measures to address an inadvertent surface release in a wetland that may contain the federally threatened bog turtle (see section 3.5.3).

All surface waterbodies crossed by the 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 to ensure that impacts on surface waters would be short-term and not significant.

Hydrostatic Testing

In accordance with USDOT 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 hydrostatic test water would be obtained from either the Chester Water Authority or municipal source and brought to the construction site via a tanker truck (table 11). No chemicals would be added to the hydrostatic test water. 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, thereby reducing the potential for erosion and the release of silt-laden materials into wetlands, waterbodies, or other sensitive resources. An energy dissipater would be used.

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 MDE, DNREC, and PADEP. Impacts from the withdrawal and discharge of hydrostatic test water would be short-term and not significant.

Table 11. Estimate of Water Usage for Hydrostatic Testing of Pipelines the 2017 Expansion Project		
Project Component	**Estimate of Water Usage (gallons)**	**Source of Water**
Parkesburg Loop	228,400	Chester Water Authority
Jennersville Loop	850,025	Chester Water Authority
Fair Hill Loop	437,215	Chester Water Authority
Summit Loop	11,065	Municipal source
Hearns Pond Loop	35,400	Municipal source
Seaford-Millsboro Connector	376,200	Municipal source
Laurel Loop	110,650	Municipal source

2.3. Wetlands

The USACE 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 USACE Regional Supplement to the USACE Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region, Version 2.0 (Environmental Laboratory, 2010); and the Regional Supplement to the USACE 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. PEM wetlands 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.

Emergent Wetlands

PEM wetlands are at several locations within the proposed construction areas. Wetlands in the project area contain common reed, woolgrass, sedges, soft rush, spotted jewelweed, skunk cabbage, and sensitive fern as dominant species.

Scrub-shrub Wetlands

PSS wetlands identified within the Project study corridor typically contain red maple, sweetgum, black willow, southern arrowwood, coastal sweet pepperbush, and northern spicebush. Herbaceous plant species within PSS wetlands include spotted jewelweed, sedges, and skunk cabbage.

Forested Wetlands

PFO wetlands are at several locations within the project construction areas. PFO wetlands observed in the Pennsylvania and Maryland have red maple, and green ash as dominant trees. The understory consists of northern spicebush, southern arrowwood, common greenbrier, Japanese honeysuckle, sensitive fern, and skunk cabbage. PFO wetlands observed in Delaware include the aforementioned species, as well as species typical to the Coastal Plain Province, including sweetgum, black willow, willow oak, pin oak, and sweet pepper bush.

Field delineations for the Project were conducted between July 2014 and July 2016. Eastern Shore observed 3 wetlands within the Parkesburg Loop area, 17 wetlands within the Jennersville Loop area, 6 wetlands within the Fair Hill Loop area, 6 wetlands within the Seaford-Millsboro Connector area, and 7 wetlands within the Laurel Loop area. No wetlands were observed in the Summit Loop Project area, or at the Honey Brook Meter and Regulation Station, the Daleville Compressor Station, or the Delmar Pressure Control Station. Table 12 summarizes the wetland crossings impacted by the Project, including wetland classification, crossing lengths, and permanent and temporary wetland impacts.

In total, the 2017 Expansion Project would temporarily impact 1.638 acres of wetlands (0.846 acre of PEM, 0.024 acre of PSS, and 0.768 acre of PFO).

Table 12. Wetlands Affected by the 2017 Expansion Project				
Milepost	**National Wetlands Inventory Classification**	**Length of Crossing (feet)[1]**	**Wetlands Affected During Construction (acres)**	**Wetlands Affected During Operation (acres)**
Parkesburg Loop				
0.70	PEM	5.70	0.01	0.00
3.67 – 3.69	PEM	6.88	0.006	0.00
3.70	PSS	0.00	<0.001	0.00
Total PEM			**0.016**	**0.00**
Total PSS			**<0.001**	**0.00**
Jennersville Loop				
0.28	PSS	0.00	0.02	0.00
0.41	PEM	0.00	0.008	0.00
1.05 – 1.07	PEM	110.61	0.00	0.00
1.12 – 1.17	PFO	9.88	0.004	0.00
1.19 – 1.27	PEM	293.28	0.25	0.00
1.19 – 1.27	PFO	0.00	0.19	0.00
2.49	PEM	168.61[2]	0.00	0.00
3.87 – 3.91	PEM	5.87	0.02	0.00
6.10 – 6.11	PEM	0.00	<0.001	0.00
6.15	PEM	0.00	0.02	0.00
6.41	PEM	3.04	0.005	0.00
6.68	PEM	26.33	0.06	0.00
6.86	PEM	32.43	0.04	0.00
1.62 – 1.83	PEM	243.14[2]	0.00	0.00
3.28 – 3.36	PFO	70.69[2]	0.00	0.00
3.78 – 3.81	PEM	1.13	0.006	0.00
2.58 – 2.75	PEM	218.09	0.18	0.00
	PFO	0.00	0.21	0.00
Total PEM			**0.59**	**0.00**
Total PSS			**0.02**	**0.00**
Total PFO			**0.404**	**0.00**
Fair Hill Loop				
0.03	PEM	85.55	0.09	0.00
0.22	PEM	11.78	0.02	0.00
0.48	PEM	15.05	0.02	0.00
0.76	PEM	97.42	0.06	0.00
3.49	PEM	9.59[2]	0.00	0.00
1.95	PEM	33.00	0.04	0.00

Table 12. Wetlands Affected by the 2017 Expansion Project				
Milepost	**National Wetlands Inventory Classification**	**Length of Crossing (feet)[1]**	**Wetlands Affected During Construction (acres)**	**Wetlands Affected During Operation (acres)**
Total PEM			**0.23**	**0.00**
Total PSS			**0.00**	**0.00**
Total PFO			**0.00**	**0.00**
Seaford-Millsboro Connector				
11.40 – 11.41	PFO	0.00	0.004	0.00
11.38 – 11.40	PFO	0.00	0.02	0.00
11.42	PFO	0.00	0.004	0.00
11.06 – 11.07	PFO	0.00	0.01	0.00
11.03 – 11.06	PFO	0.00	0.01	0.00
10.86 – 10.95	PFO	0.00	0.24	0.00
Total PEM			**0.00**	**0.00**
Total PSS			**0.00**	**0.00**
Total PFO			**0.288**	**0.00**
Laurel Loop				
4.23 – 4.38	PEM	4.56[2]	0.00	0.00
2.67 – 2.69	PFO	0.00	0.02	0.00
1.47 – 1.48	PFO	0.00	0.006	0.00
1.31 – 1.33	PFO	0.00	0.02	0.00
0.94 – 0.99	PFO	0.00	0.03	0.00
0.04 – 0.05	PEM	0.00	0.01	0.00
0.03 – 0.05	PSS	0.00	0.003	0.00
Total PEM			**0.01**	**0.00**
Total PSS			**0.003**	**0.00**
Total PFO			**0.076**	**0.00**

[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.
[2] Wetland would be crossed using HDD construction method.

Construction and Operation Impacts and Mitigation Measures

Impacts on wetlands from construction of the Project pipelines would primarily result from the 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.

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. A push-pull method could also be used in saturated wetlands. An ATWS would not be located within 50 feet of any wetland unless site-specific conditions dictate otherwise and approved by FERC. Eastern Shore has not requested any modifications to the Procedures.

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 affected by the Project would be allowed to revegetate; however, woody vegetation may take several years to decades to regenerate fully. A small amount of PFO wetland (about 0.4 acre on the Jennersville Loop, 0.3 acre on the Seaford-Millsboro Loop, and 0.08 acre on the Laurel Loop) would experience a temporary conversion to PEM or PSS wetland. 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 USACE Section 404 permits terms and conditions, including any required mitigation for impacts on PFO wetlands.

Based on the above discussion, we conclude that impacts on wetlands resulting from construction and operation of the 2017 Expansion Project would be short-term and not significant.

3. Vegetation, Fisheries, and Wildlife

3.1. Vegetation

Existing Vegetation Resources

The Parkesburg, Jennersville, and Fair Hill Loops, as well as the Daleville Compressor Station, are in the Piedmont Upland Ecoregion, as defined by the USEPA. The Summit, Hearns Pond, and Laurel Loop, as well as the Seaford-Millsboro Connector and the Delmar Pressure Control Station are located 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).

The Project crosses 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 Daleville Compressor Station site contains

four vegetation community/cover types: agriculture, forested, open space/utility corridor, and industrial/commercial. The Delmar Pressure Control Station site contains two vegetation community/cover types: agriculture and road/road right-of-way. Descriptions of the upland vegetation communities crossed by the Project 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 each Project facility. Common crops include wheat, soybean, and corn, and the production of hay.

Upland Forest

Upland forest habitats are present throughout the area of the Project. 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 plant communities. These communities are dominated by Bermuda grass, white clover, red clover, tall fescue, common dandelion, and Canada goldenrod.

Industrial/Commercial

In the Project areas, 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.

Road/Road Rights-of-Way

Road/road rights-of way in the pipeline and aboveground facilities areas consist of impervious or semi-impervious surfaces with mowed and maintained vegetated areas. Such areas are dominated by Bermuda grass, tall fescue, common dandelion, Canada goldenrod, white clover, red clover, and English plantain.

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 Project area.

Construction and Operation Impacts

Construction of the pipeline facilities would temporarily impact about 350 acres of vegetation communities and cover types. Table 13 provides a summary of vegetation communities and cover types affected by the Project. Agricultural land would be the most affected community, with 220 acres impacted (about 64 percent of the total lands impacted by the pipelines). About 17 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 Pennsylvania Department of Conservation and Natural Resources (PADCNR) indicated that there are no PADCNR-designated old growth forests in the vicinity of the Parkesburg, Jennersville, or Fair Hill Loops.

Expansion of the Daleville 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 2.90 acres; operations would permanently impact 0.25 acre. Construction of the Delmar Compressor Station would temporarily impact 0.86 acre of land, approximately 74 percent (0.64 acre) of which is agricultural land (table 13).

Table 13. Vegetation Community/Cover Type Affected by Construction and Operation

Community/Cover Type	Area Affected	
	Construction (Temporary Acres Impacted)	Operation (Permanent Acres Impacted)
Parkesburg Loop		
Agriculture	52.8	0.99
Forested	0.52	0.03
Industrial / Commercial	0.0	0.0
Open Space / Utility Corridor	19.8	0.66
Residential	0.65	0.10
Road / Road ROW	0.79	0.01
PFO Wetland	0.0	0.0
PEM Wetland	0.16	0.0
PSS Wetland	0.0	0.0
Parkesburg Loop Subtotal	**74.7**	**1.8**
Jennersville Loop		
Agriculture	55.2	4.74
Forested	5.55	1.1
Industrial / Commercial	1.03	0.0
Open Space / Utility Corridor	20.5	0.23
Residential	6.8	0.13
Road / Road ROW	0.48	0.0
PFO Wetland	0.40	0.0
PEM Wetland	0.61	0.0
PSS Wetland	0.02	0.0
Jennersville Loop Subtotal	**90.5**	**6.2**

Table 13. Vegetation Community/Cover Type Affected by Construction and Operation

Community/Cover Type	Area Affected	
	Construction (Temporary Acres Impacted)	Operation (Permanent Acres Impacted)
Fair Hill Loop		
Agriculture	29.1	0.19
Forested	4.0	0.0
Industrial / Commercial	0.0	0.0
Open Space / Utility Corridor	14.30	0.0
Residential	1.71	0.0
Road / Road ROW	0.49	0.0
PFO Wetland	0.0	0.0
PEM Wetland	0.23	0.0
PSS Wetland	0.0	0.0
Fair Hill Loop Subtotal	**49.8**	**0.19**
Summit Loop		
Agriculture	0.77	0.0
Forested	0.5	0.22
Industrial / Commercial	0.0	0.0
Open Space / Utility Corridor	0.2	0.01
Residential	0.1	0.0
Road / Road ROW	0.7	0.0
PFO Wetland	0.0	0.0
PEM Wetland	0.0	0.0
PSS Wetland	0.0	0.0
Summit Loop Subtotal	**2.2**	**0.23**
Hearns Pond Loop		

Table 13. Vegetation Community/Cover Type Affected by Construction and Operation

Community/Cover Type	Area Affected	
	Construction (Temporary Acres Impacted)	Operation (Permanent Acres Impacted)
Agriculture	2.1	0.0
Forested	0.0	0.0
Industrial / Commercial	1.4	0.0
Open Space / Utility Corridor	1.4	0.0
Residential	0.59	0.0
Road / Road ROW	0.96	0.0
PFO Wetland	0.0	0.0
PEM Wetland	0.0	0.0
PSS Wetland	0.0	0.0
Hearns Pond Loop Subtotal	**6.4**	**0.0**
Seaford-Millsboro Connector		
Agriculture	76.1	3.3
Forested	5.3	0.0
Industrial / Commercial	0.0	0.0
Open Space / Utility Corridor	1.3	0.0
Residential	2.0	0.0
Road / Road ROW	17.7	0.0
PFO Wetland	0.3	0.0
PEM Wetland	0.0	0.0
PSS Wetland	0.0	0.0
Seaford-Millsboro Connector Subtotal	**102.7**	**3.3**
Laurel Loop		

Table 13. Vegetation Community/Cover Type Affected by Construction and Operation

Community/Cover Type	Area Affected	
	Construction (Temporary Acres Impacted)	**Operation (Permanent Acres Impacted)**
Agriculture	3.6	0.0
Forested	1.3	0.0
Industrial / Commercial	2.4	0.0
Open Space / Utility Corridor	8.1	0.0
Residential	0.2	0.0
Road / Road ROW	4.1	0.0
PFO Wetland	0.0	0.0
PEM Wetland	0.01	0.0
PSS Wetland	0.08	0.0
Laurel Loop Subtotal	**19.8**	**0.0**
Pipeline Subtotal	**346.1**	**11.7**
Daleville Compressor Station		
Agriculture	0.26	0.08
Forested	0.06	0.05
Industrial / Commercial	2.0	0.00[3]
Open Space / Utility Corridor	0.6	0.12
Residential	0.0	0.0
Road / Road ROW	0.0	0.0
PFO Wetland	0.0	0.0
PEM Wetland	0.0	0.0
PSS Wetland	0.0	0.0
Daleville Compressor Station Subtotal	**2.9**	**0.25**
Delmar Pressure Control Station		

Table 13. Vegetation Community/Cover Type Affected by Construction and Operation

Community/Cover Type	Area Affected	
	Construction (Temporary Acres Impacted)	Operation (Permanent Acres Impacted)
Agriculture	0.6	0.08
Forested	0.0	0.0
Industrial / Commercial	0.0	0.0
Open Space / Utility Corridor	0.0	0.0
Residential	0.0	0.0
Road / Road ROW	0.2	0.04
PFO Wetland	0.0	0.0
PEM Wetland	0.0	0.0
PSS Wetland	0.0	0.0
Delmar Pressure Control Station Subtotal	**0.8**	**0.12**
Aboveground Facility Subtotal	**3.7**	**0.37**
Project Total	**349.8**	**12.1**

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-wide 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.

Impacts on agricultural lands and developed lands are discussed in detail in section B.4.1 and impacts on wetlands are discussed in section B.2.3. Impacts on forests would

be long term. A total of approximately 17.2 acres of forested lands would be temporarily impacted during construction and allowed to regenerate, though natural regeneration could take decades, with more than 50 years for hardwoods, such as oaks, to reach maturity. Approximately 1.4 acres of forested lands would be permanently converted to a maintained herbaceous state for pipeline operation. Approximately 0.05 acre of forest would be permanently converted to commercial/industrial cover types operate the Daleville Compressor Station.

Fragmentation of forested areas can result in changes in vegetation (for example, invasion of shrubs along the edge); however, forests within the Project area have been previously fragmented from other pipeline projects and other types of development that result in a cleared condition. To the greatest extent practicable, Eastern Shore has collocated the proposed pipelines with existing pipeline rights-of-way to minimize additional forest fragmentation.

In Maryland, the Maryland Department of Natural Resources (MD DNR) regulates impacts on forests under the Maryland Forest Conservation Act; thus Eastern Shore would conduct a Forest Stand Delineation and develop a Forest Conservation Plan. This plan would discuss forest disturbance associated with the proposed Project in Maryland and identify measures that would be implemented to protect forests from construction, and may include mitigation.

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 NRCS and state agencies for seeding mixes to use during Project restoration.

Eastern Shore would take efforts to prevent and control infestations of noxious weeds and exotic plant species. Where practical, soil would be stockpiled adjacent to the area from which it was stripped to prevent the spread of plant material. Contractor vehicles and construction equipment arriving from out-of-state would be cleaned prior to entering construction areas, and equipment cleaning stations would be available to prevent the spreading plants from infested areas. To control noxious weeds and exotic plant species, Eastern Shore may utilize manual treatment methods (pulling weeds by hand and destroying the plants), mechanical treatment methods (mowing/disking weeds and reseeding with a native mix), and/or herbicide applications. Where feasible, manual and mechanical treatment methods would be given greater consideration than herbicide application; however, treatment methods are site- and species-specific and may also be influenced by the proximity to agricultural areas and aquatic resources.

In conclusion, construction and operation of the Project 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

Existing Aquatic Resources

All of the waterbodies that Eastern Shore proposes to cross for construction of the Project are freshwater. No waterbodies are within any of the aboveground facility sites. A list of waterbodies crossed by the pipelines and the proposed method of crossing are provided in table 10 in section B.2.2.

Waterbodies crossed by the Fair Hill Loop that contribute to Big Elk Creek are considered High Quality – Trout Stocked Fisheries; however, the remaining streams are not known to provide high-quality fisheries habitat, and are not recognized as sport fisheries resources. According to the Pennsylvania Fish and Boat Commission (PFBC) and PADEP, the Parkesburg Loop would cross Valley Creek and its tributary which are classified as cold water fisheries. Eastern Shore would use the dry ditch method to cross these waterbodies. Recreational fishing may occur in the perennial streams crossed by the Project. Game fish species potentially occurring in the Project area are listed in table 14.

On September 14, 2015 and July 25, 2016, Eastern Shore submitted electronic mail messages to the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) to verify potential rare species or habitat within the proposed Project area. Responses were received from the NMFS on September 24, 2015 and August 3, 2016, indicating that no federally listed or proposed threatened or endangered species and/or designated critical habitat for listed species under the agency's jurisdiction are known to exist in the vicinity of the Project area. Additionally, the NMFS indicated that no essential fish habitat was present in the vicinity of the Project area. Consultation with the USFWS and various state agencies is discussed below.

Aquatic Resources Impacts

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.

Table 14. Representative Game and Commercial Fish Species with Potential to Occur in the vicinity of the 2017 Expansion Project

Common Name	Scientific Name	Fishery Classification
Largemouth bass	*Micropterus salmoides*	Warmwater
Smallmouth bass	*Micropterus dolomieu*	Warmwater
Black crappie	*Pomoxis nigromaculatus*	Warmwater
White crappie	*Pomoxis annularis*	Warmwater
Bluegill	*Lepomis macrochirus*	Warmwater
White crappie	*Pomoxis annularis*	Warmwater
Rock bass	*Ambloplites rupestris*	Warmwater
White bass	*Morone chrysops*	Warmwater
Walleye	*Sander vitreus*	Warmwater
American eel	*Anguilla rostrata*	Warmwater
Yellow perch	*Perca flavescens*	Warmwater
White perch	*Morone americana*	Warmwater
Chain pickerel	*Esox niger*	Warmwater
Channel catfish	*Ictalurus punctatus*	Warmwater
Bullhead catfish	*Ameiurus spp.*	Warmwater
Bluegill	*Lepomis macrochirus*	Warmwater
Chain pickerel	*Esox niger*	Warmwater
Trout[1]	*Salmo* spp./*Oncorphynchus* spp.	Coldwater
Hybrid striped bass	*Morone saxatilis*	Warmwater
Sunfish	*Lepomis spp*.	Warmwater

[1]Streams within the Parkesburg Loop, Jennersville Loop, and unnamed tributaries of Big Elk Creek in the Fair Hill Loop are listed as trout stocked fisheries.

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. These timing windows currently include conducting in-stream work in streams that support coldwater fisheries between June 1 and September 30 and conducing in-stream work in streams that support warmwater fisheries between June 1 and November 30, although these dates could be modified by a state agency. 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 not 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, thus avoiding impacts on aquatic species. Upon completion of the hydrostatic test, water would be discharged to a vegetated, upland area.

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

Existing Wildlife Resources

The Project would cross upland and wetland habitats that support a diversity of wildlife species. Many 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, 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 13 identifies the vegetation community types impacted by the Project, and table 15 lists terrestrial wildlife species common to these habitats by habitat cover type. There are no National Wildlife Refuges or wildlife preserves in the Project area. Approximately 1.6 miles of the Fair Hill Loop would be located within the Fair Hill

Natural Resource Management Area, and approximately 0.2 mile of the Summit Loop would be located within the C&D Canal Wildlife Area.

Table 15. Common Wildlife Species in the Vicinity of the 2017 Expansion Project

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	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

Wildlife Resources Impacts

Potential impacts on wildlife from the Project 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 smaller 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 and result in destruction of nests, eggs, and chicks within the construction area. The impact on vegetation would be short-term, as (with the exception the permanently maintained pipeline right-of-way), all habitats would be allowed to reestablish in temporary construction workspace and ATWS, thus remaining available for wildlife habitat.

Edge effects, resulting from habitat fragmentation, can result in interactions between wildlife 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 wildlife 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-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.

As mentioned above, approximately 1.6 miles of the proposed Fair Hill Loop is within the Fair Hill Natural Resource Management Area. This overall property is 5,656 acres. The Project is not in the vicinity of any Natural Heritage Areas, Listed Species Sites, Significant Habitat Areas, or Wetlands of Special State Concern. In addition approximately 0.2 mile of the Summit Loop would be constructed along a dirt and gravel service road which parallels the C&D Canal. No fishing piers, parking areas, or recreational trails are located in the vicinity of the pipeline. According to DNREC no designated Natural Areas are in the vicinity of the Summit Loop, Hearns Pond Loop, Seaford-Millsboro Connector, or the Delmar Pressure Control Station. The Laurel Loop crosses the James Branch Natural Area/Records Pond at milepost 4.3. However, this portion of the Laurel Loop would be within the cleared Sussex Highway (US 13) right-of-way and the pipeline would be installed using HDD between mileposts 4.2 and 4.5, therefore impact on this Natural Area is not anticipated.

The mainline valves, pressure control stations, and the Honeybrook Meter and Regulator Station would not have artificial lighting and would not impact wildlife due to

lighting. Artificial lighting associated with the Daleville Compressor station would be minimal and would consist of down-casting, cutoff fixtures. These fixtures would have minimal foot candle impacts.

In conclusion, construction and operation of the Project 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 right-of-way and implementing the restoration methods outlined in our Plan and Procedures and in Eastern Shore's ESC Plans and SPCC Plan.

3.4. Migratory Birds

Existing Avian Resources

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 (16 United States Code [USC] 703-711), which prohibits the taking of any migratory bird, or a part, nest, or eggs of any such bird, except under the terms of a valid permit issued pursuant to federal regulations. Bald and Golden Eagles are additionally protected under the Bald and Golden Eagle Protection Act (16 USC 668-668d).

Executive Order 13186 (66 Federal Register 3853) directs federal agencies to identify where unintentional take is likely to have a measurable negative effect on migratory bird populations and to avoid or minimize adverse effects on migratory birds through enhanced collaboration with the USFWS. Executive Order 13186 states that emphasis should be placed on species of concern, priority habitats, and key risk factors and that particular focus should be given to addressing population-level impacts. On March 30, 2011, the USFWS and the Commission entered into a Memorandum of Understanding that focuses on avoiding or minimizing adverse effects on migratory birds and strengthening migratory bird conservation through enhanced collaboration between the two agencies. In accordance with the executive order and the Memorandum of Understanding, Eastern Shore identified Birds of Conservation Concern and Important Bird Areas in the Project area (see Table 16) and consulted with the USFWS concerning potential Project-related migratory bird impacts.

Table 16. Bird Species of Conservation Concern with Potential to Occur in the Vicinity of the 2017 Expansion Project

Common Name	Scientific Name	Bird Conservation Region[1,2]
Bald Eagle	*Haliaeetus leucocephalus*	29, 30
Peregrine Falcon	*Falco peregrinus*	29, 30
Black Rail	*Laterallus jamaicensis*	29, 30
Short-eared Owl	*Asio flammeus*	29, 30
Whip-poor-will	*Antrostomus vociferus*	29, 30
Loggerhead Shrike	*Lanius ludovicianus*	29, 30
Brown-headed Nuthatch	*Sitta pusilla*	29, 30
Bewick's Wren	*Thryomanes bewickii*	29
Sedge Wren	*Cistothorus platensis*	29, 30
Wood Thrush	*Hylocichla mustelina*	29, 30
Blue-winged Warbler	*Vermivora cyanoptera*	29, 30
Prairie Warbler	*Setophaga discolor*	29, 30
Cerulean Warbler	*Setophaga cerulea*	29, 30
Swainson's Warbler	*Limnothlypis swainsonii*	29
Kentucky Warbler	*Geothlypis formosa*	29, 30
Bachman's Sparrow	*Peucaea aestivalis*	29
Henslow's Sparrow	*Ammodramus henslowii*	29, 30
Rusty Blackbird	*Euphagus carolinus*	29, 30
Red-throated Loon	*Gavia stellata*	30
Pied-billed Grebe	*Podilymbus podiceps*	30
Horned Grebe	*Podiceps auritus*	30
Greater Shearwater	*Puffinus gravis*	30
Audubon's Shearwater	*Puffinus lherminieri*	30
American Bittern	*Botaurus lentiginosus*	30
Least Bittern	*Ixobrychus exilis*	30
Snowy Egret	*Egretta thula*	30
Wilson's Plover	*Charadrius wilsonia*	30
American Oystercatcher	*Haematopus palliatus*	30

Table 16. Bird Species of Conservation Concern with Potential to Occur in the Vicinity of the 2017 Expansion Project

Common Name	Scientific Name	Bird Conservation Region[1,2]
Solitary Sandpiper	*Tringa solitaria*	30
Lesser Yellowlegs	*Tringa flavipes*	30
Upland Sandpiper	*Bartramia longicauda*	30
Whimbrel	*Numenius phaeopus*	30
Hudsonian Godwit	*Limosa haemastica*	30
Marbled Godwit	*Limosa fedoa*	30
Red Knot	*Calidris canutus*	30
Semipalmated Sandpiper	*Calidris pusilla*	30
Purple Sandpiper	*Calidris maritima*	30
Buff-breasted Sandpiper	*Calidris subruficollis*	30
Short-billed Dowitcher	*Limnodromus griseus*	30
Least Tern	*Sternula antillarum*	30
Black Skimmer	*Rynchops niger*	30
Red-headed Woodpecker	*Melanerpes erythrocephalus*	30
Golden-winged Warbler	*Vermivora chrysoptera*	30
Worm-eating Warbler	*Helmitheros vermivorum*	30
Nelson's Sharp-tailed Sparrow	*Ammodramus nelsoni*	30
Saltmarsh Sharp-tailed Sparrow	*Ammodramus caudacutus*	30
Seaside Sparrow	*Ammodramus maritimus*	30

[1]Source: Birds of Conservation Concern (USFWS, 2008).
[2]The 2017 Expansion Project is located in two Bird Conservation Regions: Region 29 (Piedmont) and Region 30 (New England/Mid-Atlantic Coast).

Consultation with the USFWS indicates that there are no federally listed threatened or endangered migratory birds along the Project corridor and no species-specific conservation measures have been recommended.

Impacts on Avian Resources

The loss, conversion, modification, and fragmentation of wildlife habitat and vegetation resulting from construction and operation of the Project 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.

Based on the timing of this EA issuance, if the Project is approved, it is possible that construction would start in 2017 after the migratory bird breeding season, and be completed before the start of spring nesting in 2018. If so, we would not expect any direct impacts on actively nesting birds, although some adult birds in the area may be temporarily displaced by noise and construction activity. Likewise, any construction that were to start prior to the spring breeding season would result in habitat clearing while the birds were not present or nesting, so even if construction activity were to carry over into the breeding season, the birds would likely choose habitats and areas away from the ongoing activity to establish nests. The greatest potential to impact migratory birds directly would be if construction were to begin during the nesting season, which could result in the destruction of nests and mortality of eggs and young birds that have not yet fledged. However, this timing appears unlikely at this point.

Impacts on bird habitat would occur regardless of construction timing. However, due to the pipeline portions of the Project largely utilizing various existing rights-of-way it is unlikely that construction and operation of the proposed facilities would create adverse impacts on overall migratory bird habitat.

Eastern Shore would mitigate impacts on forest interior species by avoiding core habitats and limiting forest clearing to existing edge habitats. Forested areas observed within the Project area are already fragmented by existing utility rights-of-way, roads, agricultural fields, and developed areas. Impacts on forest resources would be minimal, and the proposed alignment of the Project would avoid impacting interior (core) forest habitats. Eastern Shore proposes only 1.4 acres of new permanent easement along existing forested edge habitat and otherwise proposes to collocate the new pipelines within existing rights-of-way near forested areas. Such impacts would be temporary since abundant similar habitats exist adjacent to the proposed Project work space and throughout the Project vicinity.

Eastern Shore stated that it would implement the general recommendations of the USFWS Pennsylvania's Field Office's Adaptive Management Practices for Conserving Migratory Birds and/or the USFWS' "Nationwide Standard Conservation Measures". These measures include the following:

- Where disturbance is necessary, clear natural or semi-natural habitats (e.g., forests, woodlots, reverting fields, shrubby areas) and perform maintenance activities (e.g., mowing) between September 1 and March 31, which is outside the nesting season for most native bird species.

- Minimize land and vegetation disturbance during project design and construction by collocating with roads, fences, lay down areas, staging areas, and other infrastructure in or immediately adjacent to already-disturbed areas.

- Avoid permanent habitat alterations in areas where birds are highly concentrated.

- Avoid establishing sizable structures along known bird migration pathways or known daily movement flyways (e.g., between roosting and feeding areas).

- To conserve area-sensitive species, avoid fragmenting large, contiguous tracts of wildlife habitat, especially if habitat cannot be fully restored after construction. Where practicable, concentrate construction activities, infrastructure, and man-made structures (e.g., buildings, cell towers, roads, parking lots) on lands already altered or cultivated, and away from areas of intact and healthy native habitats. If not feasible, select fragmented or degraded habitats over relatively intact areas.

- Develop a habitat restoration plan for the proposed site that avoids or minimizes negative impacts on birds, and that creates functional habitat for a variety of bird species. Use only plant species that are native to the local area for revegetation of the project area.

Eastern Shore stated a Migratory Bird Conservation Plan would be prepared and submitted to the FERC and the USFWS. This has not been completed. Therefore **we recommend that**:

- **Prior to construction, Eastern Shore should file with the Secretary its Migratory Bird Conservation Plan along with documentation of consultation with the USFWS on the plan.**

3.5. Special Status Species

3.5.1. 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 would 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. Federally listed species identified by USFWS are identified in table 17.

Table 17. Federally listed Species that Potentially Occur in the Vicinity of the 2017 Expansion Project

State	Facility	Common Name	Scientific Name	Federal Status	Consultation Status
PA	Parkesburg Loop	Bog Turtle	*Clemmys muhlenbergii*	Threatened	Response from USFWS dated October 13, 2015 concurred with the Phase I Bog Turtle Investigation Report finding that none of the wetlands within the Parkesburg Loop area contain potential habitat.
	Jennersville Loop	Bog Turtle	*Clemmys muhlenbergii*	Threatened	Formal consultation required due to the presence of known bog turtle colonies in the vicinity of the proposed alignment.
		Northern Long-eared Bat	*Myotis septentrionalis*	Threatened	Streamlined Consultation Form submitted on January 26, 2017.
		Rusty Patched Bumblebee	*Bombus affinis*	Endangered	Response from USFWS dated February 7, 2017 stated that based on the location of the facilities within Pennsylvania the species is not expected to be present. A determination of "no effect" is appropriate.
	Daleville Compressor Station	Bog Turtle	*Clemmys muhlenbergii*	Threatened	Response from USFWS dated September 28, 2016 stated that …"there is no potential bog turtle habitat in the [compressor station] area."
		Rusty Patched Bumblebee	*Bombus affinis*	Endangered	Response from USFWS dated February 7, 2017 stated that based on the location of the facilities within Pennsylvania the species is not expected to be present. A determination of "no effect" is appropriate.
	Fair Hill Loop	Bog Turtle	*Clemmys muhlenbergii*	Threatened	Response from USFWS dated September 15, 2016, recommends that construction within wetlands with known bog turtle populations take place between October 1 and March 31 to avoid potentially harming bog turtles using these wetlands for dispersal.
		Northern Long-eared Bat	*Myotis septentrionalis*	Threatened	Streamlined Consultation Form submitted on January 26, 2017.
PA		Rusty Patched Bumblebee	*Bombus affinis*	Endangered	Response from USFWS dated February 7, 2017 stated that based on the location of the facilities within Pennsylvania the species is

Table 17. Federally listed Species that Potentially Occur in the Vicinity of the 2017 Expansion Project

State	Facility	Common Name	Scientific Name	Federal Status	Consultation Status
					not expected to be present. A determination of "no effect" is appropriate.
MD	Fair Hill Loop	Bog Turtle	*Clemmys muhlenbergii*	Threatened	Response dated October 7, 2016 stated that "…USFWS concurs with MD DNR stating that…no bog turtles are present in the project area."
DE	Summit Loop	Bog Turtle	*Clemmys muhlenbergii*	Threatened	Response from USFWS dated June 8, 2016 states that "Except for transient individuals, no proposed or federally listed endangered or threatened species are known to exist within the project area."
	Hearns Pond Loop	No sensitive species were identified as potentially occurring in the vicinity of this Project component.			
	Seaford-Millsboro Connector	Swamp Pink	*Helonias bullata*	Threatened	Response from USFWS dated February 19, 2016 states that "Except for transient individuals, no proposed or federally listed endangered or threatened species are known to exist within the project area."
	Delmar Pressure Control Station	No sensitive species were identified as potentially occurring in the vicinity of this Project component.			

As the lead federal agency authorizing the Project, FERC is required to consult with the USFWS to determine whether federally listed endangered or threatened species or designated critical habitat are found in the vicinity of the Project, and to evaluate the 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 critical habitats, the lead federal agency must prepare a Biological Assessment for those species that may be affected. The lead federal agency must submit its Biological Assessment to the USFWS and, if it is determined that the action may adversely affect a federally listed species, the lead agency must submit a request for formal consultation to comply with Section 7 of the ESA. In response, the USFWS would issue a Biological Opinion as to whether or not the federal action would likely adversely affect or jeopardize the continued existence of a listed species, or result in the destruction or adverse modification of designated critical habitat.

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 USFWS for federally listed threatened or endangered species potentially occurring in or near the Project area. Based on numerous reports and follow-up conversations between Eastern Shore and the USFWS, as well as between FERC and the USFWS, we have determined that the Project *is likely to adversely affect* a federally listed species (bog turtle). Thus we are requesting to enter formal Section 7 consultation for this species (see discussion below).

As required by Section 7 of the ESA, we are requesting that the USFWS accept the information provided in this EA as the Biological Assessment for the Project. Two separate USFWS Ecological Services Field Offices have been reviewing the Project during the informal Section 7 consultation. These offices are the Pennsylvania Ecological Services Field Office for the portions of the Project in Pennsylvania and the Chesapeake Bay Ecological Services Field Office for the portions of the Project in Maryland and Delaware. The Pennsylvania Ecological Services Field Office would be the lead office for the formal consultation.

Our informal Section 7 consultation with the USFWS to date is summarized in the following sections.

Rusty Patched Bumblebee (*Bombus affinis*)

Rusty patched bumble bees once occupied grasslands and tallgrass prairies of the Upper Midwest and Northeast; however, most grasslands and prairies have been lost, degraded, or fragmented by conversion to other uses. In spring, solitary queens emerge and find nest sites, collect nectar and pollen from flowers, and begin laying eggs. Workers hatch from these first eggs and colonies grow as workers collect food, defend the colony, and care for young. In fall, founding queens, workers and males die. Only new queens go into diapause (a form of hibernation) over winter, and the cycle begins again in spring.

The rusty patched bumblebee was listed by the USFWS as endangered on March 21, 2017. We contacted the USFWS on February 7, 2017, to discuss the potential impacts on the rusty patched bumblebee from the Project. Mr. Brian Scofield from the USFWS Pennsylvania Ecological Services Field Office stated that based on the facilities location within Pennsylvania, the rusty patched bumblebee is not expected to be present at site facilities. Therefore, he stated that based on the information present, a *no effect* determination would be appropriate for the rusty patched bumblebee. We agree.

Bog Turtle (*Clemmys muhlenbergii*)

The federally threatened bog turtle is about 4 inches in length and is distinguished by the large orange (yellow or red) blotches on each side of its head. According to the USFWS, bog turtles live in spring fed meadows and bogs where tussock sedge and grasses dominate the wetlands. Bog turtles require open conditions associated with early-successional wetland habitats, and the substrate must consist of deep mucky soils fed by groundwater seeps, with only modest amounts of open water.

Pennsylvania

In June 2015, Eastern Shore conducted a Phase I Bog Turtle Investigation for wetlands within the Parkesburg Loop area. This investigation determined that none of the wetlands within the Parkesburg Loop area contain potential Bog Turtle habitat. The report was forwarded to the USFWS Pennsylvania Field Office on July 15, 2015. A response from the USFWS, dated October 13, 2015, indicated that the USFWS concurred with the findings of the Phase I Bog Turtle Investigation Report.

In July through September 2015, Eastern Shore conducted a Phase I Bog Turtle Investigation for wetlands within the Jennersville Loop area. This investigation determined that wetlands within this Project area contained potential bog turtle habitat. These wetlands exhibited spring-fed hydrology, mucky soils, and tussock-forming vegetation which is indicative of potential bog turtle habitat. Additionally, a telephone conversation with Mr. Brian Scofield of the USFWS, and Ms. Kathy Gipe and Ms. Heather Smiles of the PFBC on September 10, 2015 indicated that several areas of known bog turtle habitat are present within or near the Jennersville Loop area. Mr. Scofield indicated that additional bog turtle habitat surveys for wetlands within these areas were not needed, but that wetlands within these areas should be considered as having the presence of the bog turtle. Further, several wetlands located along the proposed Jennersville Loop are known by the USFWS to contain bog turtles. As such, formal Section 7 consultation is required for the Project.

Eastern Shore evaluated options to avoid and/or minimize impacts on bog turtle wetlands. One option is to install the pipeline beneath the wetlands via HDD. The probability of an inadvertent release is greatest near the entry and exit points, so Eastern Shore performed a geotechnical study on the Jennersville Loop in June and August 2016 to evaluate if HDD methods would be feasible in wetlands that had been identified by the USFWS as potentially containing the bog turtle. The geotechnical report, although limited in scope, found that HDD methods would generally be feasible in the areas that were evaluated. The *Report of Geotechnical Exploration* dated August 26, 2016, was provided to the USFWS on October 25, 2016. A review of geologic maps and other materials indicated that HDD methods would generally be feasible for other portions of the Project, as well.

Following a site visit in January 2017, the USFWS requested in an email that additional geotechnical borings be collected at one wetland with a known bog turtle population where HDD may be used. In addition, the USFWS stated that portions of other wetlands containing bog turtle habitat should be crossed via open trench, and not HDD, if the portions crossed by the limit of disturbance is contained in non-mucky portions along the perimeter of the wetlands. The USFWS recommended that bog turtle populations associated with these wetlands be monitored using a USFWS approved monitoring plan.

Eastern Shore conducted additional geophysical surveys in March, 2017 including two geotechnical borings and seismic refraction tests along the HDD alignment to further evaluate the feasibility of this crossing and the risk of inadvertent release of drilling fluids into the wetland (Geo-Technical Associates, March 31, 2017). This report was provided to Brian Scofield at the USFWS on April 14, 2017. Eastern Shore also stated that if the HDD crossing method for this wetland is eventually determined to not be feasible, it would cross the wetland via an open-cut method.

The report recommended that the HDD be located at least 15 feet below the ground surface in competent rock to minimize the possibility of an inadvertent release into the overlying wetland. The transmittal letter concluded that likelihood of inadvertent surface returns within the wetland would be limited due to the geological conditions and the presence of competent rock, provided that downhole pressures and grout volumes are appropriate for the conditions and the contractor maintains best management practices during drilling. Consultation concerning this HDD crossing is ongoing.

Eastern Shore would implement procedures to mitigate the release of drilling mud. In the unlikely event that a surface release reaches a water body or wetland, corrective action would be taken immediately. Clean-up work would be performed by hand to the extent possible. A vacuum truck would be used to vacuum up the associated bentonite and soils as necessary. In the event that a surface release occurs in bog turtle habitat, a certified bog turtle surveyor would be on-site during clean-up work, and would assess and clean any bog turtles found during clean-up operations. These procedures are included in Eastern Shore's HDD Inadvertent Surface Release Contingency Plan.

On July 1, 2016 and August 8, 2016, Eastern Shore submitted PNDI online inquiries regarding potential threatened and endangered species in the vicinity of the Daleville Compressor Station portion of the Project. The PNDI inquiries indicated potential impacts for species under the jurisdiction of the USFWS, and requested additional information regarding the Project. Consultation letters providing the requested additional information were provided on July 1, 2016 and August 10, 2016. A response from the USFWS, dated September 28, 2016, indicated that the USFWS concurred that the Jennersville Loop bog turtle survey incorporated the Daleville Compressor Station

Project area, and that there is no potential bog turtle habitat in the area of the compressor station.

On February 11, 2016, Eastern Shore submitted PNDI online inquiries regarding potential threatened and endangered species in the vicinity of the Fair Hill Loop portion of the Project. A response from the USFWS Pennsylvania Field Office, dated May 12, 2016, requested that a Phase I Bog Turtle Investigation be conducted for wetlands within the area of the Fair Hill Loop. In May and June 2016, Eastern Shore conducted an investigation for wetlands within this area. One wetland was observed to contain suitable habitat for the bog turtle. None of the remaining wetlands within the surveyed area contain potential bog turtle habitat. In May and June 2016, a Phase II Bog Turtle Investigation was conducted for the indicated wetland. No bog turtles were observed in the wetland during the follow-up investigation.

The Phase I and Phase II Bog Turtle Investigation Reports were submitted to the USFWS and the PFBC in August 2016. A response from the USFWS was received on September 15, 2016 which recommended that construction within the wetland of concern take place between October 1 and March 31 to avoid potentially harming bog turtles using this wetland for dispersal. If construction takes place outside of this window, the USFWS recommended that for all areas "…within 300 feet of the potential bog turtle habitat, all areas of expected disturbance must be surveyed by a qualified surveyor for the presence of bog turtles immediately prior to construction commencement." Following this pre-construction survey, the USFWS further recommends that "…silt-fencing should be placed between the wetland and the proposed construction zone while the bog turtle surveyor is present to ensure that the fencing is properly installed in the correct location. The silt-fencing should be removed immediately following construction."

The USFWS Pennsylvania Ecological Services Field Office stated that all construction should take place between November 1 and March 31, when bog turtles are hibernating, except for the HDD(s). If this time-of-year restriction is not able to be implemented, a bog turtle survey should be conducted in accordance with the following conditions:

a. Prior to performing any construction work in wetlands, streams, or uplands within 300 feet of the potential bog turtle habitat, all areas of expected disturbance must be surveyed by a qualified surveyor for the presence of bog turtles immediately prior to construction commencement.

b. Prior to the survey, herbaceous vegetation should be cut to a height of 4 to 6 inches using a hand-held trimmer/weed-cutter, and then carefully raked away from the area to be searched. A qualified bog turtle surveyor should be present when this vegetation clearing occurs.

c. Immediately following the survey, silt-fencing should be placed between the wetland and the proposed construction zone while the bog turtle surveyor is present to ensure that the fencing is properly installed in the correct location. The silt-fencing should be removed immediately following construction.

d. If any bog turtles are located during these searches, the USFWS and PFBC should be contacted immediately, and construction should not proceed until further consultation occurs. Survey results should be submitted to the USFWS and PFBC.

Eastern Shore has agreed to these conditions.

Maryland

On April 6, 2016, Eastern Shore submitted an online inquiry to the USFWS Chesapeake Bay Field Office regarding potential threatened and endangered species in the vicinity of the Maryland portion of the Fair Hill Loop. The USFWS Official Species List generated in response to the inquiry indicated that the bog turtle may be present in the vicinity of this loop. In May and June 2016, Eastern Shore conducted a Phase I Bog Turtle Investigation for wetlands within the Fair Hill Loop area. None of the wetlands located within the Maryland portion of the loop were observed to contain potential bog turtle habitat. The investigation report was submitted to the USFWS and MD DNR in August 2016. An electronic mail response from MD DNR, dated August 19, 2016, stated that "Reviewing your report I accept your results and thus we have no further concerns for bog turtles." An electronic mail response from the USFWS, dated October 7, 2016, indicates that "… [the USFWS] concurs with [MD DNR] stating that they agree with the results of the report and that no bog turtles are present in the project area."

Delaware

On April 6, 2016, Eastern Shore submitted an online inquiry to the USFWS regarding potential threatened and endangered species in the vicinity of the Summit Loop portion of the Project. The USFWS Official Species List generated in response to the inquiry indicated that the bog turtle may be present in the vicinity of the Project area. However, in an electronic mail message to the USFWS dated April 22, 2016, Eastern Shore explained that wetlands are not present within the Summit Loop Project area. Eastern Shore received a letter from the USFWS, dated June 8, 2016, indicating that "Except for transient individuals, no proposed or federally listed endangered or threatened species are known to exist within the [Delaware] Project impact area."

Based on the information presented above we have determined that the Project *is likely to adversely* affect the bog turtle. In compliance with Section 7 of the ESA, we are requesting formal consultation with the USFWS for the Project-related impacts on this species. Because this consultation has not yet been completed, **we recommend that**:

- **Eastern Shore should <u>not begin construction activities</u> on the Project <u>until</u>:**

  a. the FERC staff completes ESA 7 consultation with the USFWS regarding the bog turtle; and

  b. Eastern Shore has received written notification from the Director of the OEP that construction or use of mitigation may begin.

<u>Swamp Pink (*Helonias bullata*)</u>

Delaware

Swamp pink is an obligate wetland plant species occurring in a variety of PFO type wetlands. Specific hydrologic requirements of swamp pink limit its occurrence within these wetlands to areas that are perennially saturated, but not inundated, by floodwater. The water table must be at or near the surface, fluctuating only slightly during spring and summer months. Swamp pink is often found growing on the hummocks formed by trees, shrubs, and sphagnum mosses, and these micro-topographic conditions may be an important component of swamp pink habitat.

On September 3, 2015, Eastern Shore submitted an online inquiry to the USFWS regarding potential threatened and endangered species in the vicinity of the Seaford-Millsboro Connector and Millsboro Pressure Control Station portions of the Project. The USFWS Information for Planning and Conservation Trust Resource Report generated in response to the inquiry indicated that the federally threatened Swamp Pink may be present in the vicinity of the project in Delaware. However, Eastern Shore received a response from the USFWS, dated February 19, 2016, indicating that "…no proposed or federally listed endangered or threatened species are known to exist within the project impact area."

We agree with this determination and therefore no further Section 7 consultation is necessary for the swamp pink.

<u>Northern Long-eared Bat (*Myotis septentrionalis*)</u>

All Pennsylvania 2017 Expansion Project Facilities

The northern long-eared bat is a medium-sized bat that spends the winter hibernating in caves and mines, called hibernacula. The northern long-eared bat's range includes much of the eastern and north central United States. During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in

crevices of both live trees and snags (dead trees). Males and non-reproductive females may also roost in cooler places, like caves and mines. Breeding begins in late summer or early fall when males begin to swarm near hibernacula. Pregnant females migrate to summer areas where they roost in small colonies. Maternity colonies of females and young generally have 30 to 60 bats at the beginning of the summer, although larger maternity colonies have also been seen. Most bats within a maternity colony give birth around the same time, which may occur from late May or early June to late July.

On October 19, 2016, Eastern Shore received an electronic mail message from Brian Scofield of the USFWS, indicating that a streamlined consultation process for the northern long eared bat was required for the Project. FERC provided the USFWS a completed Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form on January 26, 2017. As the USFWS did not respond to the submission within 30 days, we may presume the determination is correct, and consider our Section 7 responsibilities are fulfilled for this species.

3.5.2. 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 the Project area (table 18).

The Pennsylvania Natural Diversity Inventory (PNDI) database search indicated that state-endangered bog turtle could be present near the Parkesburg Loop, Jennersville Loop, the Daleville Compressor Station, and the portion of the Fair Hill Loop located in Pennsylvania. Eastern Shore received responses to its inquiries from the PFBC on June 18 and August 26, 2015. The responses stated that "Based on review, the PFBC is concerned the project will have an impact on the following species of special concern: Bog Turtle (*Glyptemys muhlenbergii*, Pennsylvania Endangered, Federal Threatened)." The responses further indicated that the PFBC has delegated coordination/consultation of joint state/federally listed species to the USFWS. Project impacts on the bog turtle are discussed above.

Pennsylvania

Jennersville Loop PNDI inquiry responses were received from the PADCNR on July 10, 2015 and August 20, 2015. The responses requested that surveys be conducted for several plant species (screw-stem, fringe-tree, grass-leaved rush, downy lobelia, stiff cowbane, autumn bluegrass, virginia bunchflower, and possum-haw) that may be present along portions of the Project area. In September 2015, Eastern Shore conducted the requested surveys.

Table 18. State-listed Species that Potentially Occur in the Vicinity of the 2017 Expansion Project

State	Facility	Common Name	Scientific Name	State Status	Consultation Status
PA	Parkesburg Loop	Bog Turtle	*Clemmys muhlenbergii*	Endangered	Coordination/consultation with the USFWS is ongoing.
	Jennersville Loop	Bog Turtle	*Clemmys muhlenbergii*	Endangered	Coordination/consultation to the USFWS is ongoing Response dated November 15, 2016 states that "…PADCNR has determined that no impact is likely. No further coordination with our agency is needed for this project." .
		Screw-stem	*Bartonia paniculata*	Species of Special Concern	
		Fringe-tree	*Chionanthus virginicus*	Species of Special Concern	
		Grass-leaved Rush	*Juncus biflorus*	Tentatively Undetermined	
		Downy Lobelia	*Lobelia puberula*	Endangered	
		Stiff Cowbane	*Oxypolis rigidior*	Species of Special Concern	
		Autumn Bluegrass	*Poa autumnalis*	Endangered	
		Virginia Bunchflower	*Veratrum virginicum*	Status Under Review	
		Possum-haw	*Viburnum nudum*	Endangered	
	Daleville Compressor Station	Bog Turtle	*Clemmys muhlenbergii*	Endangered	Coordination/consultation to the USFWS is complete.
		Fringe Tree	*Chionanthus virginicus*	No Current Status, Proposed Threatened	PADCNR concurs that no impact is likely.
	Fair Hill Loop	Bog Turtle	*Clemmys muhlenbergii*	Endangered	Coordination/consultation to the USFWS is ongoing.
		Elliott's Beardgrass	*Andropogon gyrans*	Species of Special Concern	Response dated November 15, 2016 states that PADCNR concurs that no impact is likely.
		Puttyroot	*Aplectrum hyemale*	Species of Special Concern	
		Downy Lobelia	*Lobelia puberula*	Endangered	
		Velvety Panic-grass	*Dicanthelium scoparium*	Endangered	
		Lion's-foot	*Prenanthes serpentaria*	Species of Special Concern	
		Long-stalked Crowfoot	*Ranunculus hederaceus*	Species of Special Concern	
		Tawny Ironweed	*Veronia glauca*	Endangered	
MD	Fair Hill Loop	Bog Turtle	*Clemmys muhlenbergii*	Threatened	Response from MD DNR dated August 19, 2016 states that after reviewing a Phase I bog turtle survey report "…I

Table 18. State-listed Species that Potentially Occur in the Vicinity of the 2017 Expansion Project

State	Facility	Common Name	Scientific Name	State Status	Consultation Status
					accept your results and thus we have no further concerns for bog turtles."
DE	Summit Loop	Bog Turtle	*Clemmys muhlenbergii*	Endangered	Response from DNREC dated November 8, 2016 states no concerns with Project.
	Hearns Pond Loop	No sensitive species were identified as potentially occurring in the vicinity of this project component.			
	Seaford-Millsboro Connector	No sensitive species were identified as potentially occurring in the vicinity of this Project component.			
	Laurel Loop	Black-banded Sunfish	*Enneacanthus chaetodon*	Rare	Response from DNREC dated August 31, 2016 stated that "As long as horizontal directional drilling is used to cross the pond and no in-water work is proposed, these activities should not impact this species."
		Iron Color Shiner	*Notrpis chalybaeus*	Rare	Response from DNREC dated August 31, 2016 stated that "As long as horizontal directional drilling is used to cross the pond and no in-water work is proposed, these activities should not impact this species."
		Bayonet Rush	*Juncus militaris*	Rare	Response from DNREC dated August 31, 2016 stated that "As long as the pipe is horizontally drilled lower than 12 inches below the bottom of the pond surface and entry and exit points are located in upland areas, then this species will not be affected by project activities."
	Delmar Pressure Control Station	No sensitive species were identified as potentially occurring in the vicinity of this Project component.			

The Botanical Survey Report for Species of Special Concern did not find species listed by the PADCNR, although several species were observed within a portion of the Project area, work in that area was subsequently withdrawn from consideration. The

Botanical Survey Report was forwarded to the PADCNR on November 30, 2015. A response from the PADCNR, dated December 11, 2015, indicated that the PADCNR concurred with the findings of the Botanical Survey Report.

The PNDI inquiry for the Pennsylvania portion of the Fair Hill Loop indicated potential impacts for species (as noted in table 18) under the jurisdiction of the PADCNR, and requested additional information regarding the Project. A consultation letter providing the requested additional information was provided on April 6, 2016. A response was received from the PADCNR on April 20, 2016, and requested that surveys be conducted for several plant species (elliott's beardgrass, puttyroot, downy lobelia, velvety panic-grass, lion's-foot, long-stalked crowfoot, tawny ironweed that may be present along portions of the project area. In June 2016, Eastern Shore conducted the requested surveys and found only long-stalked crowfoot (*Ranunculus hederaceus*) within the Fair Hill Loop work area. A follow-up survey in September 2016, however, identified that this species was no longer present. Based on this information, the PADCNR on November 15, 2016 stated that "Therefore, [PA] DCNR has determined that no impact is likely. No further coordination with our agency is needed for this project."

The August 8, 2016 PNDI inquiry for the Daleville Compressor Station indicated potential impacts for species under the jurisdiction of the PADCNR, and a letter from the PADCNR, dated August 19, 2016, requested that a survey be completed for the fringe-tree. This area was previously investigated during the botanical survey for the Jennersville Loop, and the fringe-tree was not observed in the Daleville Compressor Station Project area. An additional botanical survey of the Daleville Compressor Station Project area was conducted in September 2016, and the fringe-tree was not observed. The Botanical Survey Report for Species of Special Concern was forwarded to the PADCNR in October 2016. A response was received from the PADCNR on November 15, 2016, stating that "…PADCNR has determined that no impact is likely. No further coordination with our agency is needed for this project."

Maryland

On April 6, 2016, Eastern Shore submitted a consultation letter to the MD DNR Wildlife and Heritage Division to verify potential threatened and endangered species within the portion of the Fair Hill Loop in Maryland. A response from the MD DNR, dated June 22, 2016 indicated that "The Wildlife and Heritage Service has determined that there are no official State or Federal records for listed plant or animal species within the delineated area shown on the map provided." However, a Phase I Bog Turtle survey was required by the USFWS and was forwarded to the MD DNR for review. An electronic mail response from the MD DNR, dated August 19, 2016, stated that "Reviewing your report I accept your results and thus we have no further concerns for bog turtles." An electronic mail response from USFWS, dated October 7, 2016, indicates

that "… [USFWS] concur with [MD DNR] stating that he agrees with the results of the report and that no bog turtles are present in the [Maryland] project area."

Delaware

On April 8, 2016, Eastern Shore submitted a consultation letter to the DNREC Wildlife Species Conservation and Research Program (WSCRP) to verify potential threatened and endangered species, and other significant natural resources within the proposed Project area for the Summit Loop portion of the Project. A response from the WSCRP, dated August 31, 2016, indicated that "… although there are no potential habitat for the federally listed bog turtle (*Glyptemys muhlenbergii*) within the proposed project area, there are potential habitats for this species in the vicinity." The letter further indicated that the Summit Loop is within the C&D Canal Wildlife Area and further consultation with DNREC is required. Eastern Shore initiated further consultation with the DNREC Division of Fish and Wildlife regarding the C&D Canal Wildlife Area, and on November 8, 2016 an electronic mail message from Eric Ludwig of the Delaware Division of Fish and Wildlife was received, stating no objection to the Project.

Correspondence with the WSCRP, dated August 31, 2016, indicated that the black-banded sunfish and the iron color shiner have been documented in Records Pond, which would be crossed by the Laurel Loop. According to the consultation letter, "As long as horizontal directional drilling is used to cross the pond and no in-water work is proposed, these activities should not impact these species. If in-water work is proposed, a time of year restriction of April 1 to May 30th should be considered". Eastern Shore discussed the Project with Ms. Stetzar, WSCRP Fisheries Biologist and explained that HDD methods are proposed to cross Records Pond. Ms. Stetzar replied that she had no further concerns with the Project (DNREC, 2016).

The correspondence with the WSCRP indicated that bayonet rush has been documented within Records Pond. The correspondence letter states that "As long as the pipe is horizontally drilled lower than 12 inches below the bottom of the pond surface and entry and exit points are located in upland areas, then this species will not be affected by project activities." As stated above, this pond is proposed to be crossed via HDD.

Based on the above, we conclude that the Eastern Shore 2017 Expansion Project would not have adverse impacts on any state-listed species, other than the bog turtle, which is discussed in the federal listed species section of this EA.

3.5.3. Fisheries

In correspondence dated September 24, 2015 and August 3, 2016, the NMFS indicted that no essential fish habitat has been designated within the project area and that no federally listed or proposed threatened or endangered species under NMFS'

jurisdiction are expected to occur in the vicinity of the Project, and that no further consultation with that agency is required.

4. Land Use, Recreation, and Visual Resources

Construction of the Project would impact land use along the pipeline route and at aboveground facilities as described below. Land use types affected by the Project include industrial/commercial lands, agricultural, forested, open, residential, wetlands, and right-of-way.

4.1. Land Use

The Project would affect 350.9 acres during construction, and 13.1 acres would be permanently maintained for the pipeline rights-of-way and aboveground facilities. Eastern Shore would parallel and partially utilize its existing rights-of-way wherever possible. The operational rights-of-way width for the proposed Project would be incorporated into Eastern Shore's existing 35-foot-wide permanent rights-of-way, with the exception of portions of certain loops. Some additional permanent right-of-way would need to be acquired from individual property owners, and ATWS would be necessary for staging areas. Following construction, the areas disturbed by construction would be restored to their original condition and use to the greatest extent practicable. However, the Millsboro and Delmar Pressure Control Stations would involve acquisition and conversion of 0.15 acre of agricultural land to industrial use.

The Project would cross eight general land use types: existing Eastern Shore rights-of-way, agriculture, upland forests, commercial/industrial, open space, wetlands, road rights-of-way, and residential lands. Table 19 summarizes the land uses crossed by the proposed pipeline facilities.

Agriculture

About 64 percent (222 acres) of the total land use affected by the Project pipeline construction is agricultural. With the exception of the new land required for the Millsboro and Delmar Pressure Control Stations, 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.

Table 19. Land Uses Impacted by the 2017 Expansion Project																		
Project Component	**Eastern Shore ROW**		**Industrial / Commercial**		**Agriculture**		**Forested**		**Open Space / Utility Corridor**		**Residential**		**Road / Road ROW**		**Wetland**		**Totals**	
	Cons	**Oper**	**Cons**	**Oper**	**Cons**	**Oper**	**Cons**	**Oper**	**Cons**	**Oper**	**Cons**	**Oper**	**Cons**	**Oper**	**Cons**	**Oper**	**Cons**	**Oper**
Parkesburg Loop	11.35	0.0	0.0	0.0	52.78	0.99	0.52	0.03	8.42	0.66	0.65	0.10	0.79	0.01	0.016	0.0	**74.67**	**1.79**
Jennersville Loop	15.43	0.0	1.03	0.0	55.19	4.74	5.55	1.09	5.05	0.23	6.78	0.13	0.48	0.0	1.1	0.0	**89.51**	**6.21**
Fair Hill Loop	13.26	0.0	0.0	0.0	28.98	0.19	3.95	0.0	1.14	0.0	1.71	0.0	0.49	0.0	0.23	0.0	**49.76**	**0.21**
Summit Loop	0.14	0.0	0.0	0.0	0.77	0.0	0.48	0.22	0.07	0.01	0.08	0.0	0.66	0.0	0.0	0.0	**2.20**	**0.23**
Hearns Pond Loop	-	0.0	1.39	0.0	2.06	0.0	0.0	0.0	1.36	0.0	0.59	0.0	0.96	0.0	0.0	0.0	**4.97**	**0.0**
Seaford-Millsboro Connector	-	0.0	0.0	0.0	76.10	3.32	5.34	0.0	1.32	0.07	2.04	0.02	17.69	0.0	0.29	0.0	**102.78**	**3.41**
Laurel Loop	-	0.0	2.42	0.0	3.59	0.0	1.33	0.0	8.06	0.0	0.17	0.0	4.06	0.0	0.08	0.0	**17.30**	**0.0**
Pipeline Totals	**40.18**	**0.0**	**4.84**	**0.0**	**219.47**	**9.24**	**17.17**	**1.34**	**25.42**	**0.97**	**12.02**	**0.25**	**25.13**	**0.01**	**1.7**	**0.0**	**340.81**	**11.84**
Honey Brook M&R Station	0.11	0.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.11**	**0.07**
Daleville Compressor Station	1.88	0.98	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.88**	**0.98**

Table 19. Land Uses Impacted by the 2017 Expansion Project																		
Project Component	**Eastern Shore ROW**		**Industrial / Commercial**		**Agriculture**		**Forested**		**Open Space / Utility Corridor**		**Residential**		**Road / Road ROW**		**Wetland**		**Totals**	
	Cons	**Oper**	**Cons**	**Oper**	**Cons**	**Oper**	**Cons**	**Oper**	**Cons**	**Oper**	**Cons**	**Oper**	**Cons**	**Oper**	**Cons**	**Oper**	**Cons**	**Oper**
Millsboro Compressor Station	0.0	0.0	0.0	0.0	1.85	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.85**	**0.05**
Delmar Compressor Station	0.0	0.0	0.0	0.0	0.78	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.78**	**0.1**
Project Totals	**42.17**	**1.05**	**4.84**	**0.0**	**222.1**	**9.39**	**17.17**	**1.34**	**25.42**	**0.97**	**12.02**	**0.25**	**25.13**	**0.01**	**1.7**	**0.0**	**345.43**	**13.04**

The NRCS submitted a letter to FERC on December 15, 2016, notifying staff that the Project would impact four NRCS easement holdings along the Parkesburg and Jennersville Loops which are held through the Farm and Ranch Lands Preservation Program (FRPP).

For the two FRPP impacted properties on the Parkesburg Loop, Eastern Shore proposes to install the new pipeline within an existing Eastern Shore permanent easement. The two FRPP parcels associated with the Jennersville Loop require acquisition of new easement because a new alignment off the existing right-of-way was selected to avoid an existing residential subdivision, wetlands, and bog turtle habitat.

In a December 27, 2016 letter to FERC, the NRCS stated that the proposed pipelines should avoid all NRCS-held FRPP easement acreage, however in the event complete avoidance is not possible, the location of the pipeline should avoid or minimize the impact on prime farmland soils. In February 2017, Eastern Shore provided supplemental documentation to the NRCS concerning the need to cross parcels with easements and has identified construction and restoration procedures to be used to protect the agricultural uses. On April 27, 2017, the NRCS provided a letter to Eastern Shore stating that it finds that the proposed construction work areas meet NRCS' requirements for protecting the agricultural use and related conservation values of the four parcels with agricultural conservation easements.

In consideration of Eastern Shore's use of its existing easement were practicable, and its proposed soil handling and restoration plans that are consistent with FERC's Plan, we do not expect Project construction to adversely affect prime farmland soils or the long-term agricultural use of the affected NRCS easement holdings.

Based on the temporary nature of the proposed construction-related activities, Eastern Shore's proposed collocation of the rights-of-way, and our recommendation, we conclude that impacts on agricultural land use would not be significant.

Upland Forest

Overall, about 5 percent of impacts from construction of the Project would be on land characterized as forest and woodland. Pipeline construction would result in long-term to permanent impacts on forest from the removal of trees and shrubs from the construction workspace. Approximately 1.34 acres of wooded land cleared during construction would be maintained in an herbaceous state for pipeline operation. 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 our Plan, NRCS and other agency

recommendations or 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.

Based on the collocation of the pipelines with existing Eastern Shore and other 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.

Existing Rights-of-Way

In total, approximately 87 percent of the total length of pipeline associated with the Project would be located within or adjacent to existing rights-of-way. About 29 percent would be collocated within Eastern Shore's existing right-of-way. A majority of the pipeline, approximately 58 percent of the loops, would be adjacent to or within existing roads or other rights-of-way (table 20).

Industrial/Commercial

The industrial/commercial community type consists of impervious and semi-impervious surfaces, as well as routinely maintained herbaceous vegetation. Approximately 4.84 acres affected by the Project is classified as industrial/commercial land. We conclude that Project impacts on industrial/commercial land would not be significant.

Open Land

About 25.4 acres of open land (7 percent of the total project disturbance) would be impacted by construction of the Project. Additionally, 1.0 acre of open land would be used by Eastern Shore to operate Project facilities. 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 our Plan would minimize impacts on open land crossed by the pipeline loops.

Following construction of the Project, affected open land would be revegetated with the use of an 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 Project, vegetation maintenance would result in periodic impacts on open land. We conclude that the Project's impacts on open land would not be significant.

Table 20. Existing Rights-of-Way Proposed to Be Used by the 2017 Expansion Project			
Project Facility	**Mileposts**	**Length Adjacent / Within Existing ROW (in miles)**	**Type of ROW[1]**
Parkesburg Loop	3.10 – 3.22	0.12	Philadelphia Electric Company
Parkesburg Loop Total		**0.12**	
Jennersville Loop	4.14 – 4.41	0.27	Sunnyside Road
Jennersville Loop Total		**0.27**	
Fair Hill Loop	1.14 – 1.19	0.05	Appleton Road (State Road 3007)
Fair Hill Loop Total		**0.05**	
Summit Loop	0.28 – 0.53	0.25	Old Summit Bridge Road
Summit Loop Total		**0.25**	
Hearns Pond Loop	0.00 – 1.59	1.59	Sussex Highway (U.S. Route 13)
Hearns Pond Loop Total		**1.59**	
Seaford-Millsboro Connector	0.00 – 2.57	2.57	Airport Road (County Road 488)
	2.85 – 3.15	0.30	Fire Tower Road (County Road 479)
	3.22 – 3.39	0.17	Fire Tower Road (County Road 479)
	3.53 – 5.19	1.66	Mirey Branch Road (County Road 480A)
	5.29 – 5.40	0.11	Kaye Road (County Road 474)
	5.89 – 6.56	0.67	Dukes Farm Road (County Road 476A)
	6.58 – 6.93	0.35	Dukes Farm Road (County Road 476A)
	6.94 – 7.00	0.06	Sycamore Road (County Road 476)
	7.02 – 9.04	2.02	Sycamore Road (County Road 476)
	9.05 – 9.97	0.92	Jimtown Road (County Road 62)
	9.97 – 10.37	0.40	Hardscrabble Road (State Road 20)
	10.50 – 10.63	0.13	Delaware Solid Waste Authority
	10.63 – 11.96	1.33	Hardscrabble Road (State Road 20)
	12.06 – 12.13	0.07	Shiloh Church Road (State Road 74)
	12.13 – 17.00	4.87	Hardscrabble Road (State Road 20)
Seaford-Millsboro Connector Total		**15.63**	
Laurel Loop	0.00 – 5.13	5.13	Sussex Highway (U.S. Route 13)
Laurel Loop Total		**5.13**	
[1] Does not include 11.47-miles of pipeline to be installed within existing Eastern Shore easement.			

Wetlands

About 1.9 acres of wetlands would be impacted by construction of the Project. This includes approximately 0.7 acre of forested wetland that would be cleared during construction but allowed to revert to preconstruction conditions and 1.0 acres on non-forested wetland (see section 2.3). This acreage would be associated with the construction of the pipeline loops; the aboveground facilities would not impact wetlands.

The NRCS submitted a letter to FERC on December 15, 2016, notifying staff that the Project would impact two NRCS easement holdings along the Jennersville Loop that are held through the Wetland Reserve Program. The NRCS requested that Eastern Shore provide an Easement Administrative Action Analysis document for each of the easements. Eastern Shore provided supplemental documentation to the NRCS concerning the need to cross parcels with Wetland Reserve Program easements and stated that construction would not affect any wetland areas on those parcels. On April 27, 2017, the NRCS informed Eastern Shore that the new pipeline alignment is a preferred alternative as it avoids impact to wetlands protected by two NRCS held Wetland Reserve Program easements. The NRCS also found that installation of the pipeline would not affect the continued eligibility of the two parcels currently enrolled in the Wetlands Reserve Program.

We conclude that pipeline construction through wetlands using best practices generally does not result in wetland loss or significant functional impacts. Furthermore, Eastern Shore's Project would not directly affect any wetlands enrolled in the Wetland Reserve Program. Any construction-related impacts on wetlands and waterbodies would be short-term. Through implementation of Eastern Shore's ESC Plan and our Procedures, wetlands would be restored following construction and long term impacts on wetland resources would be minimal.

Road Crossings

Road crossings would be completed using open-cut or trenchless techniques (either boring or HDD), depending upon site-specific conditions. Table 21 provides a list of roadways crossed by the Project and Eastern Shore's proposed crossing technique.

Eastern Shore is required to obtain applicable permits from state and local authorities for work planned within road rights-of-way. High volume paved public roads would be bored and thus not impacted during construction. Some low volume 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 Department of Transportation representatives, as appropriate, to establish detours to accommodate local traffic.

Table 21. Public Roadway Crossings by the 2017 Expansion Project

Milepost	Roadway[1]	Classification	Jurisdiction	Crossing Method
Parkesburg Loop				
0.06	Cemetery Road (T416)	Local	West Sadsbury Township	Open Cut
0.42	Upper Valley Road (T579)	Minor Collector	West Sadsbury Township	Open Cut
0.77	Lower Valley Road (SR 372)	Major Collector	Pennsylvania	Bore
1.50	Glen Run Road (T344)	Local	Highland Township	Open Cut
2.13	Highland Road (SR 3081)	Minor Collector	Pennsylvania	Bore
2.89	Lenover Road (T367)	Local	Highland Township	Open Cut
3.38	East Friendship Church Road (SR 3056)	Local Distributor	Pennsylvania	Bore
4.48	Limestone Road (SR 10)	Minor Arterial	Pennsylvania	Bore
Jennersville Loop				
0.55	Faggs Manor Road (T336)	Local	Londonderry Township	Open Cut
1.63	Baker Road (T345)	Local	Penn Township	HDD
2.07	Ewing Road (T408)	Minor Collector	Penn Township	Open Cut
2.55	Kennett Oxford Bypass (U.S. 1)	Expressway	Federal	HDD
2.79	West Baltimore Pike (SR 3026)	Minor Arterial	Pennsylvania	Bore
2.95	South Jennersville Road (SR 796)	Minor Arterial	Pennsylvania	Bore
4.42	Kelton Road (T327)	Local Distributor	Penn Township	Open Cut
5.13	West State Road (T402)	Major Collector	New London Township	Open Cut
5.71	West Avondale Road (T321)	Minor Collector	New London Township	Open Cut
5.90	School Road (T356)	Local Distributor	New London Township	Open Cut
6.09	Kelton Pennock Bridge Road (T406)	Local Distributor	New London Township	Open Cut
6.86	Conards Mill Road (T310)	Local	New London Township	Bore
Fair Hill Loop				
0.69	Lewisville Road (SR 3006)	Local Distributor	Pennsylvania	Bore
0.92	Appleton Road (SR 3007)	Local Distributor	Pennsylvania	Bore
1.59	Flint Hill Road (T378)	Local	Franklin Township	Open Cut
1.63	Elbow Lane (T301)	Local	Franklin Township	Open Cut
3.52	Telegraph Road (SR 273)	Major Arterial	Maryland	HDD
Summit Loop				

Table 21. Public Roadway Crossings by the 2017 Expansion Project				
Milepost	**Roadway[1]**	**Classification**	**Jurisdiction**	**Crossing Method**
0.27	Lorewood Grove Road (CR 412)	Major Collection	Delaware	Bore
Hearns Pond Loop				
0.07	Bowdens Garage Road (CR 18)	Major Collector	Delaware	HDD
1.01	Camp Road (CR 532)	Local	Delaware	HDD
1.09	Old Furnace Road (CR 46)	Minor Collector	Delaware	HDD
Seaford-Millsboro Connector				
1.14	Bethel Concord Road (CR 485)	Local	Delaware	Open Cut
1.90	Dillards Road (CR 489)	Local	Delaware	Open Cut
3.40	Fire Tower Road (CR 479)	Local	Delaware	Open Cut
5.18	Mirey Branch Road (CR 480A)	Local	Delaware	Open Cut
5.49	County Seat Highway (U.S. 9)	Minor Arterial	Federal	Bore
5.51	Dukes Lumber Road (CR 474)	Local	Delaware	Open Cut
5.90	Dukes Farm Road (CR 476A)	Local	Delaware	Open Cut
6.94	Cooper Road (CR 475)	Local	Delaware	Bore
6.99	Sycamore Road (CR 476)	Local	Delaware	Bore
7.27	Beaver Dam Branch Road (CR 446)	Local	Delaware	Open Cut
8.64	Layton Road (CR 477)	Local	Delaware	Open Cut
9.07	Sycamore Road (CR 476)	Local	Delaware	Open Cut
9.44	East Trap Pond Road (CR 62)	Local	Delaware	Open Cut
12.15	Hardscrabble Road (SR 20)	Major Collector	Delaware	Bore
12.23	Bryans Store Road (CR 435)	Local	Delaware	Bore
13.11	Shortly Road (CR 431)	Local	Delaware	Bore
14.15	Hardscrabble Road (SR 20)	Major Collector	Delaware	Bore
14.34	Long Drain Road (CR 442A)	Local	Delaware	Open Cut
15.03	Cross Keys Road (CR 432)	Local	Delaware	Open Cut
15.71	Godwin School Road (CR 410)	Local	Delaware	Open Cut
16.93	Country Living Road (CR 433)	Local	Delaware	Open Cut
16.96	Hardscrabble Road (SR 20)	Major Collector	Delaware	Bore
Laurel Loop				
0.45	Bethel Concord Road (CR 485)	Local	Delaware	HDD
1.16	Walker Road (CR 480)	Local	Delaware	HDD
1.81	Boyce Road (CR 482)	Local	Delaware	HDD
2.27	Camp Road (CR 470)	Local	Delaware	HDD
2.90	Discount Land Road (CR 468)	Local	Delaware	HDD

Table 21. Public Roadway Crossings by the 2017 Expansion Project

Milepost	Roadway[1]	Classification	Jurisdiction	Crossing Method
3.39	County Seat Highway (U.S. 9)	Minor Arterial	Federal	HDD
3.78	Sycamore Road (CR 466)	Local	Delaware	HDD
4.53	Laurel Road (SR 24)	Major Collector	Delaware	HDD
4.89	Trussum Pond Road (CR 462)	Local	Delaware	HDD

1 The wearing surface of all roads listed is bituminous asphalt.

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.

Residential Land

Residential land is defined as areas containing residential structures and associated landscaped areas and include single and multiple family dwellings in subdivisions as well as those dispersed in rural areas. Since installation of Eastern Shore's original mainline pipeline system, residential development has occurred around the existing pipeline right-of-way. Temporary construction impacts on residential areas may include inconveniences caused by 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; disturbance of lawns and removal of trees, landscaped shrubs, or other vegetation screening between residences and adjacent rights-of-way; and removal of encroaching aboveground structures such as sheds from within the existing right-of-way. These impacts 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. 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 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 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.

The 2017 Expansion Project would affect approximately 12 acres of residential lands. There are 188 structures within 50 feet of the construction workspace, and 82 structures within 25 feet of the construction workspace. There are a total of 22 residences within 10 feet of the construction workspace: 4 on the Jennersville Loop, 5 on the Summit Loop, and 13 on the Seaford-Millsboro Connector. A list of these structures and Eastern Shore's residential construction plans for residences within 50 feet of the construction workspaces are included in appendix 3. We encourage affected landowners to review the residential plan for their property and file with the Secretary any comments or concerns during the EA comment period.

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 workspace, as specified in our recommendation below.

Because of the increased potential for construction activities to disrupt residences 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**:

- **<u>Prior to construction</u>, 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.**

Based on landowner comments received to date, as well as proximity of construction work areas to the residential structures listed and shown in appendix 3, **we further recommend that:**

- **Eastern Shore should develop and implement project-specific environmental complaint resolution procedures. The procedures should provide landowners with clear and simple directions for identifying and resolving their environmental mitigation problems/concerns during construction of the Project, and during restoration of the rights-of-way. Prior to construction of the 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 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 Project 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.

Public or Conservation Land

None of the following land uses are present within 0.25 mile of the Project construction work areas: Indian reservations, national trails, old growth forest, flood control land, designated Native American religious sites, local or culturally significant areas, designated scenic roads, designated Wilderness Areas, or flood control levees, structures, or flood storage areas.

The White Clay Creek and its designated tributaries are listed as part of the National Wild and Scenic River System and would be crossed by the Jennersville Loop. The proposed Jennersville Loop crosses tributaries of White Clay Creek at mileposts 3.79, 6.13, and 6.41. Specifically, the crossings at mileposts 3.79 and 6.13 are identified as West Branch White Clay Creek. The crossing at milepost 6.41 is identified as an unnamed tributary of West Branch White Clay Creek. The designated tributaries in the vicinity of the Project are managed by the NPS. At these three crossing locations, the pipeline would be installed using dry-ditch installation methods.

In an August 31, 2016 letter, the NPS expressed concerns about potential impacts on water quality and the federally threatened bog turtle and its habitat. Representatives of NPS, Eastern Shore, and FERC met on November 4, 2016, to review the proposed tributary crossing locations and proposed construction methods. Eastern Shore has proposed to use the dam-and-pump crossing method at these locations and follow any season restrictions recommended by the USFWS or PADEP. Consultation with the NPS is ongoing.

The proposed Fair Hill Loop crosses the MD DNR Fair Hill Natural Resource Management Area between milepost 1.65 and its termination at approximate milepost 3.5. This area contains 5,656 acres of land managed for multiple uses including equestrian events, hiking and mountain biking, and hunting and is the site of the annual Cecil County Fair. The Fair Hill Loop pipeline would cross an area of mostly open land within Eastern Shore's existing 25-foot-wide permanent easement. Eastern Shore is consulting with the MD DNR concerning construction timing and methods.

The proposed Summit Loop crosses the C&D Canal Wildlife Area from milepost 0.0 to approximately milepost 0.20, on property owned by the U.S. Government and managed by the USACE. Approximately 0.2 mile of the Summit Loop is within the C&D Canal Wildlife Area; however, the majority of the Summit Loop is located within exiting utility or transportation rights-of-way. On January 4, 2017, Eastern Shore submitted an application to the USACE requesting Section 408 authorization to construct and operate the Summit Loop pipeline within the portion of the C&D Canal Wildlife Area managed by the USACE. Eastern Shore anticipates receipt of the Section 408 authorization in June 2017.

4.2. 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 Project loops would be completed in about 6 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 Project 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. Aesthetic impacts 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 primarily along 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. As described above, several loops would cross public and conservation lands. Eastern Shore would restore these lands as required by the Plan and the requirements of the land management agencies.

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 location or along the existing right-of-way. No known visually sensitive areas would be affected by the Project.

4.3. Coastal Zone Management Area

The Summit Loop, Hearns Pond Loop, Seaford-Millsboro Connector, Millsboro Pressure Control Station, Delmar Pressure Control Station, and the portion of the Fair

Hill Loop located in Maryland are subject to the Coastal Zone Consistency Review. The Project components in Delaware are also subject to Coastal Zone review. Eastern Shore has initiated consultation with the Delaware Coastal Zone Management Program and the MDE for compliance with the Coastal Zone Management Act as required by FERC. The PADEP indicated that a Coastal Consistency determination is not required for work in Pennsylvania.

The Maryland segment of the Fair Hill Loop would be entirely within Eastern Shore's existing right-of-way. Utilizing existing right-of-way would avoid and/or minimize impacts on resources such as wetlands, waterbodies, and forest. Eastern Shore would also obtain a Nontidal Wetlands and Waterways Permit from the MDE to authorize impacts on wetlands and waterbodies.

The Delaware portion of the Project would be primarily within existing road rights-of-way, and would therefore require minimal tree clearing. Additionally, the use of HDD construction methods is proposed to avoid direct impacts on wetlands and waterbodies. The Millsboro and Delmar Pressure Control Stations would not involve direct impacts on wetlands or waterbodies, and would not require significant tree clearing.

Eastern Shore anticipates that the Coastal Zone Consistency and a Water Quality Certificate would be issued as part of the Maryland State Programmatic General Permit-5. For facilities in Delaware, a Coastal Zone Management approval would be required from the Delaware Coastal Zone Management Program for the project facilities in New Castle and Sussex Counties, Delaware. FERC must confirm Eastern Shore's receipt of these determinations prior to authorizing construction. Therefore, **we recommend that:**

- **Eastern Shore should <u>not begin construction</u> of the Project until it files with the Secretary a copy of the determination of consistency with the Coastal Zone Management Plan issued by Delaware and Maryland.**

4.4. Hazardous Sites

In an effort to identify sites of potential environmental concern in the Project area, regulatory database searches were conducted on July 11 and 12, 2016. These searches were performed by EDR and conducted according to the government records search requirements of the American Society for Testing and Materials Standard Practice for Environmental Site Assessments, E 1527-13, to identify sites within 0.25 mile of the pipeline construction work areas that could potentially be impacted by the Project or need to be considered during Project routing.

Parkesburg Loop

The results of the database search conducted by EDR did not identify regulatory sites within the study area. National Priority List (NPL) and Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) sites were not identified within 0.25 mile of the proposed Parkesburg Loop. Two state regulated sites were identified within 0.25 mile of the proposed pipeline.

Six sites which generate, transport, store, treat and/or dispose of hazardous waste were identified within 0.25 mile of the proposed pipeline. One site involving a registered storage tank was identified within 0.25 mile of the proposed pipeline. Leaking underground storage tank (LUST) and/or petroleum spill sites were not identified within 0.25 mile of the proposed pipeline.

Jennersville Loop and Daleville Compressor Station

The results of EDR's database search identified three regulatory sites within the Jennersville Loop/Daleville Compressor Station study area. NPL and CERCLIS sites were not identified within 0.25 mile of the proposed Jennersville Loop or Daleville Compressor Station. Two state-regulated sites were identified within 0.25 mile of the proposed pipeline.

Three sites which generate, transport, store, treat and/or dispose of hazardous waste were identified within 0.25 mile of the proposed pipeline. Four sites involving registered storage tanks, as well as two LUSTS and/or petroleum spills were identified within 0.25 mile of the proposed pipeline.

Fair Hill Loop

The results of the database search conducted by EDR did not identify regulatory sites within the Fair Hill Loop study area. NPL and CERCLIS sites were not identified within 0.25 mile of the proposed Fair Hill Loop. One state regulated site was identified within 0.25 mile of the proposed pipeline.

Two sites which generate, transport, store, treat and/or dispose of hazardous waste were identified within 0.25 mile of the proposed pipeline. One site involving registered storage tanks and one LUST and/or petroleum spill site was identified within 0.25 mile of the proposed pipeline.

Summit Loop

The results of the database search conducted by EDR did not identify regulatory sites within the Summit Loop study area. NPL and CERCLIS sites were not identified within 0.25 mile of the proposed Summit Loop. State-regulated sites were not identified within 0.25 mile of the proposed pipeline.

Sites which generate, transport, store, treat and/or dispose of hazardous waste were not identified within 0.25 mile of the Summit Loop. One site involving registered storage tanks was identified within 0.25 mile of the proposed pipeline. LUSTs and/or petroleum spill sites were not identified within 0.25 mile of the proposed pipeline. Eastern Shore also reviewed DNREC's Environmental Navigator website on July 11, 2016. No additional sites were identified as facilities of known environmental concern or regulation on the DNREC database within an approximate 0.25-mile radius of the subject property.

Hearns Pond

The results of the database search conducted by EDR identified one regulatory site within the Hearns Pond study area. NPL and CERCLIS sites were not identified within 0.25 mile of the proposed Hearns Pond Loop. One state-regulated site was identified within 0.25 mile of the proposed pipeline.

Three sites which generate, transport, store, treat and/or dispose of hazardous waste were identified within 0.25 mile of the proposed pipeline. Seven sites involving registered storage tanks and three LUSTs and/or petroleum spill sites were identified within 0.25 mile of the proposed pipeline.

Eastern Shore also reviewed DNREC's Environmental Navigator website on July 11, 2016. The results were consistent with those identified by EDR. No additional sites were identified as facilities of known environmental concern or regulation on the DNREC database within an approximate 0.25-mile radius of the subject property.

Seaford-Millsboro Connector

The results of the database search conducted by EDR did not identify regulatory sites within the Seaford-Millsboro Connector or Millsboro Pressure Control Station study area. NPL and CERCLIS sites were not identified within 0.25 mile of the proposed facilities. State-regulated sites were not identified within 0.25 mile of the proposed pipeline or control station.

Sites which generate, transport, store, treat and/or dispose of hazardous waste were not identified within 0.25 mile of the proposed pipeline. One site involving registered storage tanks and one LUST and/or petroleum spill site was identified within 0.25 mile of the proposed pipeline.

Eastern Shore also reviewed DNREC's Environmental Navigator website on July 11, 2016. No additional sites were identified as facilities of known environmental concern or regulation within an approximate 0.26-mile radius of the subject property.

Laurel Loop

The results of the database search conducted by EDR identified one regulatory site within the Laurel Loop study area. NPL and CERCLIS sites were not identified within 0.25 mile of the proposed Laurel Loop. Two state-regulated sites were identified within 0.25 mile of the proposed pipeline.

Three sites which generate, transport, store, treat and/or dispose of hazardous waste were identified within 0.25 mile of the proposed pipeline. Seventeen sites involving registered storage tanks and 13 LUSTs and/or petroleum spill sites were identified within 0.25 mile of the proposed pipeline.

Eastern Shore also reviewed DNREC's Environmental Navigator website on July 11, 2016. No additional sites were identified as facilities of known environmental concern or regulation within an approximate 0.25-mile radius of the subject property.

However, one regulatory site with one open LUST case is located adjacently west of the proposed study area near milepost 3.79 (Oneal Brothers, Inc.).

Delmar Pressure Control Station

The results of the database search conducted by EDR did not identify regulatory sites within the Delmar Pressure Control Station study area. NPL and CERCLIS sites were not identified within 0.25 mile of the proposed facility. State-regulated sites were not identified within 0.25 mile of the proposed control station.

Sites which generate, transport, store, treat and/or dispose of hazardous waste were not identified within 0.25 mile of the proposed control station. Four sites involving registered storage tanks and three LUSTs and/or petroleum spill sites were identified within 0.25 mile of the proposed control station.

Eastern Shore also reviewed DNREC's Environmental Navigator website on July 11, 2016. No additional sites were identified as facilities of known environmental concern or regulation on the DNREC database within an approximate 0.25-mile radius of the subject property.

Based on the proposed construction method and excavation depths, the distances from the regulatory sites to the study area, the assumed direction of groundwater flow, and/or their regulatory statuses, it is unlikely that the EDR-identified regulatory sites discussed above have adversely impacted the proposed construction areas. If potential soil and/or groundwater contamination is encountered during construction activities; Eastern Shore would follow the procedures set forth in its *Unanticipated Discovery of Contamination Plan*, which we have reviewed and found acceptable.

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 Plan 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, and reported in an appropriate manner.

5. Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA), 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.

Eastern Shore completed cultural resources surveys for the Parkesburg Loop, and provided a *Phase I Archaeological Survey* report and an *Architectural Reconnaissance Study* to the FERC and the Pennsylvania State Historic Preservation Office (SHPO). The Phase I survey included a generally 200-foot-wide corridor for the pipeline, as well as staging areas. The survey included visual inspection and excavation of 1,478 subsurface shovel test units. As a result of this survey, three historic archaeological sites were identified (36CH0852, 36CH0853, and 36CH0989). No further work was recommended for site 36CH0989, with Phase II testing recommended for sites 36CH0852 and 36CH0853. In a letter dated November 28, 2016, the Pennsylvania SHPO agreed with the report's recommendations. Phase II testing was completed on sites 36CH0852 and 36CH0853, and *Phase II Evaluation* reports provided to the FERC and SHPO. As a result of evaluation, both sites were recommended as not eligible for the NRHP and no further work was recommended. In a letter dated November 28, 2016, the Pennsylvania SHPO agreed that no further work was needed for site 36CH0853. We agree also. Eastern Shore has not yet provided the SHPO's comments on the Phase II report for site 36CH0852.

The architectural study area for the Parkesburg Loop extended 200 feet 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. Six previously recorded architectural resources and four newly recorded architectural resources were identified in the study area. Seven of the resources were houses/farms, some with associated barns and/or out-buildings. Three of the resources were railroads. The three railroads were previously determined eligible, or recommended as eligible, for the NRHP; however, since they were all in active use, no further work was recommended. The remaining seven resources were

recommended as not eligible for the NRHP. In an October 11, 2016 letter, the SHPO requested additional information in the form of Historic Resource Survey Forms for two properties (the farm at 547 Lenover Road, and the Parkes Tenant House). The SHPO did not recommend additional investigation for the remaining resources. Eastern Shore has not yet provided the Historic Resource Survey Forms.

Eastern Shore completed cultural resources surveys for the Jennersville Loop and Daleville Compressor Station, and provided a *Phase I Archaeological Survey* report and an *Architectural Reconnaissance Study* to the FERC and the Pennsylvania SHPO. The Phase I survey included a generally 200-foot-wide corridor for the pipeline, as well as staging areas and the Project area for the Daleville Compressor Station. The survey included visual inspection and excavation of 2,297 subsurface shovel test units. As a result of this survey, 11 archaeological sites were newly identified (36CH0979, 36CH0980, 36CH0981, 36CH0982, 36CH0983, 36CH0984, 36CH0985, 36CH0986, 36CH0897, 36CH0988, and 36CH0990), and 5 previously recorded sites (36CH0014, 36CH0473, 36CH0476, 36CH0477, and 36CH0478) were revisited.

The portions of four of the previously identified sites within the construction workspace were recommended as not eligible for the NRHP. The remaining site (36CH0014) was not tested due to heavy disturbance and denied access. Further work is required for this site. Only one of the newly recorded sites (36CH0988) was recommended as potentially eligible for the NRHP, and Phase II testing was recommended. In addition, five areas still require survey due to denied access. Eastern Shore has not yet filed the SHPO's comments on the Phase I report. Phase II testing was completed on site 36CH0988, and the resulting *Phase II Evaluation* report provided to the FERC and SHPO. As a result of the Phase II testing, the site was recommended as eligible for the NRHP. Eastern Shore is currently evaluating measures to avoid impacts on site 36CH0988. Eastern Shore has not yet filed the SHPO's comments on the Phase II report.

The architectural study area for the Jennersville Loop and Daleville Compressor Station extended 200 feet 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 on-line database. Thirteen previously recorded architectural resources and 21 newly recorded architectural resources were identified in the study area. Twenty-eight of the resources were houses/farms, some with associated barns and/or out-buildings. Three of the resources were commercial structures, and one resource was a hotel/inn. One of the resources was a railroad, and one of the resources was the Jennersville Historic District. Thirty-two of the resources were recommended as, or have been determined, not eligible for the NRHP, with no further work recommended. Two resources (the Pennsylvania, Baltimore, and Washington Railroad, and the farm at 767 State House Road) were recommended for further examination. In a July 28, 2016 letter, the Pennsylvania SHPO requested additional information in the form of Historic

Resource Survey Forms for six properties (the Pennsylvania, Baltimore, and Washington Railroad, and farms at 767 State House Road, 266 Baker Road, 348 Sunnyside Road, 550 W. Avondale Road, and 575 Kelton Pennock Bridge Road). No further information was required for the remainder of the properties. Eastern Shore provided Historic Resource Survey Forms for the six properties to the SHPO. Eastern Shore has not yet filed the SHPO's comments on the forms.

Eastern Shore completed cultural resources surveys for the Pennsylvania portion of the Fair Hill Loop, and provided a *Phase I Archaeological Survey* report and an *Architectural Reconnaissance Study* to the FERC and the SHPO. The Phase I survey included a generally 200-foot-wide corridor for the pipeline, as well as staging areas. The survey included visual inspection and excavation of 477 subsurface shovel test units. As a result of this survey, one prehistoric archaeological site was identified (36CH1008). Phase II testing was recommended for site 36CH1008. However, in a letter dated January 9, 2017, the SHPO indicated the site was not eligible for the NRHP, and no further testing was necessary. We agree with the SHPO.

The architectural study area for the Pennsylvania portion of the Fair Hill Loop extended 200 feet 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 on-line database. Six previously recorded architectural resources were identified in the study area. No new architectural resources were identified in the study area. All of the resources were houses/farms, some with associated barns and/or out-buildings. Four of the resources were recommended as not eligible for the NRHP, with no further work recommended. Two resources (the J.C. Armstrong House, and the George G. Evans Farmhouse) were recommended for further examination. In a September 30, 2016 letter, the SHPO requested additional information in the form of Historic Resource Survey Forms for four properties (the J.C. Armstrong House, George G. Evans Farmhouse, Alexander Curry House, and John Pitt Farmhouse). Eastern Shore has not yet provided the Historic Resource Survey Forms to the SHPO.

Eastern Shore completed cultural resources surveys for the Maryland portion of the Fair Hill Loop, and provided a *Phase I Archaeological Survey* report to the FERC and the Maryland SHPO. On February 9, 2017, the SHPO indicated that no investigations for historic buildings or structures were required for the Project in Maryland. The Phase I survey included a generally 200-foot-wide corridor for the pipeline, as well as staging areas. The survey included visual inspection and excavation of 1,105 subsurface shovel test units. As a result of this survey, seven archaeological sites (five historic and two pre-contact) were identified (18CE400 through 18CE406). Four of the sites (18CE401 through 18CE404) were recommended as not eligible for the NRHP. Phase II testing was recommended for sites 18CE400, 18CE405, and 18CE406. In a letter dated February 21, 2017, the SHPO concurred that Phase II evaluative investigations were warranted at sites 18CE400 and 18CE406, but not at site 18CE405 due to the low potential for yielding

significant information. Eastern Shore indicated that site 18CE400 is on a portion of the Fair Hill Loop that has been removed from the Project, and thus would be avoided. In addition, Eastern Shore indicated that site 18CE405 is located adjacent to an existing gravel road and would be avoided; and that site 18CE406 would be avoided by reducing the size of a staging area. Eastern Shore has not yet provided the SHPO with the avoidance information for these three sites to the SHPO.

Eastern Shore conducted a cultural resources survey for the Summit Loop and provided a *Phase I Cultural Resource Survey* report to the FERC and Delaware SHPO. The Phase I survey included a generally 100-foot-wide corridor for the pipeline. The survey covered both archaeological and architectural resources, and included visual inspection and the excavation of 88 subsurface shovel test units. A portion of the Project is on land owned by the USACE, and a separate addendum report was provided for that portion of the Project. As a result of the Phase I survey, four historic archaeological sites were identified (sites 1-4). Sites 1 through 3 were recommended as not eligible for the NRHP within the study area. Site 4 was recommended as potentially eligible for the NRHP. Eastern Shore indicated that site 4 is located on the opposite side of a road where the loop construction would take place, and thus would be avoided. Twenty-three architectural resources consisting of 20 houses, 2 churches, and a commercial building, were identified. None of these was recommended as eligible for the NRHP. No cultural resources were identified by the survey on the USACE lands. Eastern Shore has not yet provided the SHPO's comments on the Phase I report, or the SHPO's and USACE's comments on the addendum report for USACE lands.

Eastern Shore completed a cultural resources survey for the Hearns Pond Loop, and provided a *Phase I Cultural Resource Survey* report to the FERC and the Delaware SHPO. The Phase I survey included both sides of U.S. Route 13, as well as staging areas, and measured approximately 240 feet in width. The survey covered both archaeological and architectural resources, and included visual inspection and the excavation of 380 subsurface shovel test units. As a result of the Phase I survey, one historic archaeological site was identified (7S-E-208) and recommended as not eligible for the NRHP. The architectural study area consisted of the viewshed, taking into consideration where impacts to a resource's setting and association could occur. Twelve previously recorded architectural resources and nine newly recorded architectural resources were identified in the study area. These included 18 agricultural or dwelling complexes, a church, a culvert, and a transportation complex. Twenty of the resources were recommended as not eligible for the NRHP. One resource, a dwelling complex (S-06286), was recommended as potentially eligible for the NRHP. In a letter dated July 22, 2016, the SHPO concurred with these recommendations. On September 29, 2016, the SHPO concurred that the Hearns Pond Loop would have no adverse effect on historic properties. We agree with the SHPO.

Eastern Shore completed cultural resources surveys for the Seaford-Millsboro Connector and the Millsboro Pressure Control Station, and provided a *Phase I Cultural Resource Survey* report to the FERC and the Delaware SHPO. The Phase I survey included both sides of the various roadways paralleled by the pipeline, as well as staging areas, and measured an average of approximately 150 feet in width. The area required for the Millsboro Pressure Control Station was also included in the Phase I survey. The surveys covered both archaeological and architectural resources, and included visual inspection and the excavation of 4,373 subsurface shovel test units, and 11 3-foot by 3-foot units.

As a result of the Phase I survey, 15 historic archaeological sites were identified (7S-E-212, 7S-E-211, 7S-E-210 (locus A and B), 7S-E-209, 7S-F-159, 7S-F-160, 7S-F-161, 7S-F-162, 7S-F-163, 7S-F-164, 7S-F-165, 7S-F-166, 7S-F-167, and 7S-E-213). Locus A of site 7S-E-210 was recommended as potentially eligible for the NRHP. Eastern Shore indicated that the segment of the pipeline containing site 7S-E-210 has been removed from the Project, thus the site would be avoided. Site 7S-F-161 was also recommended as potentially eligible for the NRHP. Eastern Shore indicated the proposed pipeline is on the opposite side of the roadway as site 7S-F-161, and is therefore avoided. The remaining sites were recommended as not eligible for the NRHP. The architectural study area consisted of the viewshed, taking into consideration where impacts to a resources' setting and association could occur. A total of 81 architectural resources (48 previously recorded and 33 newly recorded) were identified in the study area. These included 58 agricultural or dwelling complexes, 21 homes/dwellings, a store, and a school.

Seventy-nine of the resources were recommended as not eligible for the NRHP. Two resources, a school (S-04595) and an agricultural complex (S-12318) were recommended as potentially eligible for the NRHP. Because, the pipeline would be below grade and would not have an impact on the visual landscape after construction is complete, Eastern Shore recommended that the Project would have no effect on architectural resources. Eastern Shore has not yet provided the Delaware SHPO's comments on the Phase I report.

Eastern Shore completed cultural resources surveys for the Laurel Loop, and provided a *Phase I Cultural Resource Survey* report to the FERC and the Delaware SHPO. The Phase I survey included both sides of the northbound lane of U.S. Route 13, as well as staging areas, and measured an average of approximately 160 feet in width. The surveys covered both archaeological and architectural resources, and included visual inspection and the excavation of 498 subsurface shovel test units. As a result of the Phase I survey, two historic archaeological sites were identified (7S-E-214 and 7S-H-128). Site 7S-H-128 was recommended as potentially eligible for the NRHP. Eastern Shore indicated it has revised the construction limits of disturbance to avoid impacting this site. Site 7S-E-214 was recommended as not eligible for the NRHP.

The architectural study area consisted of the viewshed, taking into consideration where impacts to a resource's setting and association could occur. A total of 52 architectural resources (4 previously recorded and 48 newly recorded) were identified in the study area. These included 21 dwellings/dwelling complexes, 12 commercial/office buildings, 5 motels/mobile parks, 7 stores, 2 farms, a bridge, a gas station, a radio station, a speed shop, and a farmers market. Forty-seven of the resources were recommended as not eligible for the NRHP. Five resources, including two farms (S-06037 and S-06041), a store (S-12447), and two dwellings (S-12451 and S-12461) were recommended as potentially eligible for the NRHP. Because the pipeline would be below grade and would not have an impact on the visual landscape after construction is complete, Eastern Shore recommended that the Project would have no effect on architectural resources. Eastern Shore has not yet provided the SHPO's comments on the Phase I report.

Eastern Shore completed cultural resources surveys for the Delmar Pressure Control Station and provided a *Phase I Cultural Resource Survey* report to the FERC and the Delaware SHPO. The surveys included two potential locations for the station, consisting of a total of 7.68 acres. The surveys covered both archaeological and architectural resources, and included visual inspection and the excavation of 90 subsurface shovel test units. As a result of this survey, no archaeological sites or isolated finds were identified. The architectural study area consisted of the viewshed, taking into consideration where impacts to a resource's setting and association could occur. Three resources, including an automotive garage (S-12464), a car dealership and dwelling (S-12465), and a cemetery (S-12466) were recorded and recommended not eligible for the NRHP. In a letter dated November 17, 2016, the SHPO concurred with the report's recommendations and stated that no historic properties were present to be impacted. We agree.

In response to our NOI, we received a comment from the Franklin Township Historical Commission regarding concerns about potential impacts of the Jennersville Loop and Fair Hill Loop on previously recorded historic resources (Elijah Thompson Farm, George G. Evans Farm, J.C. Armstrong House, Alexander Curry House, and John Pitt Farm). The *Architectural Reconnaissance Study* for the Jennersville Loop indicated that the Elijah Thompson Farm has been previously determined not eligible for the NRHP by the SHPO, and in its July 28, 2016 letter, the SHPO required no further information regarding this property. Eastern Shore indicated the George G. Evans Farm is approximately 0.40 mile east of the pipeline; the J.C. Armstrong House is approximately 0.10 east of the pipeline; the Alexander Curry House is approximately 220 feet west of the pipeline; and the John Pitt Farm is approximately 330 feet east of the pipeline. Therefore, these properties would be avoided by construction. In its September 30, 2016 letter, the SHPO requested additional information in the form of Historic Resource Survey Forms for four properties (the J.C. Armstrong House, George G. Evans

Farmhouse, Alexander Curry House, and John Pitt Farmhouse). Eastern Shore has not yet provided the Historic Resource Survey Forms to the SHPO.

Eastern Shore contacted the Delaware Nation, Nanticoke Lenni-Lenape Indian Nation, Nanticoke Indian Tribe, Lenape Tribe of Delaware, Oneida Indian Nation, Oneida Nation of Wisconsin, Seneca Nation of Indians, Seneca-Cayuga Tribe of Oklahoma, Shawnee Tribe, St. Regis Mohawk Tribe, Stockbridge-Munsee Band of the Mohican Nation of Wisconsin, Tonawanda Seneca Nation, Tuscarora Nation, Absentee-Shawnee Tribe of Oklahoma, Cayuga Nation, Delaware Tribe of Indians, and the Eastern Shawnee Tribe of Oklahoma regarding the Project. The Delaware Nation indicated the Project should proceed as planned, but requested to be contacted in the event of inadvertent discoveries. The Shawnee Tribe, Stockbridge-Munsee Band of the Mohican Nation of Wisconsin, Delaware Tribe of Indians, and Eastern Shawnee Tribe of Oklahoma responded and requested to continue as consulting parties on the Project. Eastern Shore has provided these tribes with the survey reports. No other responses have been received. We sent our NOI and follow-up letters to those tribes above that are federally-listed. The Shawnee Tribe indicated that no known historic properties would be negatively impacted by the Project, but requested to be notified of discoveries during construction. No other responses to our NOI or letters have been received.

Eastern Shore provided a plan to address the unanticipated discovery of historic properties and human remains during construction. We reviewed the plan and find it acceptable.

Compliance with Section 106 of the NHPA has not been completed for the 2017 Expansion Project. To ensure that the FERC's responsibilities under the NHPA and its implementing regulations are met we recommend that:

- **Eastern Shore <u>should not begin construction</u> of the 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 Pennsylvania, Maryland, and Delaware SHPOs, as applicable;

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 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."

6. Air Quality and Noise

6.1. Air Quality

The Project would result in temporary and permanent impacts on regional air quality through the short-term construction activities associated the Project and long-term operation of the modified Daleville Compressor Station. The existing and proposed compressor units at the Daleville Compressor Station are summarized in table 22 below.

Air Quality

The term "air quality" refers to concentrations of pollutants in the ambient air relative to established standards. This subsection describes well-established air quality concepts that are applied to characterize air quality and to determine the significance of increases in air pollution. These concepts include metrics for specific air pollutants known as ambient air quality standards, regional designations to manage air quality, and networks of stations which monitor ambient air concentrations. Construction and operation of the Project would affect local and regional air quality.

Table 22. Daleville Compressor Station Horsepower Summary

Unit Designation	Make/ Model	Type	Energy Source	Rated Output (hp)			
				Current	Proposed Retirement	Proposed Addition	Total
COMP-1	Caterpillar G3606 LE	4SLB RICE[1]	Natural Gas	1,665	---	---	1,665
COMP-2	Caterpillar G3606 LE	4SLB RICE[1]	Natural Gas	1,665	---	---	1,665
COMP-3	Caterpillar G3606 TALE	4SLB RICE[1]	Natural Gas	1,775	---	---	1,775
COMP-4	Caterpillar G3606 TALE	4SLB RICE[1]	Natural Gas	1,775	---	---	1,775
COMP-5	Caterpillar G3612	4SLB RICE[1]	Natural Gas	---	---	3,750	3,750
Total				6,880	---	3,750	10,630

1. 4SLB RICE = four stroke lean burn reciprocating internal combustion engine.

Air Pollutants

Air pollutants include criteria pollutants, greenhouse gases (GHGs), and hazardous air pollutants (HAPs).

Criteria Pollutants

The Clean Air Act of 1970, as amended in 1977 and 1990 (CAA), defines the following criteria pollutants:

- particulate matter with a diameter less than or equal to 10 microns (PM_{10});
- particulate matter with a diameter less than or equal to 2.5 microns ($PM_{2.5}$);
- nitrogen dioxide (NO_2);
- sulfur dioxide (SO_2);
- carbon monoxide (CO);
- ozone (O_3); and
- lead.

The USEPA has promulgated National Ambient Air Quality Standards (NAAQS) for the criteria pollutants. The NAAQS include primary standards, which are designed to protect human health, including the health of sensitive subpopulations such as children and those with chronic respiratory problems, and secondary standards, which are

designed to protect public welfare, including economic interests, visibility, vegetation, animal species, and other concerns. The NAAQS are codified at 40 CFR 50.[12]

States may adopt standards that are at least as stringent as the NAAQS. PADEP has adopted ambient air quality standards for settled particulate, beryllium, fluorides, and hydrogen sulfide that are codified at Title 25 of the Pennsylvania Code (25 Pa. Code) 131.3.[13]

Delaware has adopted Delaware Ambient Air Quality Standards, which include standards for total suspended particulate matter, hydrocarbons, and hydrogen sulfide. The Delaware Standards are codified at Title 7 of the Delaware Administrative Code (7 DE Admin. Code) Section1103.[14]

As codified at Title 26 of the Code of Maryland Regulations Subtitle 11 Chapter 4, Maryland has adopted the federal NAAQS.

Greenhouse Gases

GHGs occur in the atmosphere both naturally and as a result of human activities, such as the burning of fossil fuels. These gases are the integral components of the atmosphere's greenhouse effect that warms the earth's surface and moderates day/night temperature variation. In general, the most abundant GHGs are water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and O_3. The USEPA has expanded its definition of air pollution to include CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, finding that their presence in the atmosphere endangers public health and public welfare currently and in the future.

The GHG emissions that would result from Project construction and operation are CO2, CH4, and N2O. GHG emissions are quantified and regulated in units of short tons or metric tons of carbon dioxide equivalents (CO_2e). The CO_2e unit of measure takes into account the global warming potential (GWP) of each GHG. The GWP is a ratio relative to CO_2 that is based on the properties of the GHG's ability to absorb solar radiation as well as the residence time within the atmosphere. The GWP of CO_2, CH_4, and N_2O are 1, 25, and 298, respectively.

Hazardous Air Pollutants

The CAA was amended in 1990 to address a large number of air pollutants that are known to or may reasonably be anticipated to adversely affect human health or the

[12] https://www.epa.gov/criteria-air-pollutants/naaqs-table
[13] http://www.pacode.com/secure/data/025/chapter131/s131.3.html
[14] http://regulations.delaware.gov/AdminCode/title7/1000/1100/1103.pdf

environment. The USEPA initially identified 188 specific pollutants and chemical groups as HAPs, and the list has been modified over time. The CAA prescribes technology-based control standards for HAPs emissions from various industrial sources, but does not establish ambient air quality standards for HAPs.

Existing Air Quality

An air quality control region is an interstate or intrastate area designated by the USEPA for the attainment and maintenance of the NAAQS. An implementation plan is developed for each control region describing how compliance with the NAAQS would be achieved and maintained.

The USEPA designates the attainment status of an area for each NAAQS. An area that meets the NAAQS is termed an attainment area. An area that does not meet the NAAQS is termed a nonattainment area. An area for which insufficient data are available to determine the attainment status is termed an unclassifiable area, and treated as an attainment area. An area formerly designated as a nonattainment area that subsequently reached attainment is termed a maintenance area. The status of the counties in which the Project would be located is summarized as follows:

- Lancaster County, Pennsylvania
  - Marginal nonattainment for the 8-hour O_3 standard (2008) (Lancaster, PA Intrastate Area)
  - Maintenance for the annual and 24-hour $PM_{2.5}$ standards (Lancaster, PA Intrastate Area)
  - Attainment or the equivalent for the other pollutant standards currently in force
- Chester County, Pennsylvania
  - Marginal nonattainment for the 8-hour O_3 standard (2008) (Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE Interstate Area)
  - Maintenance for the annual and 24-hour $PM_{2.5}$ standards (Philadelphia-Wilmington, PA-NJ-DE Interstate Area)
  - Attainment or the equivalent for the other pollutant standards currently in force
- Cecil County, Maryland
  - Marginal nonattainment for the 8-hour O_3 standard (2008) (Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE Interstate Area)
  - Attainment or the equivalent for the other pollutant standards currently in force
- New Castle County, Delaware
  - Marginal nonattainment for the 8-hour O_3 standard (2008)) (Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE Interstate Area)
  - Maintenance for the annual and 24-hour $PM_{2.5}$ standards (Philadelphia-Wilmington, PA-NJ-DE Interstate Area)

  - Attainment or the equivalent for the other pollutant standards currently in force
- Sussex County, Delaware
  - In Seaford, Delaware marginal nonattainment for the 8-hour O_3 standard (2008) (Seaford, Intrastate Area); attainment for the balance of the county
  - Attainment or the equivalent for the other pollutant standards currently in force

Delaware, Pennsylvania, and Maryland are located within the Ozone Transport Region (OTR), which includes 11 Northeastern and Mid-Atlantic states, the District of Columbia, and parts of northern Virginia. Ozone transport from states in the OTR has been shown to contribute to O_3 NAAQ violations in one or more other states. Each state in the OTR is required to submit a State Implementation Plan and enact measures to limit emissions of O_3 precursors.

State agencies maintain air quality monitoring networks in the areas under their jurisdiction. Ambient air quality data that are representative of the Project were obtained from the USEPA AIRDATA database and are summarized below.

Federal Regulatory and Permitting Requirements

The CAA and 40 CFR 50-99 are the basic federal statutes and regulations governing air pollution. The following federal requirements were reviewed to determine their applicability to the proposed Project.

Prevention of Significant Deterioration and Nonattainment New Source Review

Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NNSR) were established for the pre-construction review of proposed projects in attainment areas and nonattainment areas, respectively. A project can undergo both types of review, depending on its potential emissions and the attainment status of the area(s) in which it is located.

Table 23. Existing Ambient Air Quality Estimated for the Project Area

Pollutant	Averaging Period	Rank[1]	Years	Concentration		Monitoring Station ID
				(ppm)	(µg/m³)	
PM_{10}	24-Hour	H2H	2013 - 2015	n/a	40.0	10-003-2004[1]
$PM_{2.5}$	24-Hour	98th Percentile	2013 - 2015	n/a	25.1	10-003-2004[1]
	Annual	Arithmetic Mean	2013 - 2015	n/a	9.7	
NO_2	1-Hour	98th Percentile	2013 - 2015	0.046	86.7	10-003-2004[1]
	Annual	Arithmetic Mean	2013 - 2015	0.012	22.9	
SO_2	1-Hour	99th Percentile	2013 - 2015	0.013	33.8	10-003-2004[1]
	3-hour	H2H	2013 - 2015	n/a	n/a	See note 2
CO	1-Hour	H2H	2013 - 2015	1.62	1,859.3	10-003-2004[1]
	8-Hour	H2H	2013 - 2015	1.30	1,489.3	
O_3	1-Hour	H2H	2013 - 2015	0.10	188.5	10-003-2004[1]
	8-Hour	4H	2013 - 2015	0.069	135.5	
Lead	3-Month	n/a	2013 - 2015	n/a	n/a	See note 2

1. Corner of Martin Luthur King Boulevard and Justison Street, Wilmington, DE
2. Representative data are not available.

H2H = High 2nd High
4H = 4th High
ppm = parts per million
µg/m³ = micrograms per cubic meter
Source: USEPA AIRDATA database (USEPA, 2016).

Prevention of Significant Deterioration

PSD applies to the construction of new major stationary sources of air pollutants and major modifications to existing stationary sources of air pollutants in attainment areas. PSD is intended to limit the degree to which a major new source or major modification can contribute to the deterioration of air quality. Such sources must not cause or contribute significantly to air quality levels that either exceed PSD increments or violate the NAAQS. Eastern Shore submitted an air quality dispersion model for the Daleville Compressor Station on April 20, 2017. The dispersion model demonstrates that the modifications to Daleville Compressor Station would not exceed the NAAQS.

The emissions threshold for a major stationary source under PSD depends on the facility type. As defined by 40 CFR 52.21(b)(1)(i), a facility is considered to be a major stationary source under PSD if:

- it emits or has the potential to emit (PTE) 250 tons per year (tpy) or more of any

regulated New Source Review (NSR) pollutant, or

- it is in one of the 28 source categories listed in 40 CFR 52.21(b)(1)(i)(a) and emits or has the PTE 100 tpy or more of any regulated NSR pollutant.

As defined by 40 CFR 52.21(b)(2), a major modification is any physical change or change in the method of operation of a major stationary source that would result in a significant net emissions increase of a regulated NSR pollutant.

Fugitive emissions are not counted toward the major source or major modification thresholds unless the source in question is included in one of the 28 listed source categories.

The installation of a new natural gas-fired compressor unit at the Daleville Compressor Station is the only portion of the Project which would require an air permit. The Daleville Compressor Station operates as a synthetic minor source under State Only Operating Permit No. 15-00041. A synthetic minor source is an air pollution source whose PTE (without an enforceable limit) equals or exceeds a major source threshold, but has accepted federally enforceable limitations to keep the emissions less than such threshold. A modification to an existing minor source is a major modification only if the modification is a major source by itself. The applicable major source thresholds under federal PSD and NNSR are summarized below. The proposed Project emissions, summarized below, are less than the applicable major source thresholds. The Daleville Compressor Station would remain a minor source under PSD.

Under the federal PSD program, certain areas such as national parks, national wilderness areas, national monuments, and national seashores are designated as Class 1 areas, where the minimum amount of air quality degradation is allowable. The USEPA typically requires the applicant for a proposed project that is subject to PSD to consult the Federal Land Manager of any designated Class 1 located within a 100 to 200 km radius of the proposed PSD source. The Brigantine Wildlife Refuge in New Jersey, the nearest Class I area, is located approximately 155 km to the east of the Daleville Compressor Station. Because the proposed emissions at the Daleville Compressor Station would be below the PSD thresholds and the station is more than 100 km from the nearest Class I area, the compressor station would not be required to demonstrate compliance with the PSD Class I increments.

Table 24. Comparison of Daleville Compressor Station Potential Emissions to Major Source Thresholds

Pollutant	Major Source Thresholds (tpy)			Proposed Emissions (tpy)	
	PSD	NNSR	Title V	Project[4]	Station
NO_x	250	25[1] / 100[2]	25[1]	7.13	24.90
CO	250	N/A	N/A	2.19	8.98
VOC	N/A	25[1]	25[1]	0.71	5.10
SO_2	250	100[2]	100	0.03	0.09
PM_{10}	250	N/A	100	0.48	1.70
$PM_{2.5}$	N/A	100	100	0.48	1.70
Lead	250	N/A	10	0.00	0.00
Single HAP	N/A	N/A	10	0.31	1.32
Total HAPs	N/A	N/A	25	1.24	4.60
Greenhouse Gas (GHG) as CO_2e	100,000[3]	N/A	100,000[3]	5,624	19,862

1. O_3 precursor
2. $PM_{2.5}$ precursor
3. Applies only if a major source threshold is equaled or exceeded for another regulated pollutant.
4. One Caterpillar G3612 compressor unit (8,760 full power operating hours).

VOC = volatile organic compound

Nonattainment New Source Review (NNSR)

NNSR pertains to the construction of new major stationary sources of air pollutants and major modifications to existing stationary sources of air pollutants in nonattainment areas. It applies to pollutants (and their precursors) that are classified as nonattainment. NNSR is intended to help ensure that areas which have not attained compliance with the NAAQS with respect to one or more criteria pollutants do so within prescribed time frames. Sources that trigger NNSR are subject to a variety of requirements, including the need to apply control technologies capable of achieving the Lowest Achievable Emission Rate and the need to obtain emissions offsets.

As is discussed above, the Daleville Compressor Station is in a maintenance area for the 8-hour O_3 NAAQS (2008 standard). Chester County was designated as a severe nonattainment area for the 1-hour O_3 NAAQS, which has since been revoked. Nevertheless, anti-backsliding requirements, which are intended to prevent degradation of air quality in nonattainment areas after a NAAQS has been revoked, apply in Chester County, and the NNSR threshold for O_3 precursors, NO_x and volatile organic compounds (VOC), are each 25 tpy. The upgraded Daleville Compressor Station would remain a minor source under NNSR because its emission caps are less than this threshold.

Title V Operating Permit

The Title V Permit Program, as described in 40 CFR 70, requires major sources of air emissions and certain affected non-major sources to obtain federal operating permits. The modified Daleville Compressor Station's potential emissions would remain below the Title V major source threshold.

New Source Performance Standards

New Source Performance Standards which apply to new, modified, and reconstructed facilities in specific source categories are contained in 40 CFR 60.

40 CFR Part 60, Subpart A – General Provisions

The new compressor unit would be subject to the New Source Performance Standards general provisions in 40 CFR Part 60 Subpart A. These include the requirements for notification, record keeping, and performance testing contained in 40 CFR 60.7 and 60.8.

40 CFR Part 60, Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

Subpart JJJJ applies to manufacturers, owners, and operators of certain categories of stationary spark ignition internal combustion engines. As a non-emergency natural gas-fired lean-burn such stationary engine constructed after June 12, 2006, and manufactured on or after July 1, 2007, the new compressor unit must meet the following emission standards:

- 1.0 grams per horsepower hour (g/hp-hr) of NO_x
- 2.0 g/hp-hr of CO
- 0.7 g/hp-hr of VOC

To meet these limits the new compressor unit would be equipped with the following:

- Caterpillar's Advanced Digital Engine Management (ADEM™) III, or a similar advanced electronic control system
- An oxidation catalyst that would reduce CO, VOC, and formaldehyde emissions by 93 percent, 80 percent, and 89 percent, respectively

Implementation of these measure would be enforced by PADEP in accordance with air permit requirements.

Subpart OOOOa – Oil and Natural Gas Sector: Emission Standards for New and Modified Sources

On June 3, 2016, the USEPA published final amendments to Subpart OOOO and the new Subpart OOOOa regulations in the Federal Register. The amendments, which are currently in effect, add standards for GHG as CH_4 as a regulated pollutant under these subparts. Subpart OOOOa requires leak detection and reporting (LDAR) for new compressor stations and existing compressor stations where a new compressor is added or one or more compressors are replaced with compressors with greater power output. At such a new or modified compressor station, Subpart OOOOa requires quarterly LDAR testing of VOC and CH4 emissions from both new and existing compressors, equipment, and pneumatic controllers. Therefore, a LDAR program would be required at the Daleville Compressor Station.

Implementation of these measure would be enforced by PADEP in accordance with air permit requirements.

National Emission Standards for Hazardous Air Pollutants

National Emission Standards for HAPs are set by the USEPA and codified at 40 CFR 61 and 63. These standards establish technology-based Maximum Achievable Control Technology emissions standards for specified source categories. Sources with potential emissions equal to or greater than 10 tpy of any single HAP or 25 tpy total HAPs are "major sources." Sources with potential emissions less than the major source thresholds are called "area sources." None of the Project's facilities have the PTE more than 10 tpy of any single HAP or 25 tpy total HAPs. Therefore, all Project facilities are area (not major) sources of HAPs.

40 C.F.R. 63 Subpart ZZZZ - National Emissions Standards for Hazardous Air Pollutants for Stationary RICE

Subpart ZZZZ establishes emission limitations and operating limitations for HAPs emitted from stationary RICE located at major and area sources of HAP emissions. The Daleville Compressor Station is and would remain an area source of HAPs. 40 CFR 63.6590(c) states that a new or reconstructed stationary RICE located at an area source of HAPs must comply with Subpart ZZZZ by complying with 40 CFR Part 60, Subpart IIII or JJJJ, as applicable. No further requirements apply for such engines under 40 CFR 63. The new compressor unit must comply with Subpart ZZZZ by complying with 40 CFR Part 60, Subpart JJJJ, as described above.

Greenhouse Gas Reporting

On November 8, 2010, the USEPA finalized GHG reporting requirements under 40 CFR 98. Subpart W requires petroleum and natural gas facilities with annual actual GHG emissions equal to or greater than 25,000 metric tons of CO_{2e} to report GHGs from various processes within the facility. Eastern Shore must report GHG emissions as required if any of its facilities emits more than 25,000 metric tons of CO_{2e} in a year.

Predicted annual GHG operational emissions, broken down by Project facility, are provided in tables 27 (vented and fugitive natural gas emissions) and 28 (combustion emissions). The Project's predicted annual GHG operational emissions are 42,313 tpy (38,386 metric tons per year) of CO_2e. An estimated 1.2 million metric tonnes of CO_2e annually would be attributable to the downstream impacts from the proposed Project, assuming that all of the natural gas attributed to the 2017 Expansion Project is combusted.

Chemical Accident Prevention Provisions

40 CFR 68 is designed to prevent the accidental release of hazardous substances and minimize the impacts if releases occur. The regulation includes lists of hazardous substances and threshold quantities. If a facility stores, handles, or processes a listed substance in an amount equal to or greater than its threshold quantity, the facility must prepare and submit a Risk Management Plan. If a facility does not have a listed substance onsite, or the quantity of a listed substance is below the applicability threshold, the facility is not required to prepare a Risk Management Plan. However, it must still comply with requirements of the general duty clause if it has any regulated substance or other extremely hazardous substance onsite

With the exception of natural gas constituents, no regulated substance would be handled or stored in quantities greater than an applicable threshold quantity. A natural gas pipeline is not required to have a Risk Management Plan if it is regulated by the USDOT or an equivalent state natural gas program certified by the USDOT in accordance with 49 CFR 6010.5. The USDOT's Pipeline and Hazardous Materials Safety Administration (PHMSA), acting through the Office of Pipeline Safety, inspects and enforces the pipeline safety regulations for interstate gas pipeline operators in Pennsylvania (USDOT, 2016). Consequently, a Risk Management Plan is not required for the Project. Eastern Shore must comply with the general duty clause.

General Conformity

The General Conformity Rule requires that the federal government not engage, support, or provide financial assistance for licensing or permitting, or approve any activity not conforming to an approved CAA implementation plan. This rule is codified in Title 40 CFR Part 51, Subpart W and Part 93, Subpart B, Determining Conformity of General Federal Actions to State or Federal Implementation Plans. A conformity determination must be conducted by the lead federal agency if a federal action is likely to result in direct and indirect emissions that would exceed the conformity threshold (de minimis) levels for pollutant(s) and their precursors in a nonattainment or maintenance area. According to the conformity regulations, emissions from sources that are subject to any NNSR or PSD permitting/licensing (major or minor) are exempt and are deemed to have conformed.

Section 176(c)(1) states that a federal agency cannot approve or support any activity that does not conform to an approved State Implementation Plan. Conforming activities or actions should not:

- cause or contribute to new violations of the NAAQS in any area;
- increase the frequency or severity of any existing violation of any NAAQS; or
- delay timely attainment of any NAAQS or interim emission reductions.

Table 25 below provides a summary of the counties in which Project facilities would be situated and O_3 and $PM_{2.5}$ maintenance areas in which these counties are located.

Table 25. Maintenance Areas Impacted by Project Construction

County, State	O_3 Maintenance Area	$PM_{2.5}$ Maintenance Area
Lancaster County, PA	Lancaster, PA Intrastate	Lancaster, PA Intrastate
Chester County, PA	Philadelphia-Wilmington-Atlantic City PA-NJ-MD-DE Interstate	Philadelphia-Wilmington PA-NJ-DE Interstate
Cecil County, MD	Philadelphia-Wilmington-Atlantic City PA-NJ-MD-DE Interstate	Not applicable (Attainment Area)
New Castle County, DE	Philadelphia-Wilmington-Atlantic City PA-NJ-MD-DE Interstate	Philadelphia-Wilmington PA-NJ-DE Interstate
Sussex County, DE	Seaford, DE Intrastate	Not applicable (Attainment Area)

Since parts of the Project would be located in O_3 and $PM_{2.5}$ maintenance areas, we evaluated the criteria pollutant emissions expected to be generated during construction of the Project against their General Conformity de minimis thresholds. The de minimis emission rates in an O_3 maintenance area located in the OTR are 100 and 50 tpy of NO_x and VOC, respectively. The de minimis emission rates in a $PM_{2.5}$ maintenance area are 100 tpy of direct $PM_{2.5}$ emissions and 100 tpy each for certain precursors (SO_2, VOC, and NO_x).

The estimated construction emissions for the Project are shown in table 26, below. Since these estimates are less the applicable General Conformity thresholds, a General Conformity Determination is not required.

Table 26. Construction Emissions by Maintenance and Attainment Areas

Area	Emissions (tpy)							
	NO_x	SO_2	CO	PM_{10}	$PM_{2.5}$	VOC	CO_2e	Total HAPs
O_3 Maintenance Areas[1]								
Lancaster, PA Intrastate	0.86	-	-	-	-	0.10	-	-
Philadelphia-Wilmington-Atlantic City PA-NJ-MD-DE Interstate	27.91	-	-	-	-	2.80	-	-
Seaford, DE Intrastate	13.92	-	-	-	-	1.38	-	-
$PM_{2.5}$ Maintenance Areas[2]								
Lancaster, PA Intrastate	Note 3	2.1E-3	-	-	0.08	Note 3	-	-
Philadelphia-Wilmington PA-NJ-DE Interstate	Note 4	0.03	-	-	4.19	Note 4	-	-
Attainment Areas		0.04	19.84	73.82	5.90	-	9,073	0.18
Project Total	42.69	0.07	19.84	73.82	10.17	4.28	9,073	0.18

1. The *de minimis* emission rates are 100 and 50 tpy of NO_x and VOC, respectively.
2. The *de minimis* emission rates are 100 tpy of direct $PM_{2.5}$ emissions and 100 tpy each for certain precursors [i.e., SO_2, VOC (if determined to be a significant precursor), NO_x (if determined to be a significant precursor), and ammonia].
3. Included in the Lancaster, PA Intrastate Maintenance Area.
4. Included in Philadelphia-Wilmington-Atlantic City PA-NJ-MD-DE Interstate Maintenance Area.

State Requirements

Since the Project would not include any new stationary sources of air emissions in Maryland or Delaware, it would not be subject to these states' air permitting requirements. However, a Plan Approval must be obtained from PADEP prior to installation of the proposed new Caterpillar G3612 RICE, COMP-5, at the Daleville Compressor Station.

(1) Pennsylvania Air Quality Regulations

Plan Approval

Prior to constructing, modifying, or operating a source, emissions unit or equipment that emits air contaminants in Pennsylvania, the owner/operator must obtain a pre-construction permit authorization known as a Plan Approval. 25 Pa. Code Chapter 127 Subchapter B specifies the requirements and procedures for obtaining a Plan Approval. On December 14, 2016, Eastern Shore submitted an application to PADEP for an Air Plan Approval to install the new compressor unit at the Daleville Compressor Station. The PADEP issued the Air Plan Approval for the compressor station on April 13, 2017.

Particulate Matter Emissions

Limits on the PM emissions from combustion units are established in 25 Pa. Code §123.11(a). For combustion units with a maximum heat input greater than 2.5 but less than 50 million British thermal units per hour, the emission limit is 0.4 pound per million British thermal units (lb/MMBtu). The rated heat input of the new compressor unit is within the aforementioned range. Eastern Shore has provided emission calculations which show that its expected PM emission rate is 0.00999 lb/MMBtu, which is much less than the limit.

SO_2 Emissions

Chester County is located in the outer zone of the Southeast Pennsylvania air basin. 25 Pa. Code §123.22(e) limits SO_2 emissions from this area to 1.2 lb/MMBtu. Since the new compressor unit would fire only pipeline natural gas, it would emit SO_2 at a rate much less than this prescribed limit.

(2) Maryland Air Quality Regulations

Nuisance and Odor

Code of Maryland Regulations 26.11.06.08 prohibits the operation of an installation or premises in a manner that creates a nuisance. Code of Maryland Regulations 26.11.06.09 prohibits the discharge into the atmosphere of gases, vapors, or odors beyond the property line in a manner that creates a nuisance or air pollution. We expect that Eastern Shore would operate its Maryland facilities in accordance with this regulation.

(3) Delaware Air Quality Regulations

Particulate Emissions from Construction

Requirements on the use of watering or other dust control methods during grading, land clearing, excavation and use of non-paved roads are provided in 7 DE Admin. Code Section 1106.3. Further details on Eastern Shore's proposed fugitive dust mitigation measures are described below.

Air Quality Impacts

(4) Construction

Construction Emission Estimates

Eastern Shore anticipates starting Project construction in June 2017 and finishing in December 2017. Air quality impacts associated with construction of the Project would

include engine emissions from construction equipment and fugitive dust generated by construction activities or resulting from wind erosion of disturbed areas. No open burning of any brush, slash, or any materials will result from construction activities.

The construction equipment and other vehicles that would be used during construction would be powered by diesel or gasoline engines and emit criteria pollutants, HAPs, and GHGs. Eastern Shore provided detailed construction emission calculations in the Project's Resource Report 9 submittal. Emission estimates for on-road construction vehicle engines based on emission factors in grams per vehicle mile traveled for on-road vehicles for NO_x, CO, PM_{10}, $PM_{2.5}$, SO_2, VOCs, CO_2 and CO_{2e} were obtained from the USEPA's Motor Vehicle Emission Simulator (MOVES, 2014). Emission estimates for off-road construction equipment engines were based on the equipment that is expected to be used (number, type, capacity, and level of activity).

Emission factors in g/hp-hr for NO_x, CO, PM_{10}, $PM_{2.5}$, SO_2, VOC, and CO_2 for nonroad equipment engines were obtained using USEPA's NONROAD model (NONROAD, 2008a). NONROAD was run to obtain annual average emission factors for Pennsylvania, Maryland, and Delaware. Emission factors in grams per gallon or liter of fuel for CH_4 and N_2O were obtained from the 2016 Climate Registry Default Emission Factors (The Climate Registry, 2016), and apportioned based on CO_2 emissions.

Fugitive dust would result from land disturbances during construction and wind erosion of the disturbed areas prior to their full revegetation. These emissions were estimated using methods described in the Western Regional Air Partnership Fugitive Dust Handbook (Western Governors' Association, 2006).

Estimated emissions from construction are provided in table 27. These emissions are not expected to cause, or significantly contribute, to a violation of any applicable ambient air quality standard. The emissions would be limited to the immediate vicinity of the Project area and would be short-term.

Mitigation

We expect that the impacts of these emissions on air quality would be minor. Construction emissions would be intermittent, temporary, and local. The amount of fugitive dust generated would be a function of construction activities, soil type, moisture content, wind speed, frequency of precipitation, vehicle traffic, vehicle types, and roadway characteristics.

Table 27. Construction Emissions by County								
County and Construction Activity	**Estimated Construction Emissions (tpy)**							
	NO_x	**SO_2**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**VOC**	**CO_2e**	**Total HAPs**
Lancaster Co.								
Commuter transit	0.07	3.2E-04	0.39	1.8E-03	1.7E-03	9.2E-03	46	2.3E-03
On-road vehicles	0.04	8.5E-05	8.1E-03	1.2E-03	1.1E-03	1.4E-03	10	2.7E-04
Off-road equipment	0.76	1.6E-03	0.32	0.07	0.07	0.09	216	4.7E-03
Open burning								
Fugitive dust				0.13	0.01			
Subtotal	0.86	2.1E-03	0.72	0.20	0.08	0.10	272	7.3E-03
Chester Co.								
Commuter transit	0.19	9.4E-04	1.12	5.3E-03	4.8E-03	0.03	134	6.6E-03
On-road vehicles	0.21	5.5E-04	0.42	5.7E-03	5.3E-03	0.01	68	5.8E-03
Off-road equipment	8.38	0.02	3.87	0.63	0.63	1.06	2,132	0.04
Open burning								
Fugitive dust				30.18	3.17			
Subtotal	8.78	0.02	5.42	30.82	3.81	1.10	2,334	0.06
Cecil Co.								
Commuter transit	0.10	4.7E-04	0.55	2.6E-03	2.3E-03	0.01	67	3.2E-03
On-road vehicles	0.05	1.2E-04	0.01	1.7E-03	1.5E-03	2.0E-03	14	4.0E-04
Off-road equipment	7.00	0.01	2.92	0.50	0.50	0.77	1,773	0.04
Open burning								
Fugitive dust				15.51	1.66			
Subtotal	7.15	0.01	3.47	16.02	2.17	0.78	1,854	0.04
New Castle Co.								
Commuter transit	0.03	1.4E-04	0.17	7.9E-04	7.2E-04	4.0E-03	21	9.8E-04
On-road vehicles	0.07	1.6E-04	0.02	2.2E-03	2.0E-03	2.6E-03	18	5.2E-04
Off-road equipment	3.28	6.5E-03	1.37	0.25	0.25	0.37	860	0.02
Open burning								
Fugitive dust								
Subtotal	3.37	6.8E-03	1.55	0.26	0.26	0.38	899	0.02
Kent Co.								
Commuter transit	0.10	4.7E-04	0.54	2.6E-03	2.3E-03	0.01	67	3.2E-03
On-road vehicles	0.05	1.2E-04	0.01	1.7E-03	1.5E-03	2.0E-03	14	4.0E-04
Off-road equipment	5.83	0.01	2.61	0.45	0.45	0.68	1,657	0.03
Open burning								
Fugitive dust								
Subtotal	5.98	0.01	3.17	0.46	0.46	0.70	1,738	0.04
Sussex Co.								
Commuter transit	0.29	1.4E-03	1.63	7.7E-03	7.0E-03	0.04	201	3.2E-04
On-road vehicles	0.16	3.7E-04	0.04	5.0E-03	4.6E-03	6.0E-03	42	1.7E-04
Off-road equipment	19.72	0.03	6.58	1.14	1.14	1.77	3,447	0.06
Open burning								

Table 27. Construction Emissions by County								
County and Construction Activity	**Estimated Construction Emissions (tpy)**							
	NO_x	**SO_2**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**VOC**	**CO_2e**	**Total HAPs**
Fugitive dust				25.32	2.66			
Subtotal	20.16	0.03	8.25	26.48	3.81	1.81	3,689	0.06
Project Total	**46.30**	**0.08**	**22.57**	**74.23**	**10.58**	**4.87**	**10,786**	**0.22**

Eastern Shore has committed to the following mitigation measures:

- Low-sulfur fuels would be used.
- The construction equipment would comply with USEPA mobile source emissions performance standards and would be properly maintained in accordance with manufacturer guidance and industry best practices. Equipment would be operated on an as-needed basis, primarily during daylight hours.
- Fugitive dust emissions would be mitigated by minimizing the extent of the areas disturbed, application of dust suppressants, rinsing construction vehicles before they leave the work site, constructing and maintaining construction entrances to minimize transport of soil and mud to paved roads, and avoiding excessive vehicle speeds on unpaved roads. All areas disturbed by construction would be stabilized in accordance with the FERC Plan.

Eastern Shore would maintain at least 25 feet of separation will be maintained between residences and construction areas, where possible. Where this is not possible, at a minimum, the Eastern Shore would implement the following:

- Construction would be planned so as to minimize the extent and duration of disturbance within 25 feet of residences.
- Prior to the start of construction, notice would be provided by phone or in person to any affected landowners.
- Fugitive dust production would be minimized by the use of dust suppression techniques such as water sprays.
- Affected areas would be revegetated as soon as practicable.

While the measures described above would help control fugitive dust, we conclude that more detail is necessary given that the Project includes components in $PM_{2.5}$ non-attainment areas, and because the Project would 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:**

- **<u>Prior to construction of the Project</u>, Eastern Shore should file with the Secretary, for review and approval by the Director of OEP, a Fugitive Dust Control Plan. The plan should specify the precautions that Eastern Shore would take to minimize fugitive dust emissions from construction activities, including additional mitigation measures to control fugitive dust emissions of $PM_{2.5}$. 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 Project are complete, 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.

(5) Operation

The Project's operational emissions would include fugitive and vented natural gas releases and combustion emissions.

Natural Gas Releases

Natural gas releases included fugitive and vented emissions. Fugitive emissions are defined as those emissions which do not pass through a stack, vent, or other

functionally equivalent opening, and include natural gas leaks from valves, flanges, pumps, compressors, seals, connections, etc. Vented emissions are defined as those emissions which pass through a stack, vent, or equivalent opening. A compressor may be vented for startup, shutdown, maintenance, or for protection of gas seals from contamination. Natural gas is also vented during compressor startups. Portions of a compressor station or the entire station may be blown down (i.e., vented) for testing, maintenance, or in the event of an emergency.

The proposed new compressor unit would consist of a new Ariel KBZ/4 reciprocating gas compressor frame and pipeline cylinders driven by a natural gas-fired Caterpillar G3612 reciprocating internal combustion engine.

The Daleville Compressor Station is equipped with two blowdown vents, each fitted with a stack silencer, restriction orifice plate in the blowdown pipe, and a gas-to close automated valve.

Eastern Shore provided detailed operational emission calculations for fugitive and vented gas releases from Project facilities in the Project's Resource Report 9 submittal. These are based on a methodology described in natural gas industry guidelines (Interstate Natural Gas Association of America, 2005) and are summarized in table 28 below.

Table 28. Fugitive and Vented Natural Gas Release Emissions

County	Tons per Year				
	CO_2	CH_4	CO_2e	VOC	Total HAPs
Honey Brook M&R	0.25	46.2	1,156	0.52	0.05
Daleville Compressor Station	3.85	721.1	18,032	8.14	0.82
Parkesburg Loop	0.02	4.4	111	0.05	5.0E-03
Jennersville Loop	0.03	6.2	155	0.07	7.0E-03
Fair Hill Loop	0.03	6.0	150	0.07	6.8E-03
Summit Loop	4.7E-03	0.9	22	1.0E-02	1.0E-03
Hearns Pond Loop	7.1E-03	1.3	33	0.01	1.5E-03
Seaford -Millsboro Connector	0.08	15.0	376	0.17	0.02
Laurel Loop	0.02	4.2	106	0.05	4.8E-03
Millsboro Pressure Control Station	0.25	46.2	1,156	0.52	0.05
Delmar Pressure Control Station	0.25	46.2	1,156	0.52	0.05
Project Total	**5.06**	**949.5**	**23,742**	**10.72**	**1.08**

Combustion Emissions

Combustion of natural gas in the new compressor engine, COMP-5, would result in emissions of criteria pollutants, GHG, and HAPs. Eastern Shore provided detailed combustion emissions in the Project's Resource Report 9. These include emission

estimates for both the proposed new and existing equipment, and account for the emission caps contained in the Daleville Compressor Station operating procedure. These emissions are summarized in table 29 below.

Table 29. Daleville Compressor Station Maximum Short-Term Emissions

Emissions in Pounds per Hour (lbs/hr)									
Emissions Unit	**NO_x**	**CO**	**VOC**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**Total HAP**	**Single HAP[1]**	**GHG as CO_2e**
COMP-1	2.57	0.64	0.42	0.126	0.126	0.0071	0.34	0.10	1,480
COMP-2	2.57	0.64	0.42	0.126	0.126	0.0071	0.34	0.10	1,480
COMP-3	1.96	0.75	0.49	0.134	0.134	0.0075	0.37	0.11	1,569
COMP-4	1.96	0.75	0.49	0.134	0.134	0.0075	0.37	0.11	1,569
GEN-1	12.52	0.63	0.41	0.029	0.029	0.0016	0.21	0.15	336
COMP-5	4.13	1.27	0.41	0.278	0.278	0.0155	0.72	0.18	3,259

1. Formaldehyde

Table 30. Daleville Compressor Station Potential to Emit

Emissions Unit (tons per year)	NO_x	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	Total HAP	Single HAP[1]	GHG as CO_2e
COMP-1	9.63	2.41	1.57	0.47	0.47	0.026	1.28	0.36	5,546
COMP-2	9.63	2.41	1.57	0.47	0.47	0.026	1.28	0.36	5,546
COMP-3	8.57	3.30	2.16	0.59	0.59	0.033	1.63	0.49	6,872
COMP-4	8.57	3.30	2.16	0.59	0.59	0.033	1.63	0.49	6,872
GEN-1	0.63	0.032	0.020	0.0014	0.0014	0.0001	0.010	0.0076	17
COMP-5	7.13	2.19	0.71	0.48	0.48	0.027	1.24	0.31	5,624
Station Cap	24.90	70.00	16.00	-	-	-	25.00	10.00	-

1. Formaldehyde

Mitigation

Eastern Shore would be required to conduct quarterly LDAR testing of VOC and CH4 emissions from new and existing compressors, equipment, and pneumatic controllers as prescribed by 40 CFR Part 60, Subpart OOOOa. If any equipment is found to leak natural gas abnormally, it would be repaired promptly. These obligations would be included as one or more enforceable conditions in the Daleville Compressor Station

operating permitted. The frequency and extent of natural gas venting would be minimized to the extent practical.

The new compressor unit would be equipped with Caterpillar's ADEM™ III, or a similar advanced electronic control system. The unit would also be equipped with an exhaust silencer and an oxidation catalyst that would reduce CO, VOC, and formaldehyde emissions by 93 percent, 80 percent, and 89 percent, respectively. The engine would combust only clean-burning natural gas, and would be maintained in accordance with the manufacturer's specifications. Implementation of these measure would be enforced by PADEP in accordance with air permit requirements.

Potential impacts on air quality associated with construction and operation of the Project would be minimized by strict adherence to all applicable federal and state regulations. Based on the analyses presented above, we conclude that operation of the proposed facilities would not have a significant impact on regional air quality.

6.2. Noise

Construction of Project facilities and operation of the modified compressor station, modified meter station and proposed pressure control stations may affect overall noise levels in the Project areas. The land use in the Project areas is rural residences and agricultural lands, and the terrain consists of level to gently rolling hills.

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 Project 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[15] 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

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

equivalent to a continuous L_{eq} noise level of 48.6 dBA. A person's threshold for perception of a change in noise is considered to be 3 dB.

The USEPA 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, as well as parks and recreational areas (for example, wilderness areas) valued specifically for their solitude and tranquility.

There are no Chester, Lancaster, Cecil, or Sussex County noise ordinances applicable to construction or operation of the Project facilities. Title 7 of the DE Admin Code 1149 and New Castle County Ordinance, Section 22.02.008 prohibits most commercial construction between 9:00 p.m. and 7:00 a.m. on weekdays and between 10:00 p.m. and 9:00 a.m. on weekends and legal holidays. Title 26 of the Code of Maryland Regulations Subtitle 2 Chapter 3 - Control of Noise Pollution sets a residential L_{dn} noise standard of 55 dBA.

Construction Impacts and Mitigation

Eastern Shore would require its contractors to incorporate noise mitigation measures into their construction protocols. 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 to the extent practical. 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.

Construction at the Daleville Compressor Station, Honey Brook Meter and Regulation Station, Millsboro Pressure Control Station and Delmar Pressure Control Station would consist of earth work (e.g., site grading, clearing grubbing) and construction of the site foundations and equipment, and it is assumed that the highest level of construction noise would occur during site earth work (i.e., time frame when the largest amount of construction equipment would operate). The analysis indicates that the maximum noise level of construction activities at the nearest NSA would not exceed the following, noting that construction would only occur during daytime hours (table 31).

Table 31. Estimated Peak Construction Noise for Project Facilities	
Project Facility	**(dBA) L_{dn}**
Daleville Compressor Station	66
Honey Brook M&R Station	70
Millsboro Pressure Control Station	77
Delmar Pressure Control Station	55

Eastern Shore has proposed to cross twenty-three waterbodies by the HDD method. 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 are not exposed to excessive noise levels during any potential HDD activities, **we recommend that**:

- **Prior to any HDD construction, 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.**

Construction activities associated with the Project would result in short-term and temporary increases in ambient noise levels. With non-HDD-related construction limited to daytime hours, Eastern Shore's proposed mitigation measures, and our recommendations for the landowner complaint resolution and noise mitigation for any potential HDD activities, we conclude that nearby landowners and NSA receptors would not be significantly affected by construction-related noise associated with the Project.

Operation Impacts and Mitigation

Daleville Compressor Station

The land surrounding the existing Daleville Compressor Station is residential and agricultural. The nearest NSA is 550 feet from the compressors station. In December, 2014, Hoover & Keith, Inc. (H&K) conducted a baseline sound level survey with ambient sound levels for the current station. Only three of the four existing compressor units are simultaneously operated at any time, and one unit is reserved as a spare. The results of this survey and acoustical analysis were used to predict the impact of operation of the proposed new COMP-5 unit. Table 32 summarizes the existing and predicted noise levels at the nearby NSAs for the modified Daleville Compressor Station.

Table 32. Noise Analysis for the Modified Daleville Compressor Station

NSAs	Distance and Direction to Closest NSA (feet)	Calculated L_{dn} of Existing Station at Full Load Operation[1] (dBA)	Estimated L_{dn} of Proposed Compressor Unit[2] at Full Load (dBA)	Total Station L_{dn} (Existing Station + Expansion) at Full Load Operation[3] (dBA)	Potential Increase Above Existing Station Sound Level (dB)
NSA #1 (House)	550 ft. W-NW	44.7	45.8	48.3	3.6
NSA #2 (House)	900 ft. NE	43.3	42.7	46.0	2.7
NSA #3 (House)	700 ft. E-NE	47.4	44.6	49.2	1.8
NSA #4 (House)	1,750 ft. SE	36.4	35.8	39.1	2.7
NSA #5 (House)	1,950 ft. SW	35.3	34.4	37.9	2.6

1 COMP-1, -3, and -4 in operation; COMP-2 assumed to be the spare unit.
2 COMP-5
3 COMP-1, -3, 4, and -5 in operation. COMP-2 assumed to be the spare unit.

As shown in the preceding table 32, the estimated noise attributable to the modified Daleville Compressor Station would be well below the FERC criteria of an L_{dn} of 55 dBA at the nearest NSA. 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 3.6 dB, and therefore, the noise increase would be noticeable at the nearest NSA.

Eastern Shore would implement noise control measures for the proposed compressor unit such as, but not limited to, an acoustically designed compressor building,

low noise engine exhaust silencer, and low noise air inlet silencer. In addition to the noise mitigation measures outlined above, Eastern Shore intends to install a unit blowdown silencer for the proposed compressor unit at the Daleville Compressor Station, and estimates that the initial sound for a blowdown event would be 43 dBA at NSA #1.

To ensure that the noise attributable to operation of the modified station would not exceed an L_{dn} of 55 dBA at the nearby NSAs, **we recommend that**:

- **Eastern Shore should file a noise survey with the Secretary no later than 60 days after placing the modified Daleville 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 Daleville 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 should 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.**

Honey Brook Meter and Regulation Station

The land surrounding the existing Honey Brook Station is residential and agricultural. The nearest NSA is 350 feet from the existing Station. On October 12-13, 2016, H&K conducted a baseline sound level survey with ambient sound levels for the current Station. Table 33 summarizes the existing and predicted noise levels at the nearby NSAs for the modified Honey Brook Meter and Regulation Station.

Because the proposed modifications to the existing Honey Brook Station are minor (i.e., installation of new lateral piping), the sound level contribution of the modified Honey Brook Station is anticipated to not change, and there would be no increase in sound levels for the planned minor modifications.

Table 33. Noise Analysis for the Modified Honey Brook Station

NSAs	Distance and Direction to Closest NSA	Measured L_{dn} Sound Level (dBA) [1]	Estimated L_{dn} of Existing M&R Station (dBA) [2]	Estimated L_{dn} of Modified M&R Station (dBA)	Increase Above Existing M&R Station (dBA)
NSA #1 (Houses)	350 ft. NW to N-NE	55.6	55.6	55.6	0
NSA #2 (Houses)	750 ft. NE	45.1	47.7	47.7	0
NSA #3 (Houses)	900 ft. W	45.9	45.7	45.7	0
NSA #4 (House)	1,150 ft. S	41.7	42.8	42.8	0

[1] The existing Station was the dominant sound source at NSA #1. The existing Station was not audible at NSA #2 thru NSA #4.

[2] The existing Station sound level contribution for NSA #2 thru NSA #4 has been calculated from the existing sound level contribution of the Station at NSA #1.

Millsboro Pressure Control Station

The land surrounding the proposed Millsboro Pressure Control Station is residential and agricultural, and an existing Eastern Shore Meter Station is adjacent to the proposed Station. The nearest NSA is 150 feet from the proposed Millsboro Pressure Control Station. On October 13, 2016, H&K conducted a baseline sound level survey with ambient sound levels for the existing meter station. Table 34 summarizes the existing and predicted noise levels at the nearby NSAs for the proposed Millsboro Pressure Control Station.

Table 34. Noise Analysis for the Proposed Millsboro Pressure Control Station

NSAs	Distance and Direction to Closest NSA	Measured L_{dn} (dBA)	Measured L_{dn} (dBA)	Calculated Ambient L_{dn} (dBA)	Estimated L_{dn} of Station at Full Capacity (dBA)	Total L_{dn} Station plus Ambient (dBA)	Potential Increase Above Ambient (dBA)
NSA #1 (House)	150 ft. NW	45.7	43.8	50.5	52.6	54.7	4.2
NSA #2 (Houses)	600 ft. E to NE	46.9	48.6	54.8	39.4	55.0	0.4
NSA #3 (Houses)	2,050 ft. W-SW	44.6	47.8	53.9	25.5	53.9	0.0

As shown in table 34, the estimated noise attributable to the proposed Millsboro Pressure Control Station would be below the FERC criteria of an L_{dn} of 55 dBA at the nearest NSA. 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 4.2 dB, and therefore, the noise increase would be noticeable at the nearest NSA. To ensure that the noise attributable to operation of the proposed Millsboro Pressure Control Station would not exceed an L_{dn} of 55 dBA at the nearby NSAs, **we recommend that**:

- **Eastern Shore should file a noise survey with the Secretary no later than 60 days after placing the Millsboro Pressure Control Station in service. If the total noise attributable to the Millsboro Pressure Control Station exceeds an L_{dn} of 55 dBA at any NSA, Eastern Shore should file a report on what changes are needed and should install the additional noise controls to meet the level within 1 year of the in-service date. 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.**

Delmar Pressure Control Station

The land surrounding the proposed Delmar Pressure Control Station is commercial, residential, and agricultural. The nearest NSA is 1,050 feet from the proposed station. On October 13, 2016, H&K conducted a baseline sound level survey with ambient sound levels for the proposed station. Table 35 summarizes the existing ambient noise levels at the nearby NSAs for the proposed Delmar Pressure Control Station.

Table 35. Noise Analysis for the Proposed Delmar Pressure Control Station

NSAs	Distance and Direction to Closest NSA	Meas'd L_d (dBA	Meas'd L_n (dBA)	Calc'd Ambient L_{dn} (dBA)	Est'd L_{dn} of Station at Full Capacity (dBA)	Total L_{dn} (Station + Ambient) (dBA)	Potential Increase Above Ambient (dBA)
NSA #1 (House)	1,050 ft. S-SE	46.6	43.8	50.7	43.4	51.5	0.7
NSA #2 (Houses)	2,200 ft. SE	45.5	47.0	53.3	34.7	53.3	0.4

As shown in table 35, the estimated noise attributable to the proposed Delmar Pressure Control Station would be well below the FERC criteria of an L_{dn} of 55 dBA at the nearest NSA. 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 0.7 dB, which would be a minimal noise impact.

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.

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.

This section describes the federal safety regulations for operating pipeline facilities in the United States. The USDOT 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 USDOT is mandated to prescribe minimum safety standards to protect against risks posed by pipeline facilities under 49 USC 601. The USDOT pipeline standards are published in 49 CFR 190-199. Part 192 specifically addresses natural gas pipeline safety issues. 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.

49 USC 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 USDOT's agent to inspect interstate facilities within its boundaries; however, the USDOT is responsible for enforcement actions. Neither Pennsylvania, Maryland, 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 USDOT and the FERC, the USDOT 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 USDOT 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 the USDOT. The Memorandum also provides for referring complaints and inquiries made by state and local governments and the general public involving safety matters related to pipelines under the Commission's jurisdiction.

The FERC also participates as a member of the USDOT'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 2017 Expansion Project must be designed, constructed, operated, and maintained in accordance with the USDOT 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 USDOT specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

The USDOT 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.

All of the pipelines associated with the proposed Project 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 USDOT Pipeline Safety Regulations also 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 USDOT 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 USDOT 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[16] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle[17]; 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. The USDOT regulations specify the requirements for the integrity management plan at Part 192.911.

Because the Project 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 USDOT 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;

[16] 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.

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

- 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 USDOT 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 USDOT requires all operators of natural gas transmission pipelines to notify the USDOT 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
- involve property damage of more than $50,000 (1984 dollars)[18].

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 36 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 36 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.

[18] $50,000 in 1984 dollars is approximately $112,955.73 as of May 2015 (CPI, Bureau of Labor Statistics, 2015).

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 36. Natural Gas Transmission Pipeline Significant Incidents by Cause (1996-2015)

Cause	No. of Incidents	Percentage
Corrosion	311	23.7
Excavation[2]	210	16.0
Pipeline material, weld or equipment failure	357	27.2
Natural force damage	146	11.1
Outside force[3]	84	6.4
Incorrect operation	41	3.1
All other causes[4]	163	12.4
TOTAL	**1,312**	**100**

[1] All data gathered from PHMSA Significant Incident files, March 30, 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.

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 37 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 who were concerned about the consequences of an accident and the perceived 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.

Eastern Shore would comply with all applicable USDOT pipeline safety standards, as well as regular monitoring and testing of the pipeline. While pipeline failures are rare, the potential for pipeline systems to rupture and the risk to nearby residents is discussed below. The service incidents data summarized in table 36 include natural gas transmission system failures of all magnitudes with widely varying consequences. Table 37 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. 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.

The nationwide totals of accidental fatalities from various anthropogenic and natural hazards are listed in tables 38 and 39 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.

Table 37. Outside Forces Incidents by Cause (1996-2015)		
Cause	**No. of Incidents**	**Percent of all Incidents**
Third party excavation damage	172	13.1
Operator excavation damage	25	1.9
Unspecified excavation damage/previous damage	13	1.0
Heavy rain/floods	74	5.6
Earth movement	32	2.1
Lightning/temperature/high winds	27	2.1
Natural force (other)	13	1.0
Vehicle (not engaged with excavation)	49	3.7
Fire/explosion	9	0.7
Previous mechanical damage	6	0.5
Fishing or maritime activity	9	0.7
Intentional damage	1	0.1
Electrical arcing from other equipment/facility	1	0.1
Unspecified/other outside force	9	0.7
TOTAL	438	100
Derived from Excavation, Outside Force, and Natural Force categories in table 35.		

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.

Table 38. 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	0
2015	14	3
[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 39. 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[a]	81
Lightning[a]	49
Tornado[a]	72
Tractor Turnover[b]	62
Natural gas distribution lines[c]	14
Natural gas transmission pipelines[c]	2
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. [a] National Oceanic and Atmospheric Administration's National Weather Service, Office of Climate, Water and Weather Services, 30 year average (1985-2014) http://www.weather.gov/om/hazstats.shtml. [b] Bureau of Labor Statistics, 2007 Census of Occupational Injuries. [c] PHMSA significant incident files, January 14, 2016. http://www.phmsa.dot.gov/pipeline/library/data-stats/pipelineincidenttrends, 20 year average.	

For the portion of the Project where looping is proposed, based on these numbers, we conclude that operation of the Project would represent a slight increase in risk to the nearby public.

8. Cumulative Impacts

In accordance with NEPA and FERC policy, we evaluated the potential for cumulative impacts of the 2017 Expansion Project. Cumulative impacts were assessed for the proposed Project elements when added to other past, present, and reasonably foreseeable future activities.

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; USEPA, 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 Project. 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.

The proposed Project would affect confined corridors within Chester County, Pennsylvania; Cecil County Maryland; and New Castle and Sussex Counties, Delaware. We assessed the potential cumulative effects of the proposed Project with other projects within a geographic scope as defined in table 40. In general, the pipeline loops and compressor station expansion associated with the 2017 Expansion Project 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 component.

To assess cumulative impacts for the 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 municipality crossed by the proposed pipeline routes to obtain information on any planned future developments. Other past, present or future projects that may have a cumulative effect when combined with the proposed 2017 Expansion Project are presented in table 41. The projects that are listed as "active" or "approved" by the county may or may not be under construction concurrent with the proposed Project. No oil and gas development occurs in the counties where the Project is located.

Table 40. Geographic Scope of Analysis for Cumulative Impacts	
Environmental Resource	**Geographic Area**
Soils and Geology	Cumulative impacts on soils and geology would be contained within or adjacent to the construction workspace.
Water Resources and Wetlands	For the Parkesburg, Jennersville, and Fair Hill Loops the geographic scope for cumulative impacts is the West Branch White Clay Creek and Big Elk Creek subwatersheds[1]. As the Project would not directly impact any wetlands or waterbodies in Delaware, cumulative impacts would not result for these resources in Delaware.
Vegetation and Wildlife	For the Parkesburg, Jennersville, and Fair Hill Loops, the geographic scope is the West Branch White Clay Creek and Big Elk Creek subwatersheds[1]. For facilities in Delaware, the geographic scope was defined as a 1-mile radius from the Project.
Cultural Resources	Overlapping impacts on cultural resources would be largely contained within or adjacent to proposed workspaces. Further, the Project would have no adverse impacts on cultural resources, thereby preventing any cumulative impact.
Land Use	A 1-mile radius was used as the geographic area for cumulative land use effects.
Traffic	Same township or concentrated residential area as the Project.
Visual	A distance of 0.25 mile and existing visual access points (e.g., road crossings) was used for cumulative visual impacts.
Noise - Operations	Other facilities that would impact any noise sensitive area (NSA) located within 1 mile of a noise emitting permanent aboveground facility (i.e., the modified Daleville Compressor Station) were considered.
Noise - Construction	A distance of 0.25 mile from pipeline or aboveground facilities construction was considered.
Air Quality – Operation	A geographic area of 50 kilometers from aboveground facilities was considered.
Air Quality – Construction	A geographic area of 0.25 mile from pipeline or aboveground facilities was considered.

Table 40. Geographic Scope of Analysis for Cumulative Impacts	
Environmental Resource	**Geographic Area**
Socioeconomics	The proposed Project would not include any major aboveground facilities, therefore potential impacts on socioeconomics were not considered in the analysis.
Environmental Justice	The proposed Project would not include any major aboveground facilities, therefore potential impacts on Environmental Justice were not considered in the analysis.
[1] Subwatersheds were based on Watersheds of Chester County http://www.chesco.org/DocumentCenter/View/8467.	

Eastern Shore is presently completing two Commission-authorized construction projects in the vicinity of the Project locations (Docket Nos. CP15-18-001 and CP15-498-000), but anticipates their construction to be complete prior to the commencement of construction for the Project. Any future construction proposed by Eastern Shore would be the subject of an NGA Section 7(c) certificate application, and NEPA review, or would be subject to the environmental requirements of the Commission's blanket certificate program 18 CFR 157.206(b). As table 41 indicates, the Chester County pipeline portions of the White Oak Project (Docket No. CP15-18-001) slightly overlap the proposed Parkesburg, Jennersville and Fair Hill Loops and therefore have a potential for cumulative impacts. As Eastern Shore does not expect the timing of active construction to overlap between projects, cumulative impacts would primarily be related to the 2017 Expansion Project constructing in areas previously disturbed by the White Oak Project, which would be undergoing restoration at the time of the start of construction for the 2017 Expansion Project. The compressor station upgrades for the White Oak Project's Delaware City Compressor Station is over 20 miles (32 km) but within 50 km of the proposed Daleville Compressor Station work, so cumulative impacts on air quality is considered.

Geology and Soils

Impacts on soils and geologic features would be highly localized and limited primarily within and adjacent to the project footprints during the period of construction, for example, if erosion or run-off were to migrate off the right-of-way boundaries. As such, cumulative impacts on soils would happen only if other projects are constructed at the same time and place as the proposed facilities, or if the latter project were to re-disturb soils and contribute erosion or related impacts.

Table 41. Projects Occurring in the Vicinity of the 2017 Expansion Project			
Project Name	**Development Category**	**Status**	**Distance from the Project (mile)**
Parkesburg Loop			
ESNG - White Oak Mainline Expansion – Daleville Loop CP15-18-001	Commercial / Utility	Active *July 2016*	0.0
West Bridge Street ID: 14134	Transportation	Approved *July 20, 2016*	0.7
Jennersville Loop			
ESNG - White Oak Mainline Expansion – Daleville Loop CP15-18-001	Commercial / Utility	Active *July 2016*	0.0
ESNG - White Oak Mainline Expansion - Kemblesville Loop CP15-18-001	Commercial / Utility	Active *July 2016*	0.0
Jennersville Farm ID: SD-8-13-8477	Residential	Approved *September 13, 2013*	0.2
Laura B. Bramble ID: SD-3-13-7651	Residential	Active *April 4, 2013*	0.2
Fair Hill Loop			
Franklin Township Salt Storage Building ID: LD-7-14-10165	Commercial / Utility	Active *August 1, 2014*	0.6
Telecommunications Tower	Commercial / Utility	Active *July 27, 2016*	0.7
Telecommunications Tower	Commercial / Utility	Active *July 27, 2016*	0.6
Vineyard Christian Fellowship ID: SD-10-13-8666	Residential	Active *October 18, 2013*	0.8
David P. Callahan ID: SD-8-14-10373	Residential	Active *September, 1, 2014*	0.4
Louise W. Vannoy Family Trust ID: SD-7-13-8297	Residential	Active *August 6, 2013*	0.2
Watkins, Bentley & Chambers ID: 4015	Residential	Approved *September 15, 2015*	0.6
Chippenham Hills ID: 0804011570	Residential	Active *March 1, 2006*	1.0
Newark Baptist Church ID: 0804033442	Residential	Active *January 5, 1989*	0.5
Warburton Estates ID: 0804020847	Residential	Active *October 17, 1989*	0.4
State Line Farm Estates ID: 0804019415	Residential	Active *December 17, 2007*	0.9
Aston Pointe ID: 0804006267	Residential	Active *October 22, 2008*	0.0
Summit Loop			
Summit Bridge Estates ID: 20150181	Residential	Active *March 8, 2016*	0.3

Table 41. Projects Occurring in the Vicinity of the 2017 Expansion Project			
Project Name	**Development Category**	**Status**	**Distance from the Project (mile)**
Summit Circle ID: 20150247	Residential	Active *May 24, 2016*	0.5
Seaford- Millsboro Connector, Laurel Loop, Millsboro and Delmar Pressure Control Stations			
No adjacent projects identified for Sussex County, DE.			
Honeybrook M&R Station			
Ervan L. Stoltzfus ID: 76-22-3	Residential	Active *November 25, 2015*	0.7
John I. Stoltzfus ID: 76-345-1	Residential	Active *July 1, 2016*	1.0

Construction of the Project pipeline loops could disturb the same soils and geologic features undergoing restoration and right-of-way restabilization at the beginning and the end of the White Oak Project Daleville and Kemblesville Loops. Eastern Shore would be required to ensure all disturbed areas are restored properly, which may require additional restoration or stabilization measures for any overlapping work areas.

Impacts on soils from the proposed Project 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 soil erosion prevention and mitigation measures in accordance with county conservation district approved ESC Plans. We conclude that cumulative impacts on geology and soils from the Project and in consideration with other projects would be minor.

Water Resources and Wetlands

Construction and operation of the Project would result in minor and short-term impacts on ground water (including vegetation clearing, excavation of pipeline trench and facility foundations) and on surface waterbodies (including increased sedimentation and turbidity from erosion). Longer term impacts could also occur until adjacent disturbed areas are stabilized through revegetation. Eastern Shore would minimize these effects by implementing specific waterbody construction and mitigation measures, including temporary and permanent erosion controls contained in its ESC Plans, SWPP Plan, SPCC Plan, and HDD Contingency Plan, compliance with our Plan and Procedures, and by complying with applicable federal and state permits requirements.

The projects listed in table 41 are within the defined geographic scope of the Project and could also occur within the same temporal scope meaning a cumulative impact on surface waters could occur from one or more of these projects. For example, the White Oak Project Daleville and Kemblesville loops, and the Jennersville and Fair Hill loops of the 2017 Expansion Project could contribute to cumulative impacts on West

Branch White Clay Creek and Elk Creek. Residential and commercial development within these watersheds may also affect surface waters. These projects would individually result in temporary impacts on groundwater through removal of surface vegetation and soil compaction, and to surface water through linear construction activities across streams and exposed soils resulting in temporary erosion and sedimentation. However, such impacts would be minor, as the activities associated with the White Oak Project are expected to be completed by the time the proposed 2017 Expansion Project would start construction. We anticipate that the 2017 Expansion Project, when combined with the other identified projects, would only have a minor and temporary contribution to an overall minor short-term cumulative impact on ground and surface waters.

Construction and operation of the Project would result in approximately 1.6 acres of wetlands impacted during construction throughout the Project area. This includes approximately 0.7 acre of PFO wetlands that would be cleared during construction but allowed to revert back to preconstruction conditions. Construction of the Daleville and Kemblesville Loops in Chester County, Pennsylvania as part of the White Oak Project is resulting in temporary disturbance of about 1.06 acres of wetland in proximity to the 1.26 acres of wetlands that would be disturbed by the 2017 Expansion Project in Chester County. However, such impacts would be short term and minor, as the activities associated with the White Oak Project are expected to be completed by the time the proposed Project would start construction. Eastern Shore is required to comply with our Procedures for restoration of the White Oak Project, which would be coordinated with the required use of the Procedures for the 2017 Expansion Project. Compliance with our Procedures and the terms and conditions of Eastern Shore's Section 404 and 401 permits would result in only temporary and minor incremental impacts on wetlands.

Likewise, the other project (non-FERC) proponents would be required to comply with any mitigation requirements and permit conditions in their respective authorizations and state permits for wetland impacts. We expect that these projects would take steps to avoid and minimize wetland impacts and to provide required mitigation, resulting in minor impacts on wetlands. As a result, we anticipate that the Project, when combined with these other projects, would only have a cumulative impacts on wetlands.

Vegetation and Wildlife

The construction activities associated with clearing, grading, removal of vegetation, and potential for establishment of invasive plant species occurring during the same time and in the same area can result in cumulative impacts. In addition, changes of these vegetative environments can also cause alteration of wildlife habitat, displacement of wildlife, and other secondary effects such as forest fragmentation. All of the projects above are within the geographic and temporal scope of the Project due to the potential for long- and short-term impacts on mature trees and associated wildlife habitats.

The project area is primarily agricultural, with residential and commercial development and with small clusters of mature trees along roads and between fields. Approximately 96 percent of the 2017 Expansion Project would be within existing rights-of-way, industrial/commercial areas, or on pasture land or tilled agricultural fields and therefore the clearing of forested areas during construction and operation presents the most opportunity for cumulative impact to vegetation and wildlife. The 2017 Expansion Project would result in the clearing of approximately 17 acres of forest during construction, with about 1.3 acres of forest being permanently maintained as open land. The remaining 15.7 acres would be allowed to revert to forest, although this would occur over a period of more than 20 years.

The White Oak Project would result in the clearing of approximately 7.2 acres during construction and the long term conversion of about 0.8 acre of forest to open land. It can be assumed that the residential and commercial projects in table 41 would also result in the permanent loss of some forested areas. The impact on vegetation and wildlife from all of the actions would have a cumulative effect when considered with the 2017 Expansion Project.

We anticipate that that there would be minor temporary cumulative impact on herbaceous vegetation and wildlife species that utilize open space, pastureland, and existing rights-of-way, however, almost 97 percent of the Project would be located in existing rights-of-way, agricultural lands, or in previously developed areas and these areas would be allowed to revert back to preconstruction conditions following construction, minimizing the potential for significant cumulative impacts.

Because of the transient nature of wildlife and the ability to adapt to already disturbed/developed areas and the minimal amount of permanent tree clearing, we do not anticipate significant cumulative impact on vegetation and wildlife in the Project area.

Land Use

The construction and operation of the project and other reasonably foreseeable future projects would require the temporary and permanent use of land, which would result in temporary and permanent impact/conversion of land use. The majority of the Project impacts on general land uses would be temporary, and related to construction workspaces. As the predominant land use in the area is agricultural, the conversion of agricultural lands to commercial/industrial, residential, or other non-agricultural uses would have the greatest potential for cumulative impact. While the majority of the Project impacts would be temporary, construction of the Project would result in some permanent land use changes, including the conversion of 1.3 acres of forest to maintained right-of-way. With the exception of the Millsboro Pressure Control Station (0.05 acre permanent conversion from agricultural land to aboveground facility), no permanent aboveground facilities would be located outside of existing aboveground facilities or

rights-of-way, preventing a cumulative impact of loss of commercial, residential, or agricultural land to permanent aboveground natural gas infrastructure.

In addition, because the Project would be collocated within existing rights-of-way for over 96 percent of the route, forest conversion would be reduced and overall land use would generally be consistent with the current baseline condition of utility and roadway rights-of-way. This collocation would also result in fewer visual impacts, although minor amounts of forest conversion would occur where the construction work area requires clearing of trees outside the existing cleared rights-of-way. Although the other projects listed in table 41 could result in land use changes, such as from agricultural to residential, the 2017 Expansion Project would generally allow most areas to revert to preconstruction conditions, preventing cumulative impact that would be caused if the 2017 Expansion Project were resulting in permanent land use changes along the entire route. For these reasons, we conclude that cumulative impacts on land use would not be significant.

Traffic

If both the 2017 Expansion Project and the projects listed in table 41 are constructed at the same time, there could be minor cumulative impacts from increased traffic in the general area (e.g., town or concentrated residential area) of the combined project activities. If new homes are being constructed as part of these residential developments shown in table 41 at the same time as construction of the 2017 Expansion Project, we anticipate that deliveries of building materials could coincide with Project, use of local roads (e.g., right-of-way access; pipe deliveries; personnel commutes), also resulting in some minor cumulative impact on traffic.

These impacts would be expected to be localized, minor, and short-term (only lasting for a few minutes to perhaps a day), and detours would be provided and/or local access maintained. Based on this information, we do not anticipate that the Project, when considered with the other projects in the area, would result in any significant cumulative impact on traffic.

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 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 Part 93, Subpart B.

The proposed Project may be constructed in the same general timeframes as projects listed in table 41. The air quality impacts during construction of the proposed Project would be short-term and intermittent along the pipeline right-of-way and aboveground facility sites. Eastern Shore has agreed to implement several practices to

reduce construction emissions, as described in section B.6.1. above (e.g., use of low-sulfur fuels; compliance with USEPA mobile source emissions performance standards). Eastern Shore would also comply with the applicable PADEP, MDE, and DNREC requirements for minimizing construction emissions from the Project. In addition, Eastern Shore's proposed mitigation measures and our recommendation for a Fugitive Dust Control Plan would minimize construction-related emissions.

We expect that the MDE, DNREC, and PADEP would impose best management practices or site-specific mitigation measures to minimize construction-related air quality impacts associated with the projects listed in table 41. The proposed 2017 Expansion 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 significant cumulative construction-related air quality impacts.

The operational emissions from the Project would be associated with the Daleville Compressor Station, proposed to be modified for the 2017 Expansion Project. The Daleville Compressor Station is approximately 40 km from Eastern Shore's Delaware City Compressor Station, which was evaluated in Docket CP15-18-001 (White Oak Project). Both of the compressor station are considered to be minor sources. Because of the distance between these two emission sources, we do not anticipate significant cumulative air quality impacts to result from operation of the modified Daleville Compressor Station and the Delaware City Compressor Station.

The other projects listed in table 41 would not result in 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 area surrounding the construction right-of-way or aboveground facility worksite, which we have defined as 0.25 mile for geographic scope. The related impacts are limited to the noise receptors within this distance from the construction activity. In general for the 2017 Expansion Project, the various components are distant from one another, and the noise produced by construction activities at one Project facility would not be audible at other Project facilities. The exception is the proposed work at the Daleville Compressor Station, which is adjacent to the beginning of the Jennersville Loop. These two project components may have a cumulative noise impact on the residences along Street Road. However, these NSAs are over 500 feet from the pipeline construction area, and any noise overlaps would be of short duration.

It is anticipated that construction will progress in two spreads: one in Lancaster and Chester Counties, Pennsylvania and Cecil County, Maryland and a second in New Castle and Sussex Counties, Delaware. Noise impacts could occur during the construction of the Project and the other projects identified in table 41. We do not expect construction timing to overlap between the Project and the construction of the White Oak (Docket Nos. CP15-18-001) or System Reliability (CP15-498-000) projects; therefore, cumulative noise impacts are not anticipated for these projects.

It is unlikely that construction from the proposed Project and other projects identified in table 41 would occur concurrently in the vicinity of Project-identified NSAs; therefore, we do not expect cumulative construction noise impacts from these projects.

Operational noise impacts from the proposed Project would result from the Daleville Compressor Station expansion. Noise generated from compressor station facilities 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. Because of the substantial distance between the Daleville Compressor Station and Eastern Shore's other compressor or pressure control stations (further than the defined geographic scope of 1 mile), we do not anticipate significant cumulative noise impacts to result from operation of the Project. There could be some noise impact if the other projects listed in table 41 were under construction concurrent with the operation of the modified Daleville Compressor Station, but this would also be short term and minor.

The other projects listed in table 41 would not be permanent noise sources; therefore, no cumulative operational noise impacts would occur.

C. ALTERNATIVES

We considered several alternatives to the proposed action to determine if any were reasonable and preferable to the proposed action. Alternatives evaluated in this section include the no action alternative, systems alternatives, and route alternatives. The proposed modifications to the existing Daleville Compressor Station, Honey Brook Meter and Regulation Station, and the Delmar Pressure Regulation Station would take place within the footprint of Eastern Shore's existing facilities. Construction and operation of similar compression, metering, or pressure control facilities at undeveloped alternative sites would result in greater environmental impact and affect new landowners other than those currently affected. Therefore, we did not examine any alternative locations for the proposed compressor station or meter and regulation station modifications. Similarly, we did not examine alternative locations for mainline valves and the Millsboro Pressure Control Station as these need to be sited within the right-of-way of their associated pipeline facilities.

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 or portion of the 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 the Project; however, the project objectives would not be met.

According to Eastern Shore, the Project's purpose is to provide incremental expansion capacity sufficient to provide additional firm transportation service to existing customers on the Eastern Shore pipeline system during high-demand winter months. Although a Commission decision to deny the 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 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, especially if they were not able to be looped or collocated to a similar extent as the proposed Project.

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

2. System Alternatives

System alternatives would make use of other existing, modified, or proposed pipeline systems to meet the same objectives as the Project. 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 2017 Expansion 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 Project.

Eastern Shore currently operates the only interstate natural gas transmission pipeline system in the 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 attractive alternative to the proposed Project. Columbia Gas Transmission, Transcontinental Gas Pipe Line and Texas Eastern Transmission's systems would require on the order of 150 miles or more of pipeline and associated compression and delivery point meter and regulator station facilities in order to serve as a viable alternative to Eastern Shore's proposed Project. Such an alternative would likely be economically unfeasible from the standpoint of the participating shippers and would also significantly increase the anticipated landowner and environmental impacts associated with the Project.

The proposed loops and aboveground facilities are proposed to be located primarily on Eastern Shore's existing right-of-way, within the limits of existing aboveground facilities, or within roadway or railway rights-of-way thereby minimizing the need for construction on undisturbed lands and affecting new landowners.

We have not identified any other system alternative that would have a significant environmental advantage over the proposed Project and achieve Eastern Shore's stated Project objective; therefore, we eliminated system alternatives from further consideration.

3. Routing Alternatives

As discussed in section B above, the majority of the Project facilities would be constructed or installed in existing rights-of-way where environmental impacts would be minimized. Where practicable, locating new facilities in existing rights-of-way avoids the creation of new rights-of-way; minimizes impacts on new landowners; avoids or minimizes the need for new permanent rights-of-way; and reduces temporary impacts. In response to our NOI we received comments from a landowner, local governments, and resource agencies expressing concerns over the routing of a part of the Jennersville Loop, including where the proposed route deviates from the existing Eastern Shore right-of-way and instead creates new right-of-way in areas previously undisturbed by interstate natural gas pipeline infrastructure. Specific areas of concerns identified included avoiding a residential neighborhood along Dutton Farm Lane at approximate milepost 3.9 and wetland areas that containing bog turtle habitat between mileposts 4.2 and 5.0. Accordingly, we evaluated route variations along the Jennersville Loop, including using the existing right-of-way to determine if an alternative route might be able to reduce impacts on residential areas and wetlands containing bog turtle habitat.

Jennersville Loop Route Variations

We evaluated two route variations to the proposed Jennersville Loop; a route that stays on eastern Shore's existing right-of-way and one that deviates west of the areas of concern (see figure 2). Table 42 compares certain sensitive resources and potential impacts of these route variations. The Jennersville Loop as proposed deviates from Eastern Shore's existing right-of-way beginning at about milepost 3.8 and travels for 2.2 miles along a railroad and private and public roads. Eastern Shore states that this deviation is necessary to avoid wetlands with known populations of the federally listed bog turtle, to avoid planned development, and to avoid an existing densely developed residential area.

Alternative 1 (Existing Right-of-way)

We first considered the possibility of the new pipeline loop staying within or adjacent to the existing right-of-way, like the majority of the Jennersville Loop. As such, Alternative 1 would remain on the existing Eastern Shore easement between milepost 3.8 and 5.0, crossing 1.2 miles of agricultural land, 0.5 mile of forest, and 0.3 mile of residential area.

Specifically, Alternative 1 would remain on the eastern edge of Eastern Shore's existing pipeline easement, crossing under the railroad tracks with workspaces passing within 50 feet of approximately 12 residences in the Dutton Farm Lane neighborhood and on Kelton Road. The route would then run parallel to the West Branch White Clay Creek, crossing the creek once as well as one emergent wetland and one forest/shrub wetland. According to the USFWS, each of these wetlands has known populations of the federally listed bog turtle.

Conversely, Eastern Shore's proposed routing completely avoids the two wetland areas known to contain bog turtles; instead crossing an emergent wetland area that was surveyed and found not to contain bog turtle habitat. Additionally, Eastern Shore would avoid the Dutton Farm Lane neighborhood by constructing this segment of the Jennersville Loop along the western edge of Sunnyside Road, overlapping the roadway right-of-way and thus minimizing direct impacts on residential uses and landscaping. Eastern Shore's proposed route with would be within about 50 feet of only one residence along Sunnyside Road (see residential construction maps in appendix 3).

Eastern Shore's proposed route is longer than Alternative 1 by 0.4 mile; however, Alternative 1 would cross higher quality portions of the West Branch White Clay Creek and associated wetlands (i.e., containing habitat for the federally listed bog turtle) and would cross within 50 feet of considerably more residences. Direct impacts on these residential properties would be greater with Alternative 1, because the new pipeline construction would be more in the landscaped and/or middle portions of the residential tracts rather than adjacent to a road, as with the proposed route. Based on our discussion

in section B.4.1, Eastern Shore would effectively minimize impacts on residential areas (e.g., using specialized residential construction methods, limiting the construction to daylight hours, and fencing all construction areas within 100 feet of residences). Therefore, we conclude that Alternative 1 is not environmentally preferable to the proposed route and we are not recommending it.

Alternative 2 (Western Route)

Another option we considered was routing the pipeline to the west, using road collocations to the extent possible. In a north-to-south direction, Alternative 2 would divert off the existing easement as it crosses South Jennersville Road (SR 796) at approximate milepost 3.0. A diversion off the existing pipeline easement at milepost 3.0 would allow the alternative route to use a north-to-south roadway right-of-way to bypass a forested area between mileposts 3.2 and 3.4 as well as the identified bog turtle and residential areas of concern further south along the existing easement. Alternative 2 would follow South Jennersville Road for 0.7 mile through an area of commercial businesses and medical professional offices; and at a driveway for a large distribution center, the route would turn back towards the pipeline right-of-way. From the entrance to the distribution center, the route would head east and south, using private roads and driveways for 0.6 mile, and then traverse along approximately 1 mile of farm roads and agricultural land to rejoin the existing pipeline right-of-way at milepost 5.0.

In order to gain the benefit of the road collocation noted above, and avoiding the forested area crossed by the proposed route, this variation, by design, must be slightly longer than the proposed route (as well as Alternative 1). As such, it would result in the creation of approximately 1.3 miles of new pipeline right-of-way on private property. Further, Alternative 2 would cross within 50 feet of four residences and create the most new pipeline right-of-way. We conclude that Alternative 2 would not offer a significant environmental advantage over Eastern Shore's proposed route, and therefore we are not recommending it.

In summary, we have determined that Eastern Shore's proposed project, as modified by our recommended mitigation measures, is the preferred alternative than can meet the project objectives.

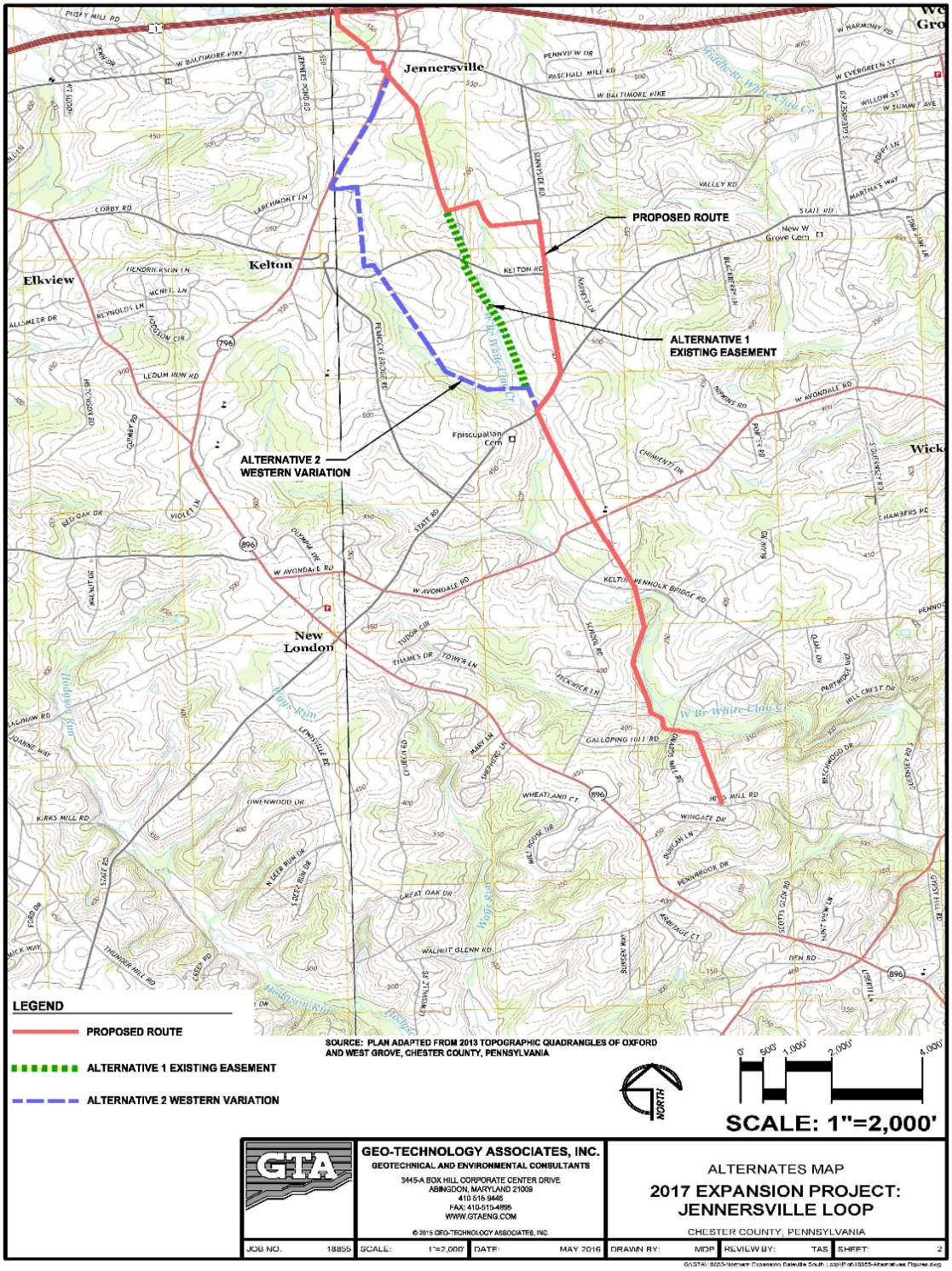


Figure 2: Jennersville Loop Route Variations

Table 42. Comparison of Jennersville Loop Route Alternatives			
Alternatives Considered **Evaluation Factors**	**Proposed Route**	**Alternative 1 Existing Pipeline Easement**	**Alternative 2 Western Deviation**
Length (miles)	2.2	1.8	2.3
Construction Impacts on Forest (acres)[1]	3.7	3.7	0.3
Construction Impacts on Wetlands (acres)[2]	0.5 Freshwater Emergent	0.7 Freshwater Forest/Shrub 1.0 Freshwater Emergent	0
White Clay Creek Crossings	1	1	1
Number of Road Crossings	1	3	2
Approximate Number of Residences Within 50 feet of the Construction Work Area	1	12	4
1. Impacts were calculated based on an average 75-foot-wide construction corridor. 2. Impacts on wetlands are based on USFWS National Wetland Inventory maps.			

D. CONCLUSIONS AND RECOMMENDATIONS

We conclude that approval of the 2017 Expansion 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 application and supplemental filings; implementation of Eastern Shore's proposed mitigation; and our recommended mitigation below. We recommend that the Commission Order 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 the Project 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 Project. 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, 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 the 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 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 with the Secretary for review and written approval by the Director of OEP. Eastern Shore must file revisions to the plan as schedules change. The 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), with the opportunity for OEP staff to participate in the training session(s);
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. Eastern Shore shall employ at least one EI per construction spread. The EIs shall be:

    a. responsible for monitoring and ensuring compliance with all mitigation measures required by the Order and other grants, permits, certificates, or other authorizing documents;
    b. responsible for evaluating the construction contractor's implementation of the environmental mitigation measures required in the contract (see condition 6 above) and any other authorizing document;
    c. empowered to order correction of acts that violate the environmental conditions of the Order, and any other authorizing document;
    d. a full-time position, separate from all other activity inspectors;
    e. responsible for documenting compliance with the environmental conditions of the Order, as well as any environmental conditions/permit requirements imposed by other federal, state, or local agencies; and
    f. responsible for maintaining status reports.

8. Beginning with the filing of its Implementation Plan, Eastern Shore shall file updated status reports 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.

9. **Prior to receiving written authorization from the Director of OEP to commence construction of the 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).

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

11. **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 Project where compliance measures were not properly implemented, if not previously identified in filed status reports, and the reason for noncompliance.

12. **Prior to construction of the Jennersville Loop**, Eastern Shore shall complete its consultation with the NPS and the USACE and file with the Secretary, for review and written approval by the Director of OEP, its final construction and restoration plan for the crossings of the tributaries of White Clay Creek and NPS comments on that plan.

13. **Prior to construction**, Eastern Shore shall file with the Secretary its Migratory Bird Conservation Plan along with documentation of consultation with the USFWS on the plan.

14. Eastern Shore shall **not begin construction activities** on the Project **until**:

    a. the FERC staff completes ESA 7 consultation with the USFWS regarding the bog turtle; and
    b. Eastern Shore has received written notification from the Director of the OEP that construction or use of mitigation may begin.

15. **Prior to construction**, Eastern Shore shall 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.

16. 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 Project, and restoration of the rights-of-way. **Prior to construction of the 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 the 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.

17. Eastern Shore **shall not begin construction** of the Project until it files with the Secretary a copy of the determination of consistency with the Coastal Zone Management Plan issued by Delaware and Maryland.

18. Eastern Shore **shall not begin construction** of the 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:

(1) remaining cultural resources survey report(s) and addendums;
(2) site evaluation report(s) and avoidance/treatment plan(s), as required; and
(3) comments on the cultural resources reports and plans from the Pennsylvania, Maryland, and Delaware SHPOs, as applicable;

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 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."**

19. **Prior to construction**, 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 will take to minimize fugitive dust emissions from the pipeline 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 will 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.

20. **Prior to any HDD construction for the 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.

21. Eastern Shore shall file a noise survey with the Secretary **no later than 60 days** after placing the modified Daleville 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 Daleville 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.

22. Eastern Shore file a noise survey with the Secretary **no later than 60 days** after placing the proposed Millsboro Pressure Control Station in service. If the total noise attributable to the proposed Millsboro Pressure Control Station exceeds an L_{dn} of 55 dBA at any NSA, 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.

E. REFERENCES

Berg, T. M., W. E. Edmunds, A. R. Geyer, and others, compilers. 1980. Geologic map of Pennsylvania: Pennsylvania Geological Survey, 4th ser., Map 1, 2nd ed., 3 sheets, scale 1:250,000.

Bureau of Labor Statistics. 2007. Census of Occupational Injuries.

Council on Environmental Quality. 2005. Memorandum for Federal NEPA Contacts: Emergency Actions and NEPA, September 8, 2005.

Cecil County Planning and Zoning. 2011. Cecil County Master Water and Sewer Plan. http://www.ccgov.org/uploads/planningandzoning/notices/mwsp_2011_3rd_draftcombined.pdf

Chester County Planning Commission. 2016. Natural Environment and Planning. Online: http://www.chesco.org/documentcenter/view/31279

----------. 2017. Watersheds Maps. Watersheds of Chester County. Online http://www.chesco.org/DocumentCenter/View/8467

Chester Water Authority. 2014. Annual Report. http://www.chesterwater.com/annualreport/annualreport2014.pdf.

Clark, John. 2014. DNREC – Division of Fish and Wildlife. Personal communication on July 24, 2014.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. Office of Biological Services, U.S. Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C.

Crone, A.J. and R.L. Wheeler. 2000. Data for Quaternary faults, liquefaction features, and possible tectonic features in the Central and Eastern United States, east of the Rocky Mountain front. U.S. Geological Survey. Open File Report 00-260. ix + 332 p.

Delaware Department of Natural Resources and Environmental Control. 2012. State of Delaware 2012 Combined Watershed Assessment Report. http://www.dnrec.delaware.gov/swc/wa/Documents/WAS/Final%202012%20Inte

grated%20305(b)%20Report%20and%20303(d)%20list.pdf.

----------. 2011. State of Delaware Surface Water Quality Standards, as Amended July 11, 2011. http://regulations.delaware.gov/AdminCode/title7/7000/7400/7401.pdf.

----------. 2016. Edna Stetzer, DNREC Fisheries Biologist. Geo-Technology Associate's personal communication on September 14.

Environmental Data Resources, Inc. 2014a. Area Study, Daleville Loop, Cochranville, PA, September 17, 2014.

----------. DataMap Well Search Report, Parkesburg Loop – Parkesburg, PA, July 12, 2016.

----------. DataMap Well Search Report, Jennersville Loop – West Grove, PA, July 12, 2016.

----------. DataMap Well Search Report, Fair Hill Loop – Newark, DE, July 12, 2016.

----------. DataMap Well Search Report, Summit Loop – Middletown, DE, July 12, 2016.

----------. DataMap Well Search Report, Woodside Loop – Dover, DE, July 29, 2016.

----------. DataMap Well Search Report, Hearns Pond Loop – Seaford, DE, July 13, 2016.

----------. DataMap Well Search Report, Seaford Millsboro Connector – Laurel, DE, August 2, 2016.

----------. DataMap Well Search Report, Laurel Loop – Laurel, DE, July 12, 2016.

----------. DataMap Well Search Report, Delmar – Delmar, DE, July 12, 2016.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Wetlands Research Program Technical Report Y-87-1. http://www.cpe.rutgers.edu/Wetlands/1987-Army-Corps-Wetlands-Delineation-Manual.pdf.

----------. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region, Version 2.0. http:// www.usace.army.mil/Portals/2/docs/civilworks/regulatory/reg_supp /AGCP_regsupV2.pdf.

----------. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region, Version 2.0. http://acwc.sdp.sirsi.net/client/search/asset/1012680

Federal Energy Regulatory Commission. 2013. Upland Erosion Control, Revegetation, and Maintenance Plan.

----------. 2013. Wetland and Waterbody Construction and Mitigation Procedures.

Godt, Jonathan. 2003. Landslide Overview Map of the Coterminous United States. U. S. Geological Survey Open File Report 97-289. Internet: http://pubs.usgs.gov/circ/c1244/c1244.pdf.

Geo-Technology Associates. 2017. Report of Geophysical Services. April 14 Letter Report to Brian Scofield of USFWS.

Kochanov, W.E. and S.O Reese. 2003. Density of Mapped Karst Features in South-Central and Southeastern Pennsylvania. Pennsylvania Department of Conservation and Natural Resources, Map 68.

Maryland Department of the Environment. 2016. Maryland's Designated Uses for Surface Waters. http://www.mde.state.md.us/programs/Water/TMDL/Water%20Quality%20Standards/Pages/programs/waterprograms/tmdl/wqstandards/wqs_designated_uses.aspx.

National Groundwater Association. 2012. Groundwater's Role in Pennsylvania's Economic Vitality. http://www.ngwa.org/Documents/States/Use/pa.pdf.

National Park Service. 2016. October 3 letter to FERC regarding Eastern Shore 2017 Expansion Project, PF16-7-000.

----------. 2016. December 15 letter to FERC regarding Eastern Shore 2017 Expansion Project, FERC Docket No. PF16-7-000.

----------. 2016. December 27 letter to FERC regarding Eastern Shore 2017 Expansion Project, FERC Docket No. PF16-7-000.

National Oceanic and Atmospheric Administration. National Weather Service, Office of Climate, Water and Weather Services, 30 year average (1985-2014) http://www.weather.gov/om/hazstats.shtml.

Pennsylvania Department of Conservation and Natural Resources. 2015. DCNR Map Viewer. http://www.gis.dcnr.state.pa.us/maps/index.html?geology=true.

Pennsylvania Department of Environmental Protection. 2000. Pennsylvania Wellhead Protection Program. https:// www.dep.state.pa.us/dep/deputate/watermgt/wc/subjects /srceprot/source/Final_WHPP_AppB.htm.

----------. Water Attribute Viewer for the Enterprise (WAVE). Internet: http://www.depgis.state.pa.us/wave/.

----------. 2014. Existing Use Classification, September 23. http://www.dep.state.pa.us/dep/deputate/watermgt/wc/subjects/srceprot/source/Final_WHPP_AppB.htm

Pennsylvania Fish and Boat Commission. 2014. GIS data. Warmwater/Coolwater Fisheries – Streams. http:// www.pasda.psu.edu/uci /MapService.aspx?Dataset=1068&entry=PASDA.

----------. Pennsylvania Species by Watersheds. 2016. http:// fishandboat.com/pafish /fishhtms/chap2.htm.

Pipeline and Hazardous Materials Safety Administration. 2016. Significant incident files, January 14. http://www.phmsa.dot.gov/pipeline/library/data-stats /pipelineincidenttrends.

Ramsey, K.W. 2005. Geologic Map of New Castle County, Delaware. Delaware Geological Survey, Geologic Map series No. 13. 1 plate.

Thomas, Craig. 2014. Chester County Water Resources Authority. Eastern Shore's personal communication on October 23 and 28.

----------. 2016. Chester County Water Resources Authority. Eastern Shore's personal communication on September 22.

Trapp and Horn. 1997. Trapp, Henry and Marilee A. Horn. Groundwater Atlas of the United States: Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, Virginia, West Virginia. http://pubs.usgs.gov/ha/ha730/ch_l/.

U.S. Census Bureau. 2009. Statistical Abstract of the United States: 2010 (129th Edition) Washington, DC, http://www.census.gov/statab.

U.S. Department of Agriculture, Natural Resources Conservation Service. April 27, 2017. Letter to Eastern Shore Natural Gas Company.

----------. April 27, 2017. Communication to FERC regarding Eastern Shore 2017 Expansion Project, FERC Docket No. CP17-28.

U. S. Environmental Protection Agency. 1999. Consideration of Cumulative Impacts in EPA Review of NEPA Documents (USEPA 315-R-99-002).

--------. 2011. National Sole Source Aquifer GIS Layer. March 17. https://catalog.data.gov/dataset/national-sole-source-aquifer-gis-layer.

--------. 2016. Air Data: Air Quality Data Collected at Outdoor Monitors Across the United States. https://www.epa.gov/outdoor-air-quality-data. Accessed September 2, 2016.

U.S. Fish and Wildlife Service. 2015a. Northern Long-eared Bat (*Myotis septentrionalis*). Northern Long-eared Bat Listed as Threatened with Interim 4(d) Rule Comment Period on Interim Rule Open Through July 1. http://www.fws.gov/midwest /endangered/mammals/nlba/. Accessed April 30, 2015.

U.S. Global Change Program. 2014. Climate Change Impacts in the United States: The Third National Climate Assessment. http://www.globalchange.gov/browse/reports /climate-change-impacts-united-states-third-national-climate-assessment-0.

U. S. Geological Survey. 2006. Quaternary fault and fold database for the U.S. http:// earthquakes.usgs.gov/regional/qfaults/.

----------. 2014a. Seismic hazards map. http://earthquake.usgs.gov/earthquakes/states /delaware/hazards.php.

----------. 2014. Newark West, Delaware-Maryland-Pennsylvania, 1:24,000 7.5-minute topographic quadrangle map.

----------. 2013a. Oxford, Pennsylvania, 1:24,000 7.5-minute topographic quadrangle map.

----------. 2014. Trap Pond, Delaware, 1:24,000 7.5-minute topographic quadrangle map.

----------. 2014. Seaford, Delaware, 1:24,000 7.5-minute topographic quadrangle map.

----------. 2014. Delmar, Delaware, and Maryland 1:24,000 7.5-minute topographic quadrangle map.

----------. 2014. Laurel, Delaware, 1:24,000 7.5-minute topographic quadrangle map.

----------. 2013b. Parkesburg, Pennsylvania, 1:24,000 7.5-minute topographic quadrangle map.

----------. 2013c. West Grove, Pennsylvania-Delaware, 1:24,000 7.5-minute topographic quadrangle map.

----------. 2014. Millsboro, Delaware, 1:24,000 7.5-minute topographic quadrangle map.

----------. 2014c. Saint George's, Delaware, 1:24,000 7.5-minute topographic quadrangle map.

Woods, Alan J., James M. Omernik, and Douglas D. Brown. Level III and IV Ecoregions of Delaware, Maryland, Pennsylvania, Virginia, and West Virginia. July 1999.

F. LIST OF PREPARERS

Cotton, Douglas – Project Manager, Description, Land Use, Cumulative Impacts, Alternatives
M.S., Urban & Regional Planning, 1980. University of Wisconsin-Madison
B.A., Geography, 1977. University of Massachusetts-Amherst

Johnson, Gertrude –Deputy Project Manager
B.S., Mechanical Engineering, 2003. Virginia Commonwealth University

Boros, Laurie – Cultural Resources
B.A., Anthropology/Archaeology, 1980. Queens College, City University of New York

Jeudy, Harry –Air Quality, Noise, and Reliability and Safety
B.S., Mechanical Engineering, 2000. Pennsylvania State University
Graduate Studies, Mechanical Engineering, Temple University

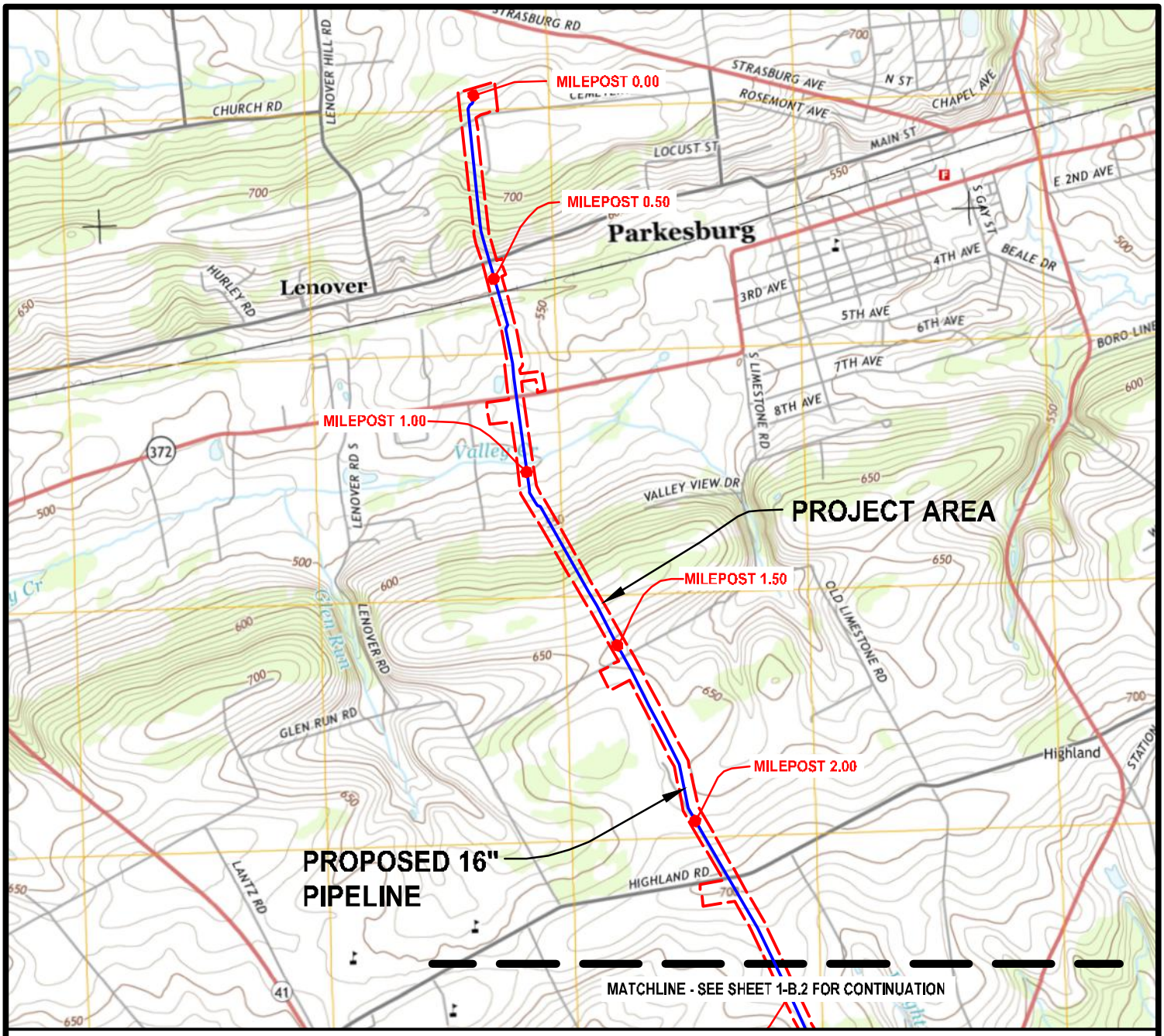
Rodgers, Keith – Soils, Geology, and Groundwater
M.E., Water Resources, 2008. University of Arizona
B.S., Geological Sciences with Geochemistry Option, 2004. Virginia Technical University

Yuan, Julia –Water Resources
M.P.S., Natural Resources Management, 2003. State University of New York College of Environmental Science and Forestry
B.S., Environmental Biology/Forestry, 1999. State University of New York College of Environmental Science and Forestry

Zielinski, Jennifer –Vegetation, Wildlife, and Threatened and Endangered Species
M.S., Environmental Policy, 2015. George Washington University
B.S., Environmental Science, 2010. University of Delaware

APPENDIX 1

USGS TOPOGRAPHIC MAPS



SOURCE: U.S. GEOLOGICAL SURVEY QUADRANGLE MAP OF PARKESBURG, PENNSYLVANIA. DATED 2013.

LEGEND

PROJECT AREA

PROPOSED PIPELINE

NORTH

0' 500' 1,000' 2,000' 4,000'

SCALE: 1"=2,000'

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TOPOGRAPHIC MAP

2017 EXPANSION PROJECT
PARKESBURG LOOP

CHESTER COUNTY, PENNSYLVANIA

JOB NO.	18854	SCALE:	1"=2000'	DATE:	JULY 8, 2016	DRAWN BY:	MAJ	REVIEW BY:	TAS	APPENDIX:	1-B.1

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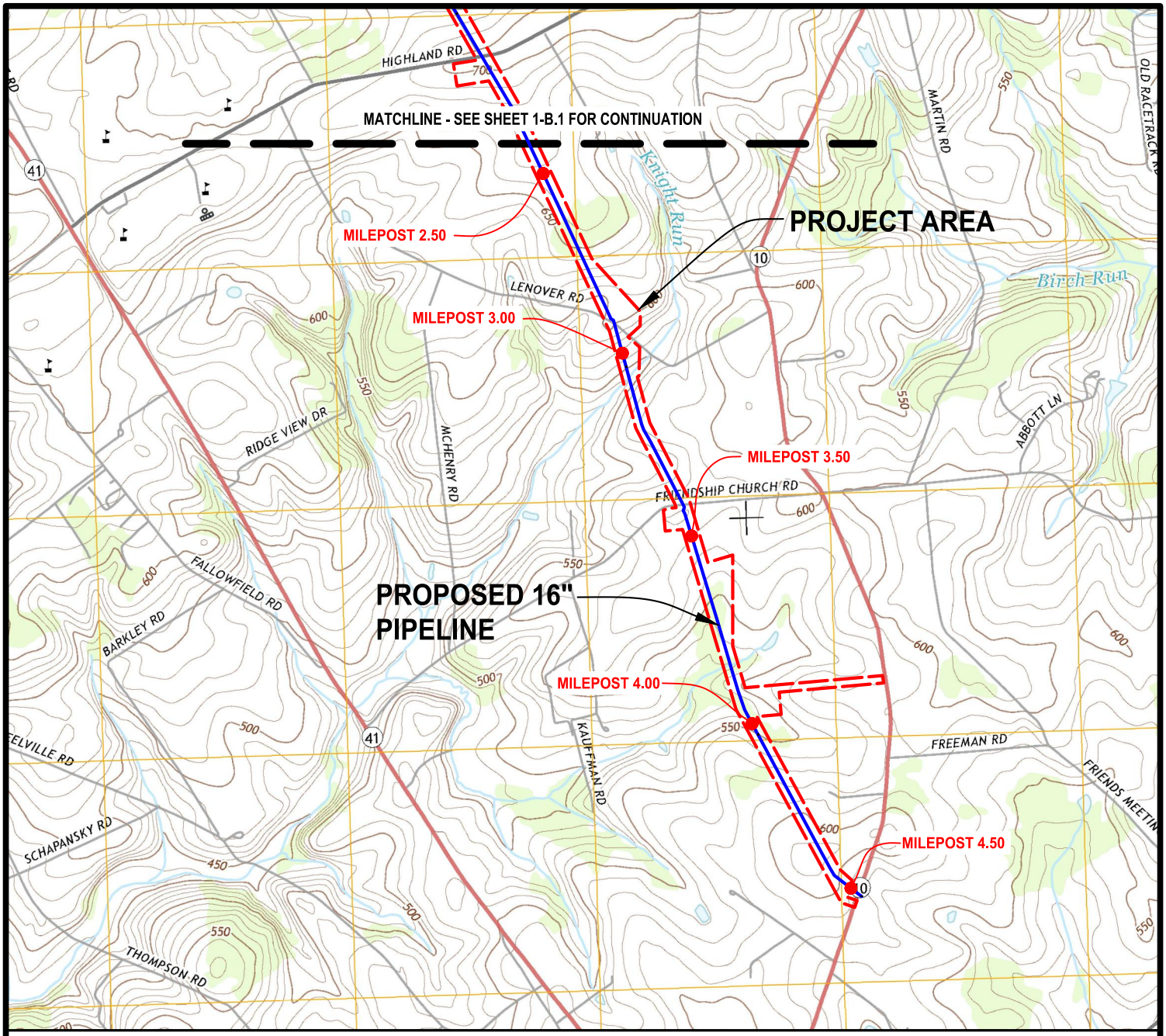

SOURCE: U.S. GEOLOGICAL SURVEY QUADRANGLE MAP OF PARKESBURG, PENNSYLVANIA. DATED 2013.

LEGEND

PROJECT AREA

PROPOSED PIPELINE

NORTH

0' 500' 1,000' 2,000' 4,000'

SCALE: 1"=2,000'

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TOPOGRAPHIC MAP

2017 EXPANSION PROJECT
PARKESBURG LOOP

CHESTER COUNTY, PENNSYLVANIA

JOB NO.	18854	SCALE:	1"=2000'	DATE:	JULY 8, 2016	DRAWN BY:	MAJ	REVIEW BY:	TAS	APPENDIX:	1-B.2

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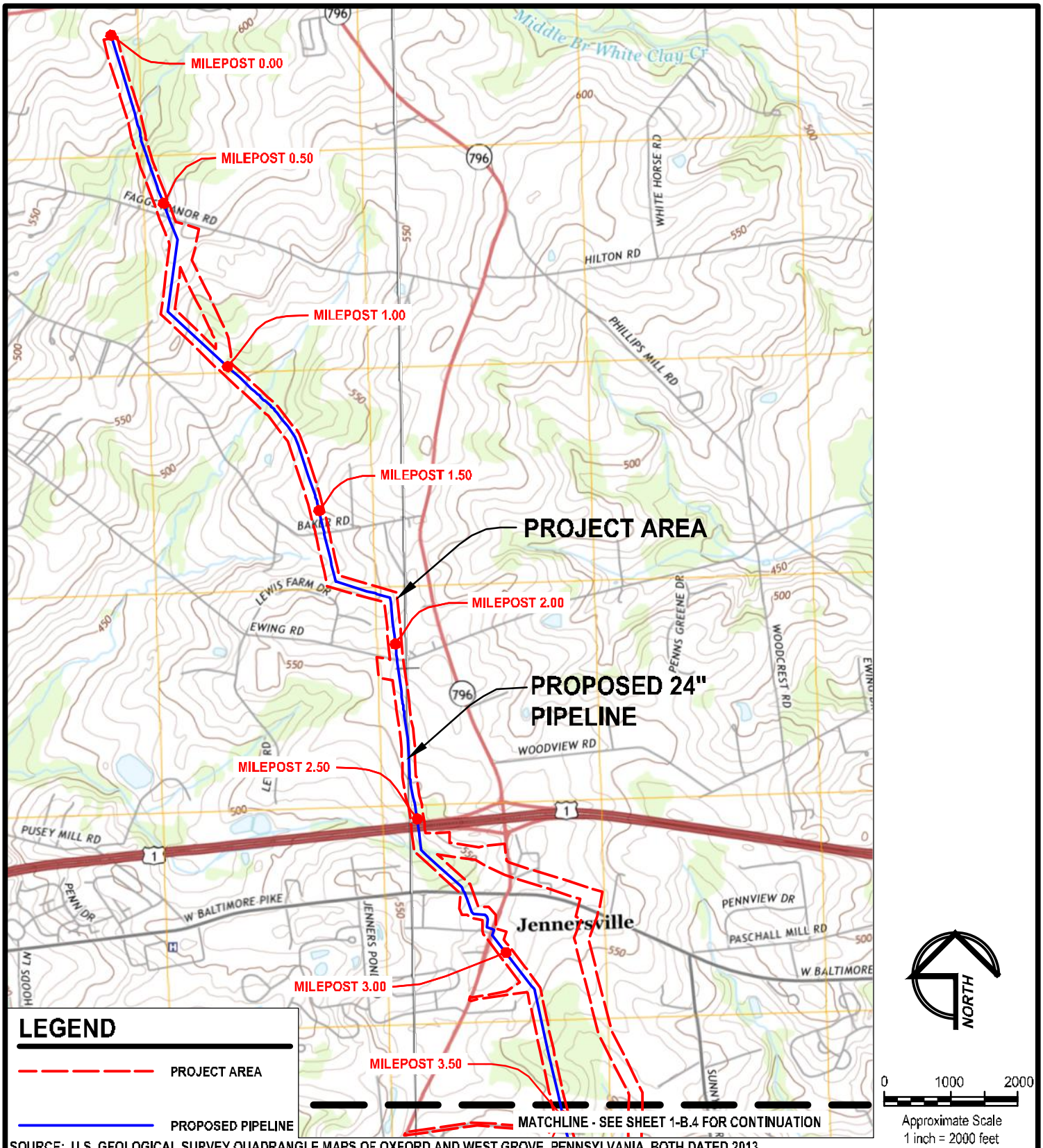

SOURCE: U.S. GEOLOGICAL SURVEY QUADRANGLE MAPS OF OXFORD AND WEST GROVE, PENNSYLVANIA. BOTH DATED 2013.

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TOPOGRAPHIC MAP
2017 EXPANSION PROJECT
JENNERSVILLE LOOP
CHESTER COUNTY, PENNSYLVANIA

JOB NO.	18855	SCALE:	1"=2000'	DATE:	JULY 8, 2016	DRAWN BY:	MAJ	REVIEW BY:	TAS	APPENDIX:	1-B.3

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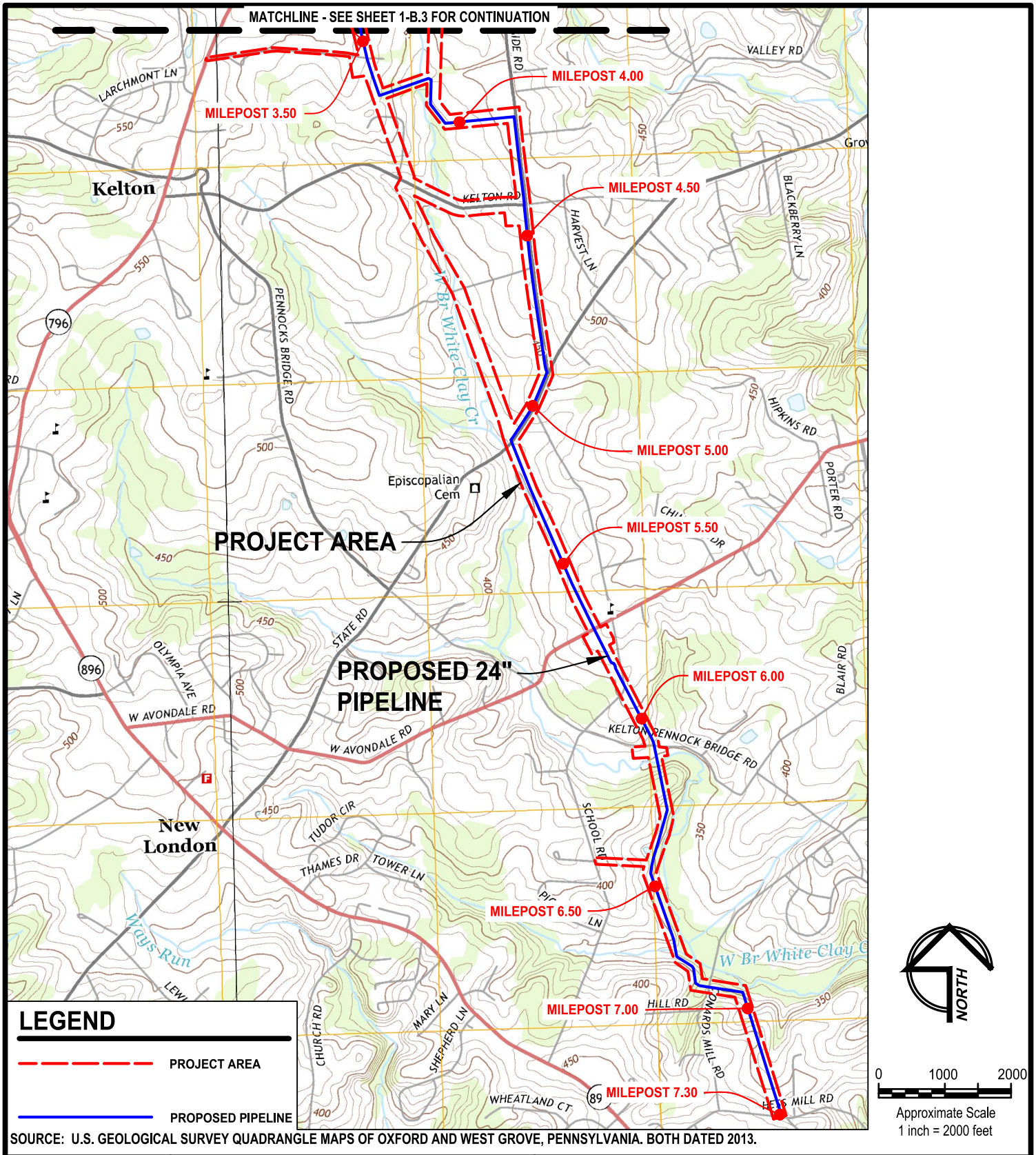

SOURCE: U.S. GEOLOGICAL SURVEY QUADRANGLE MAPS OF OXFORD AND WEST GROVE, PENNSYLVANIA. BOTH DATED 2013.

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TOPOGRAPHIC MAP
2017 EXPANSION PROJECT
JENNERSVILLE LOOP
CHESTER COUNTY, PENNSYLVANIA

JOB NO.	SCALE:	DATE:	DRAWN BY:	REVIEW BY:	APPENDIX:
18855	1"=2000'	JULY 8, 2016	MAJ	TAS	1-B.4

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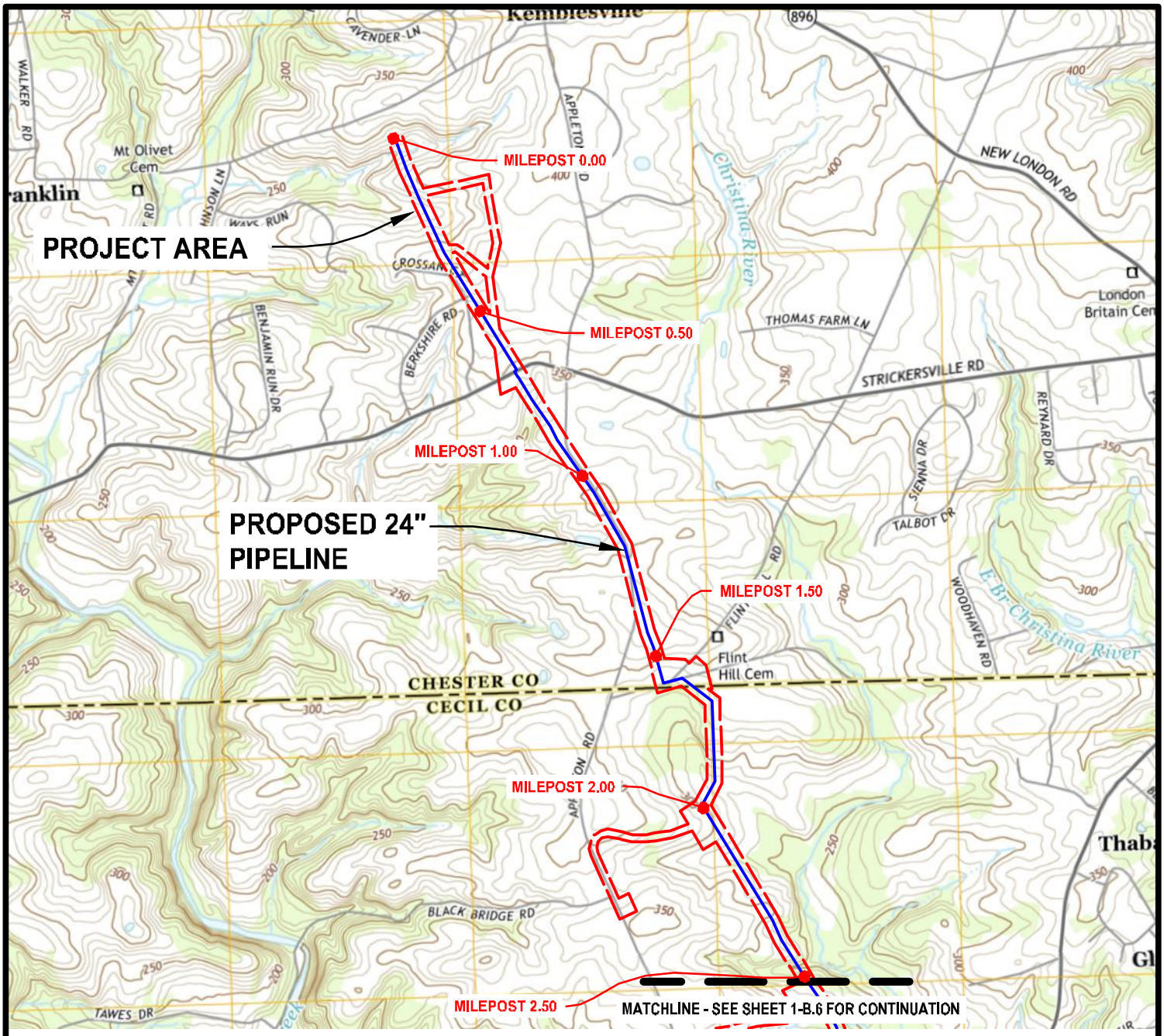

SOURCE: PLAN ADAPTED FROM 2014 TOPOGRAPHIC QUADRANGLES OF WEST GROVE, PENNSYLVANIA AND NEWARK WEST, DELAWARE, MARYLAND, AND PENNSYLVANIA

LEGEND

PROJECT AREA

PROPOSED PIPELINE

NORTH

0' 500' 1,000' 2,000' 4,000'

SCALE: 1"=2,000'

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TOPOGRAPHIC MAP

2017 EXPANSION PROJECT FAIR HILL LOOP

CHESTER COUNTY, PENNSYLVANIA AND CECIL COUNTY, MARYLAND

JOB NO.	SCALE:	DATE:	DRAWN BY:	REVIEW BY:	APPENDIX:
19150	1"=2,000'	NOVEMBER 23, 2016	CLO	TAS	1-B.5

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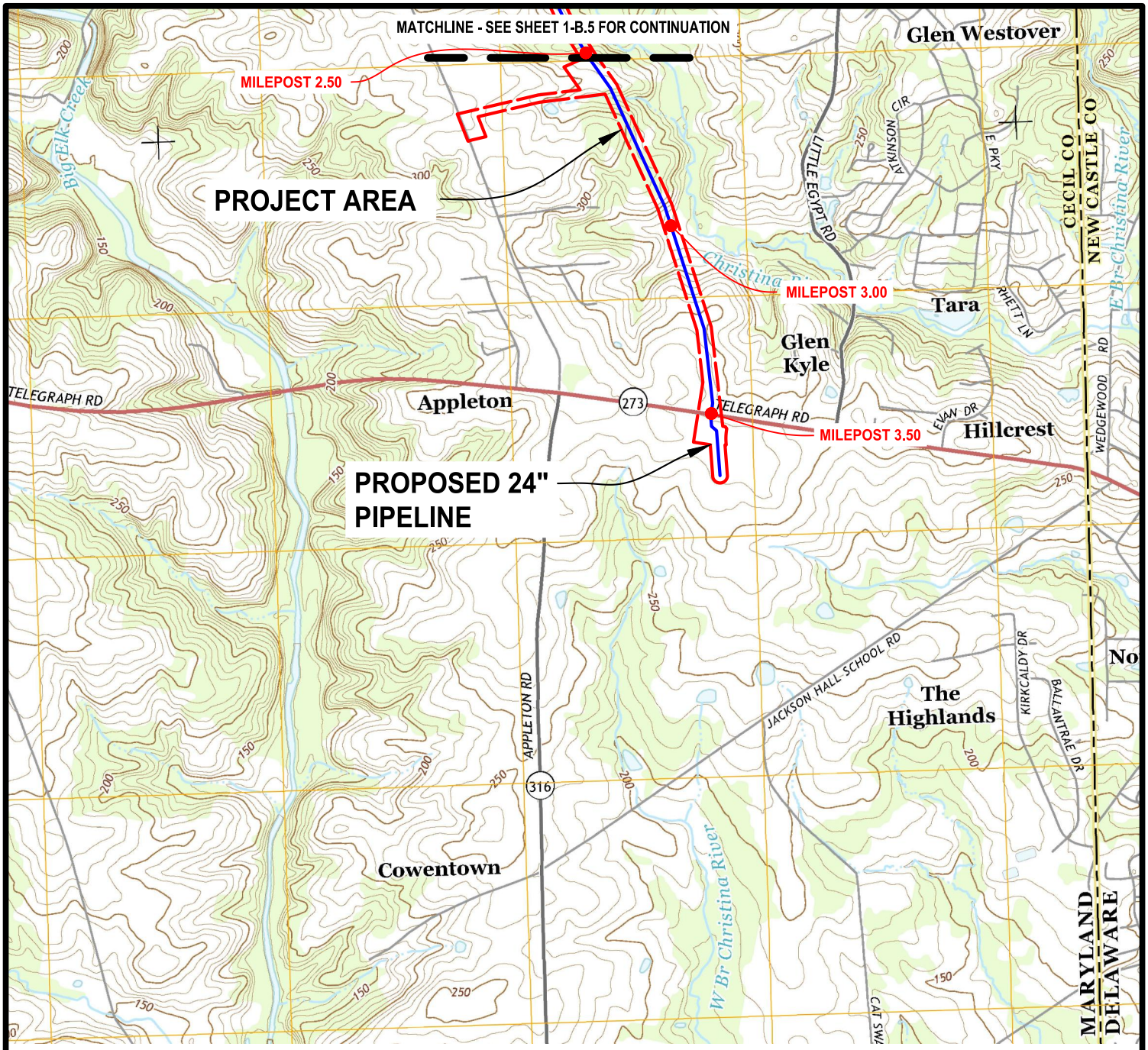

SOURCE: PLAN ADAPTED FROM 2014 TOPOGRAPHIC QUADRANGLES OF WEST GROVE, PENNSYLVANIA AND NEWARK WEST, DELAWARE, MARYLAND, AND PENNSYLVANIA

LEGEND

PROJECT AREA

PROPOSED PIPELINE

NORTH

0' 500' 1,000' 2,000' 4,000'

SCALE: 1"=2,000'

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TOPOGRAPHIC MAP

2017 EXPANSION PROJECT FAIR HILL LOOP

CHESTER COUNTY, PENNSYLVANIA AND CECIL COUNTY, MARYLAND

JOB NO.	SCALE	DATE	DRAWN BY	REVIEW BY	APPENDIX
19150	1"=2,000'	NOVEMBER 23, 2016	CLO	TAS	1-B.6

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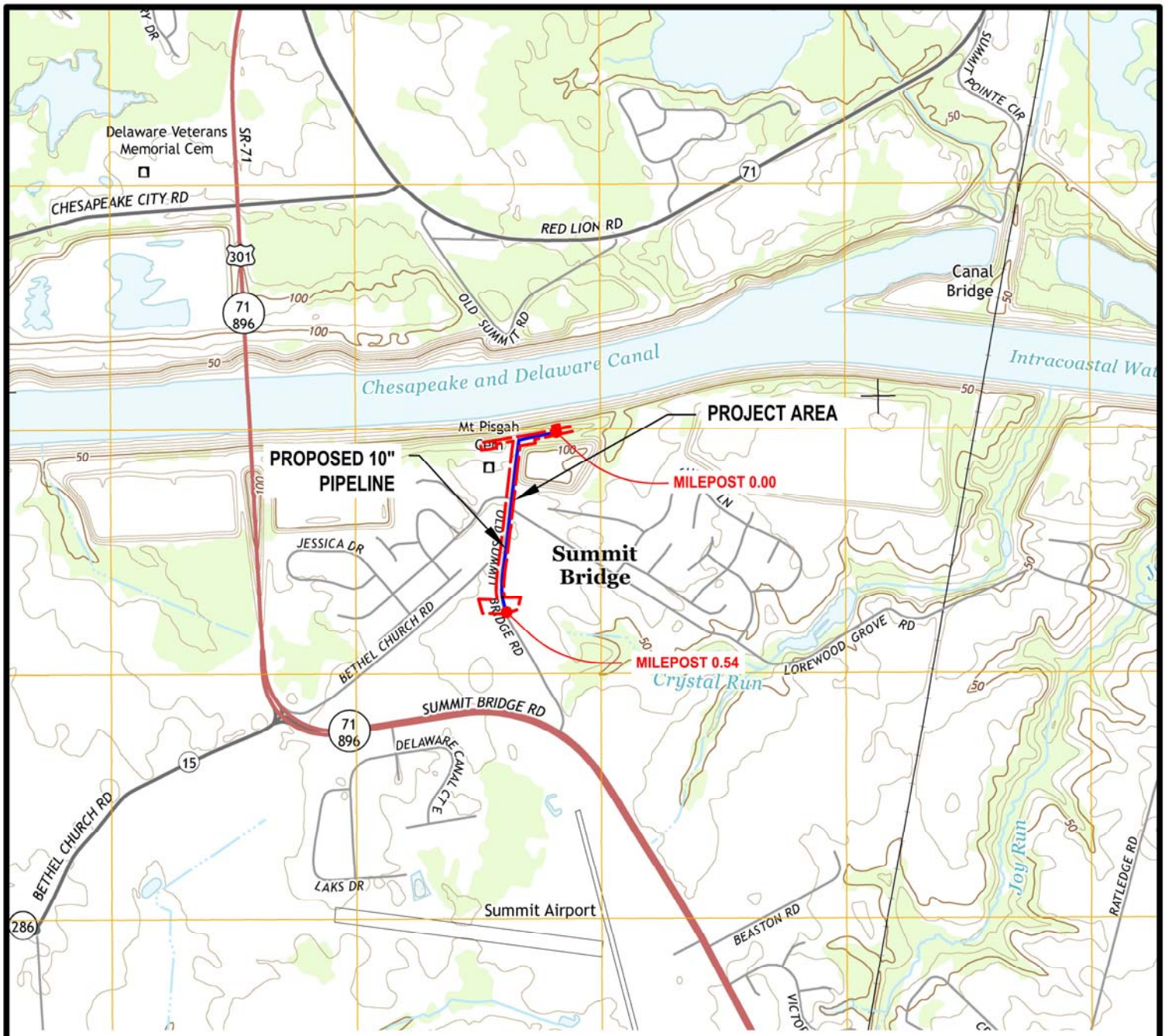

SOURCE: PLAN ADAPTED FROM A 2014 TOPOGRAPHIC QUADRANGLE OF SAINT GEORGE'S, NEW CASTLE COUNTY, DELAWARE

NORTH

0' 500' 1,000' 2,000' 4,000'

SCALE: 1"=2,000'

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TOPOGRAPHIC MAP

2017 EXPANSION PROJECT SUMMIT LOOP

NEW CASTLE COUNTY, DELAWARE

JOB NO.	19224	SCALE:	1"=2,000'	DATE:	NOVEMBER 23, 2016	DRAWN BY:	CLO	REVIEW BY:	TAS	APPENDIX:	1-B.7

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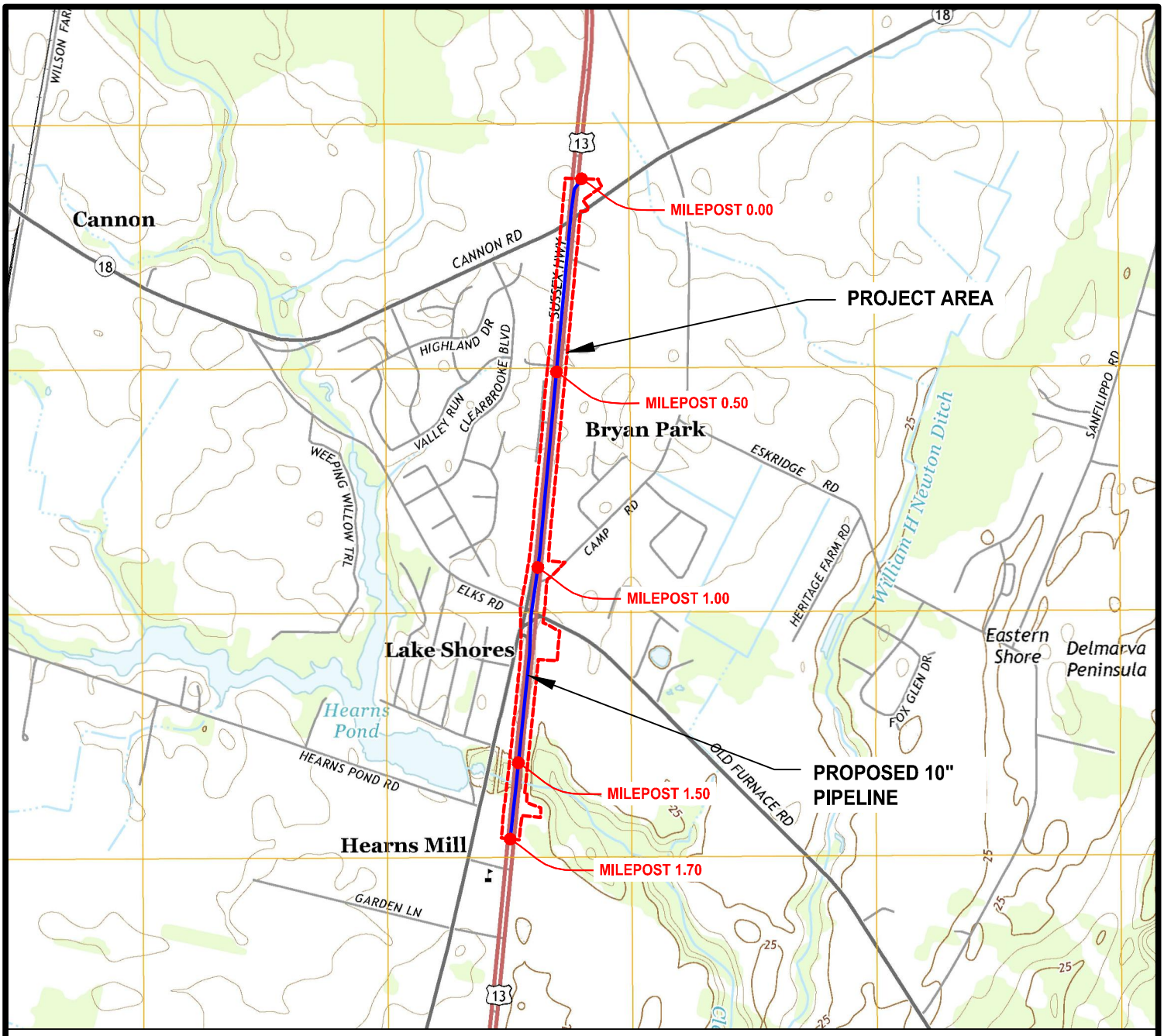

SOURCE: THE BASE MAP IS ADAPTED FROM A 2014 TOPOGRAPHIC QUADRANGLE OF SEAFORD EAST, SUSSEX COUNTY, DELAWARE

LEGEND

PROJECT AREA

PROPOSED PIPELINE

NORTH

0' 500' 1,000' 2,000' 4,000'

SCALE: 1"=2,000'

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TOPOGRAPHIC MAP

2017 EXPANSION PROJECT HEARNS POND LOOP

SUSSEX COUNTY, DELAWARE

JOB NO.	19228	SCALE:	1"=2,000'	DATE:	NOVEMBER 28, 2016	DRAWN BY:	MJS	REVIEW BY:	TAS	APPENDIX:	1-B.8

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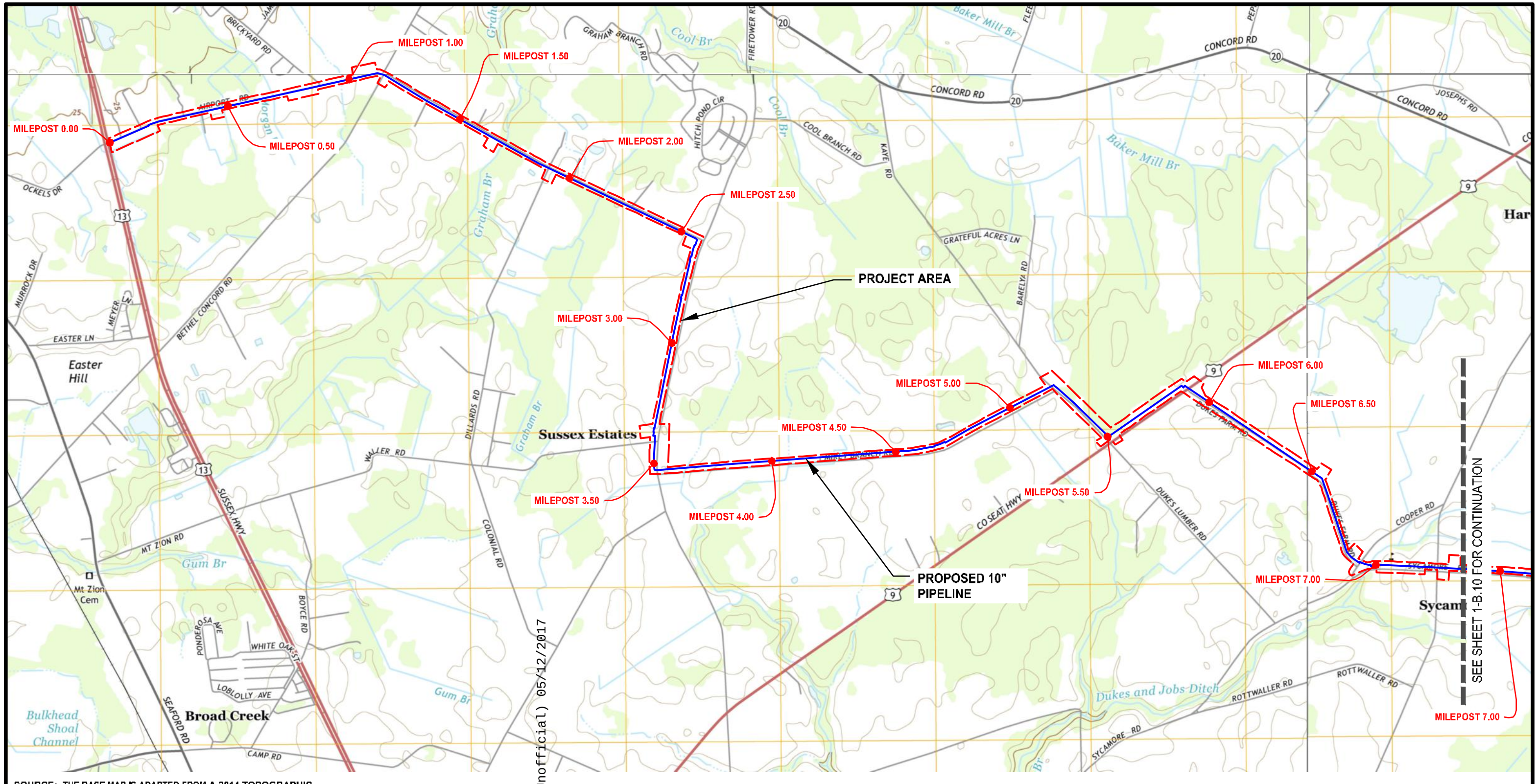

SOURCE: THE BASE MAP IS ADAPTED FROM A 2014 TOPOGRAPHIC QUADRANGLE OF LAUREL, TRAP POND, AND MILLSBORO, SUSSEX COUNTY, DELAWARE

LEGEND

PROJECT AREA

PROPOSED PIPELINE

NORTH

0' 500' 1,000' 2,000' 4,000'

SCALE: 1"=2,000'

20170512-4001 FERC PDF (Unofficial) 05/12/2017

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TOPOGRAPHIC MAP

2017 EXPANSION PROJECT SEAFORD-MILLSBORO CONNECTOR

SUSSEX COUNTY, DELAWARE

JOB NO.	19229	SCALE:	1"=2,000'	DATE:	NOVEMBER 28, 2016	DRAWN BY:	CLO	REVIEW BY:	TAS	APPENDIX:	1-B.9

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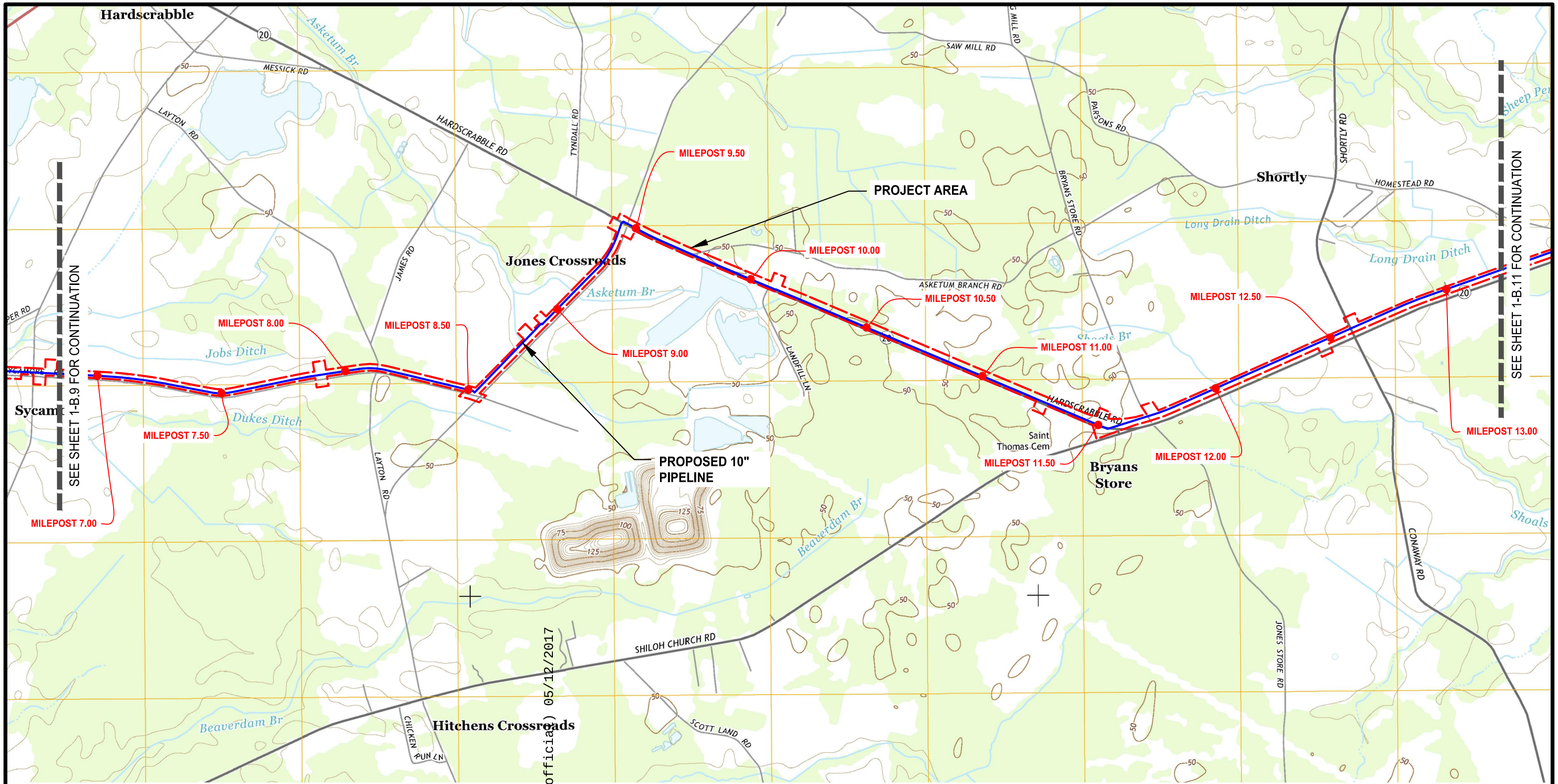

SOURCE: THE BASE MAP IS ADAPTED FROM A 2014 TOPOGRAPHIC QUADRANGLE OF LAUREL, TRAP POND, AND MILLSBORO, SUSSEX COUNTY, DELAWARE

20170512-4001 FERC PDF (Unofficial) 05/12/2017

LEGEND

PROJECT AREA

PROPOSED PIPELINE

NORTH

0' 500' 1,000' 2,000' 4,000'

SCALE: 1"=2,000'

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TOPOGRAPHIC MAP

2017 EXPANSION PROJECT SEAFORD-MILLSBORO CONNECTOR

SUSSEX COUNTY, DELAWARE

JOB NO.	19229	SCALE:	1"=2,000'	DATE:	NOVEMBER 28, 2016	DRAWN BY:	CLO	REVIEW BY:	TAS	APPENDIX:	1-B.10

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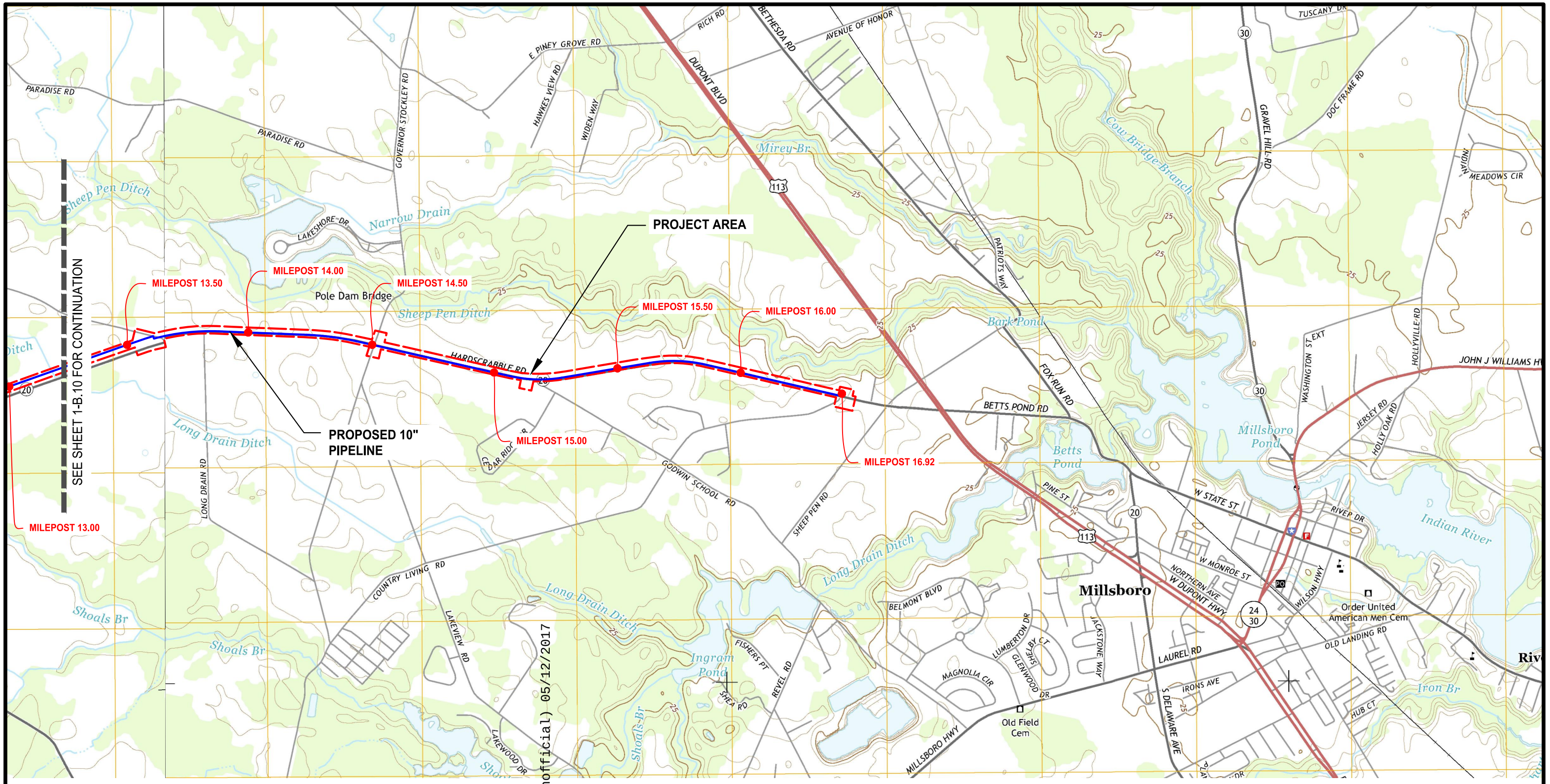

SOURCE: THE BASE MAP IS ADAPTED FROM A 2014 TOPOGRAPHIC QUADRANGLE OF LAUREL, TRAP POND, AND MILLSBORO, SUSSEX COUNTY, DELAWARE

20170512-4001 FERC PDF (Unofficial) 05/12/2017

LEGEND

PROJECT AREA

PROPOSED PIPELINE

NORTH

0' 500' 1,000' 2,000' 4,000'

SCALE: 1"=2,000'

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TOPOGRAPHIC MAP

2017 EXPANSION PROJECT SEAFORD-MILLSBORO CONNECTOR

SUSSEX COUNTY, DELAWARE

JOB NO.	19229	SCALE:	1"=2,000'	DATE:	NOVEMBER 28, 2016	DRAWN BY:	CLO	REVIEW BY:	TAS	APPENDIX:	1-B.11

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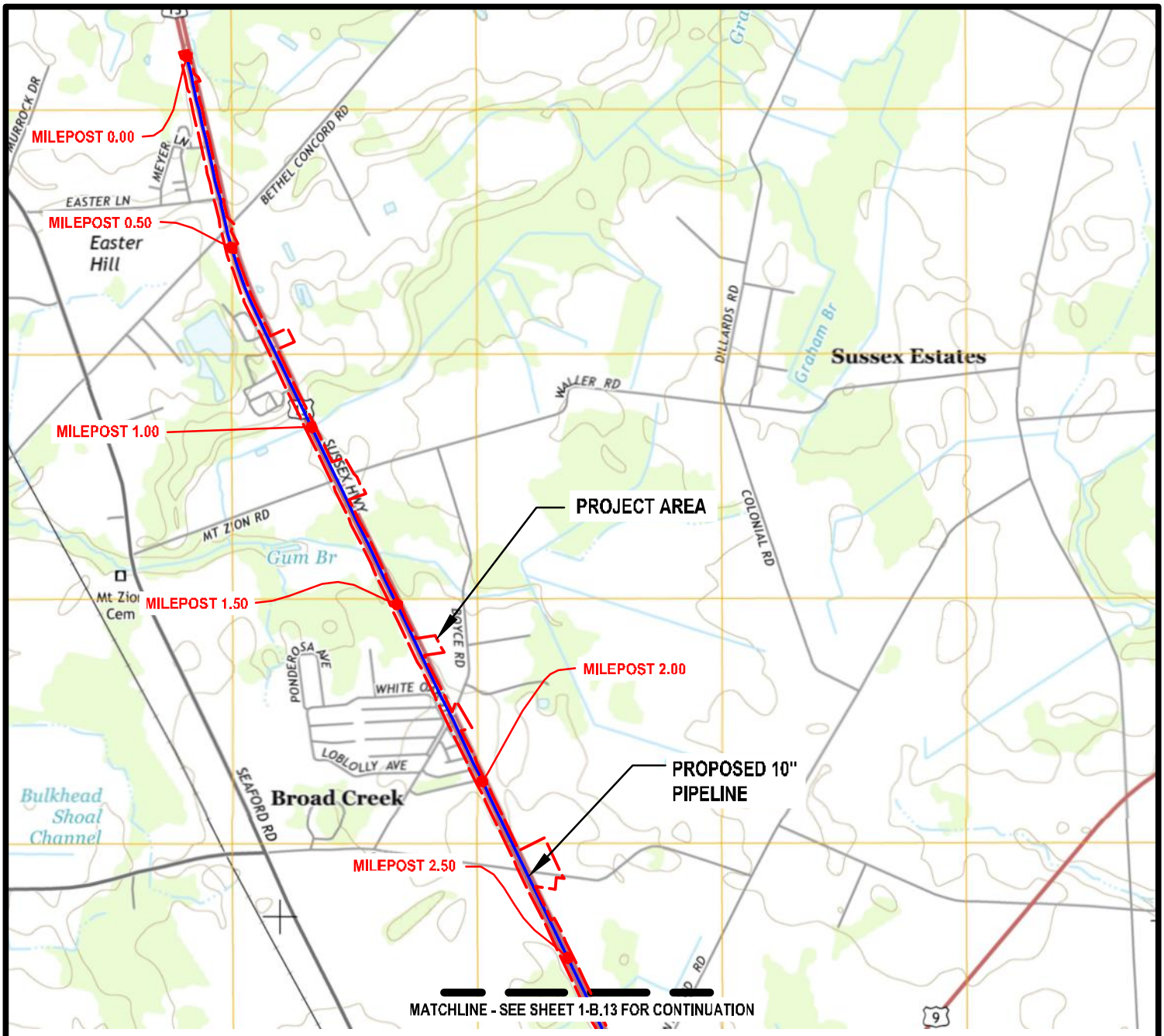

SOURCE: PLAN ADAPTED FROM A 2014 TOPOGRAPHIC QUADRANGLE OF LAUREL, SUSSEX COUNTY, DELAWARE

LEGEND

PROJECT AREA

PROPOSED PIPELINE

NORTH

0' 500' 1,000' 2,000' 4,000'

SCALE: 1"=2,000'

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410-515-9446
FAX: 410-515-4895
WWW.GTAENG.COM

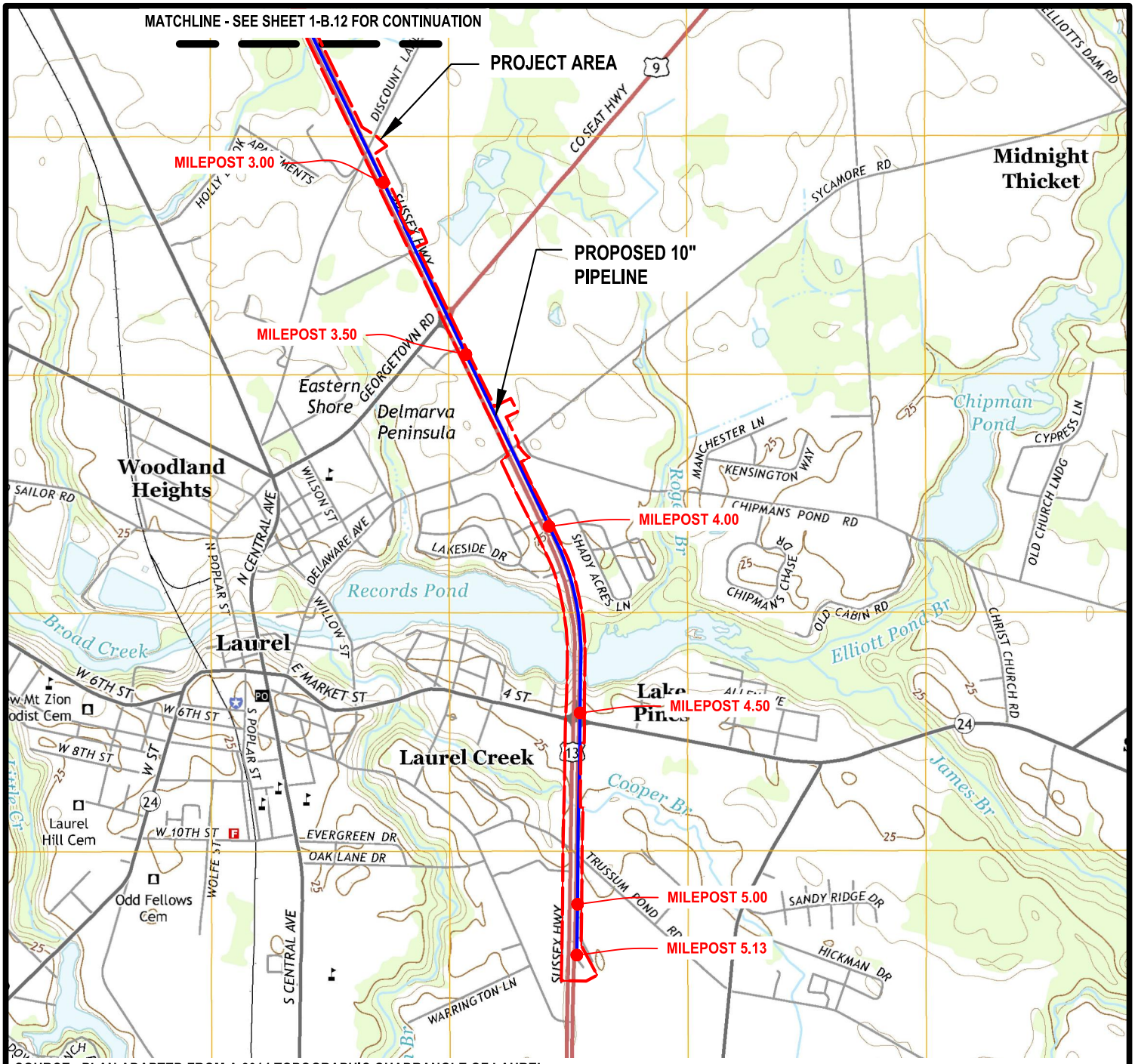
TOPOGRAPHIC MAP

2017 EXPANSION PROJECT LAUREL LOOP

SUSSEX COUNTY, DELAWARE

JOB NO.	19230	SCALE:	1"=2,000'	DATE:	NOVEMBER 28, 2016	DRAWN BY:	CLO	REVIEW BY:	TAS	APPENDIX:	1-B.12

G:\GTA\1□□63-201□S□stem E□□ansion Pro□e□t\Plot\1□□63-Laurel Loo□Figures (DE).dwg



SOURCE: PLAN ADAPTED FROM A 2014 TOPOGRAPHIC QUADRANGLE OF LAUREL, SUSSEX COUNTY, DELAWARE

LEGEND

PROJECT AREA

PROPOSED PIPELINE

NORTH

0' 500' 1,000' 2,000' 4,000'

SCALE: 1"=2,000'

GEO-TECHNOLOGY ASSOCIATES, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
3445-A BOX HILL CORPORATE CENTER DRIVE
ABINGDON, MARYLAND 21009
410-515-9446
FAX: 410-515-4895
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TOPOGRAPHIC MAP

2017 EXPANSION PROJECT LAUREL LOOP

SUSSEX COUNTY, DELAWARE

JOB NO.	SCALE:	DATE:	DRAWN BY:	REVIEW BY:	APPENDIX:
19230	1"=2,000'	NOVEMBER 28, 2016	CLO	TAS	1-B.13

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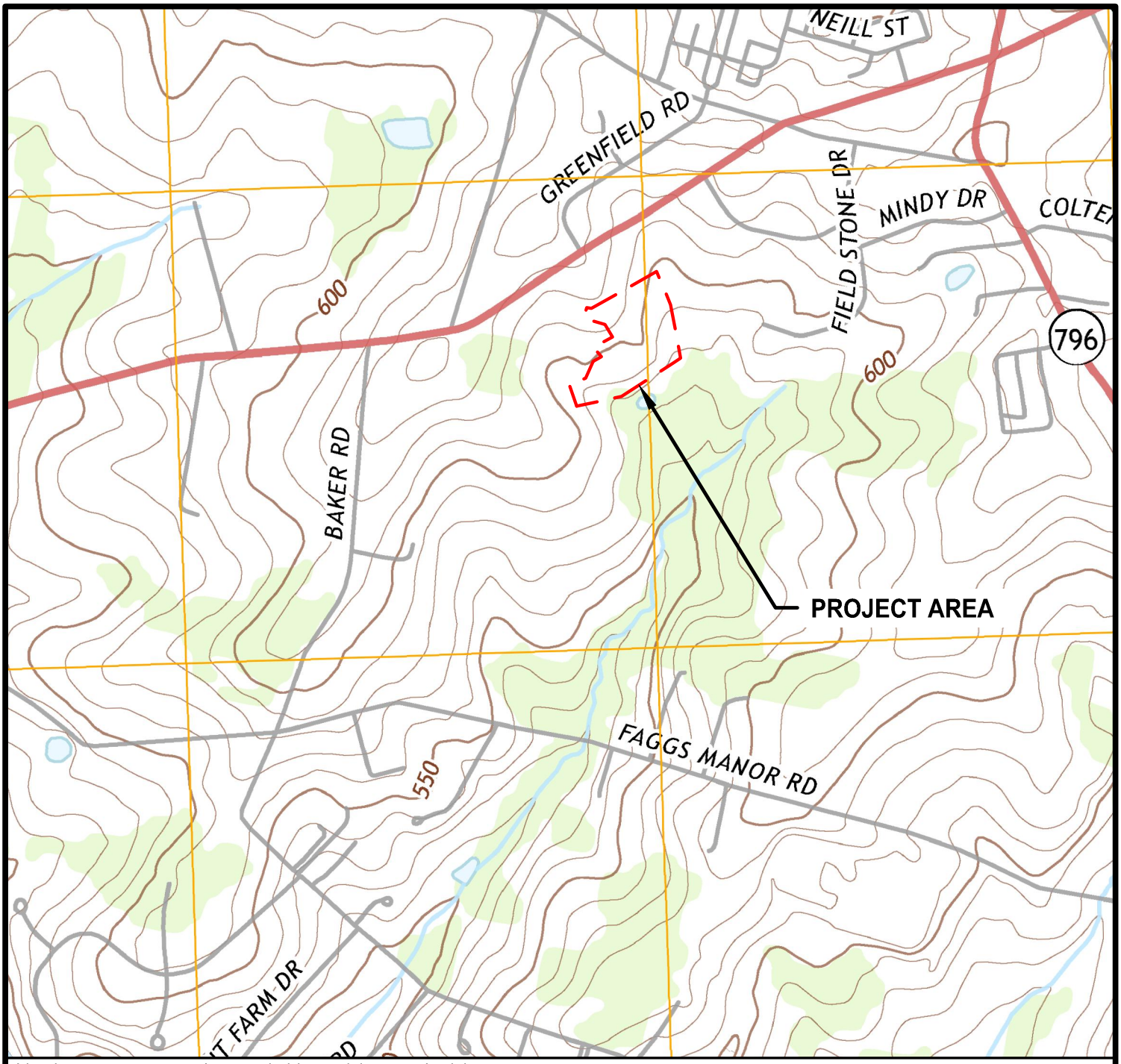

SOURCE: PLAN ADAPTED FROM 2013 TOPOGRAPHIC QUADRANGLES OF PARKESBURG AND OXFORD, CHESTER COUNTY, PENNSYLVANIA

LEGEND

PROJECT AREA

0' 250' 500' 1,000' 2,000'

NORTH

SCALE: 1"=1,000'

GEO-TECHNOLOGY ASSOCIATES, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
3445-A BOX HILL CORPORATE CENTER DRIVE
ABINGDON, MARYLAND 21009
410-515-9446
FAX: 410-515-4895
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TOPOGRAPHIC MAP

2017 EXPANSION PROJECT
DALEVILLE COMPRESSOR STATION

CHESTER COUNTY, PENNSYLVANIA

JOB NO.	SCALE:	DATE:	DRAWN BY:	REVIEW BY:	APPENDIX:
18855	1"=1,000'	NOVEMBER 28, 2016	MJS	TAS	1-B.14

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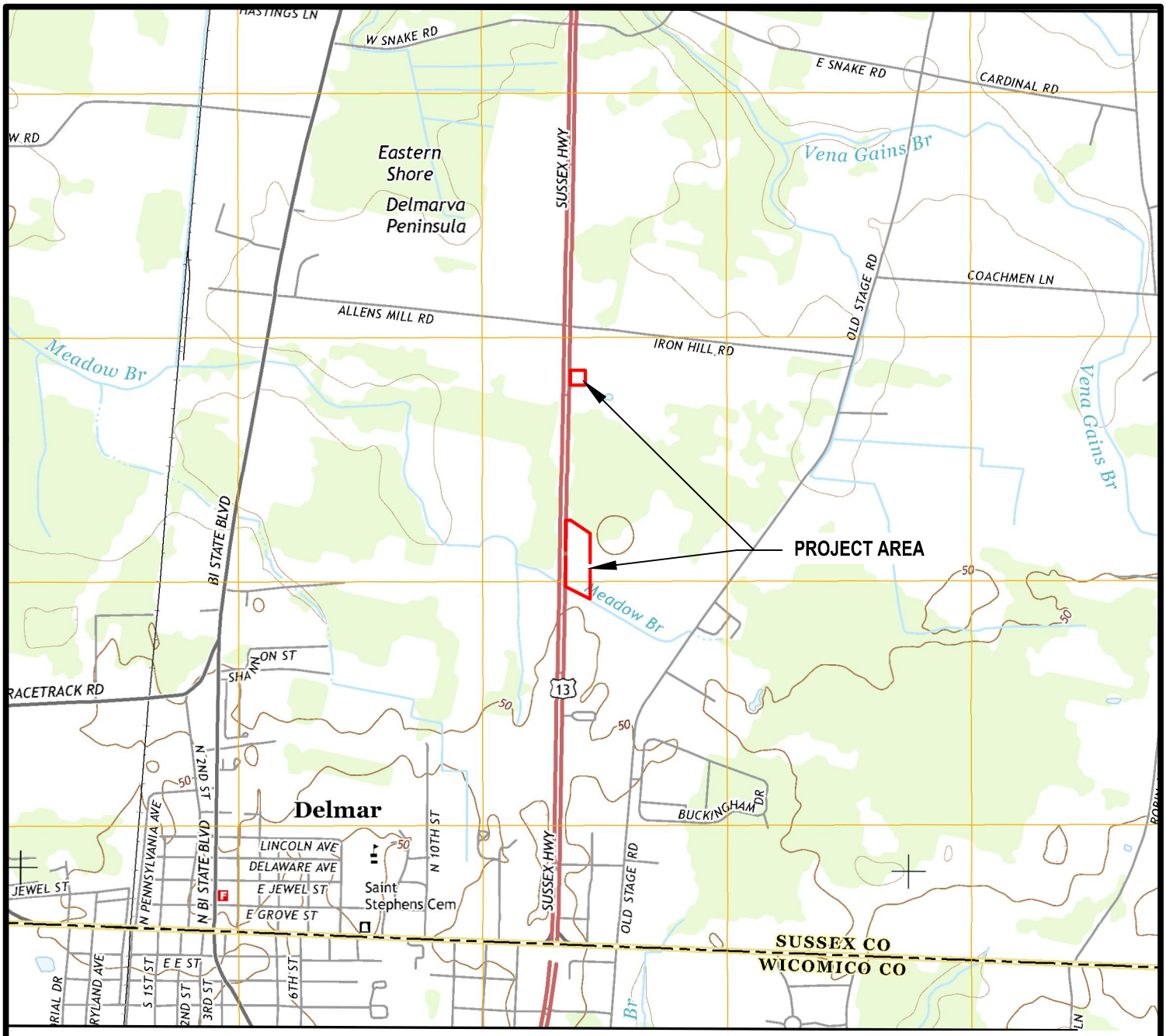

SOURCE: PLAN ADAPTED FROM A 2014 USGS TOPOGRAPHIC QUADRANGLE OF DELMAR, SUSSEX COUNTY, DELAWARE AND WICOMICO COUNTY, MARYLAND

LEGEND

PROJECT AREA

NORTH

0' 500' 1,000' 2,000' 4,000'

SCALE: 1"=2,000'

GEO-TECHNOLOGY ASSOCIATES, INC.
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3445-A BOX HILL CORPORATE CENTER DRIVE
ABINGDON, MARYLAND 21009
410-515-9446
FAX: 410-515-4895
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TOPOGRAPHIC MAP

2017 EXPANSION PROJECT
DELMAR CONTROLLER LOOP

SUSSEX COUNTY, DELAWARE

JOB NO.	SCALE:	DATE:	DRAWN BY:	REVIEW BY:	APPENDIX:
19231	1"=2,000'	NOVEMBER 28, 2016	JMW	TAS	1-B.15

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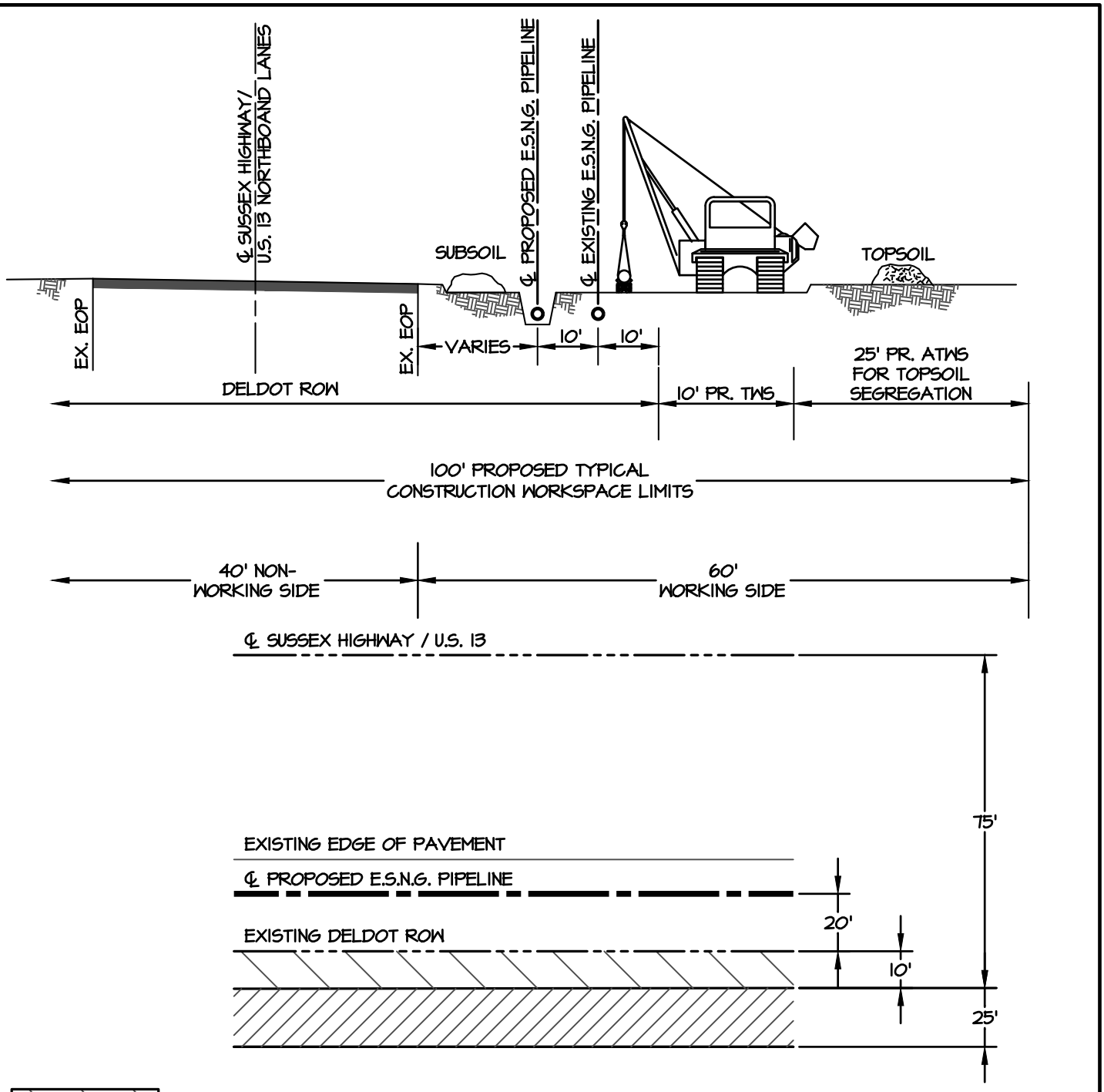
APPENDIX 2

TYPICAL CROSS SECTIONS



NOTES:

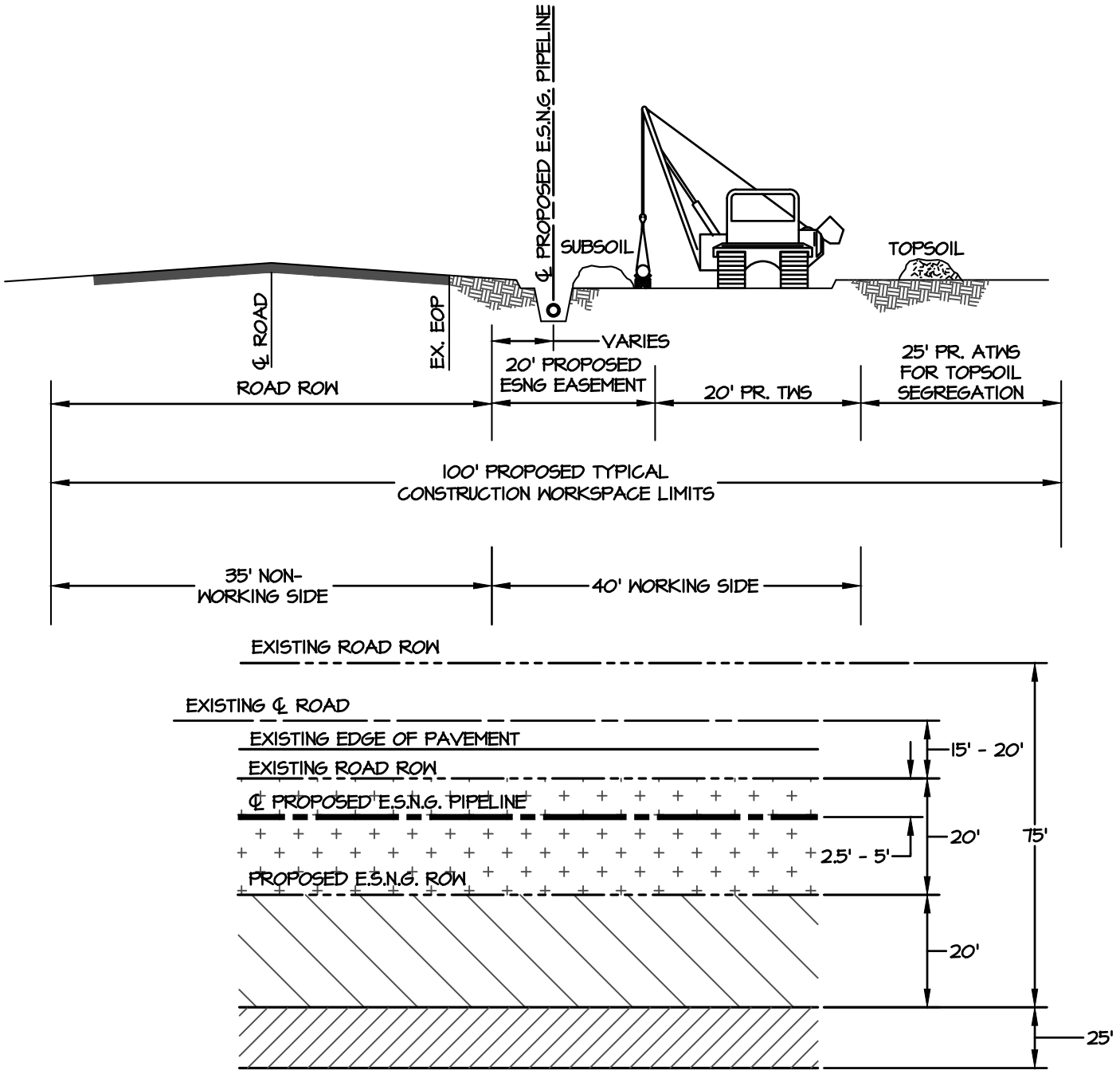
1. CONFIGURATION DOES NOT INCLUDE ADDITIONAL TEMPORARY WORKSPACE FOR STAGING, CROSSINGS AND PIPE STORAGE.
2. REFER TO ENVIRONMENTAL NOTES FOR DETAILED ENVIRONMENTAL PROTECTION MEASURES

MRA
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
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

EASTERN SHORE NATURAL GAS
2017 EXPANSION PROJECT
TYPICAL CONSTRUCTION SECTION #1
DIVIDED HIGHWAY ROADSIDE
CROSS SECTION & OVERVIEW

SCALE: N.T.S.	DATE: 10/14/2016	DRAWN BY: BKS	DESIGN BY: CWB	REVIEW BY: CWB	JOB NO. : 18854



PROPOSED PERMENENT 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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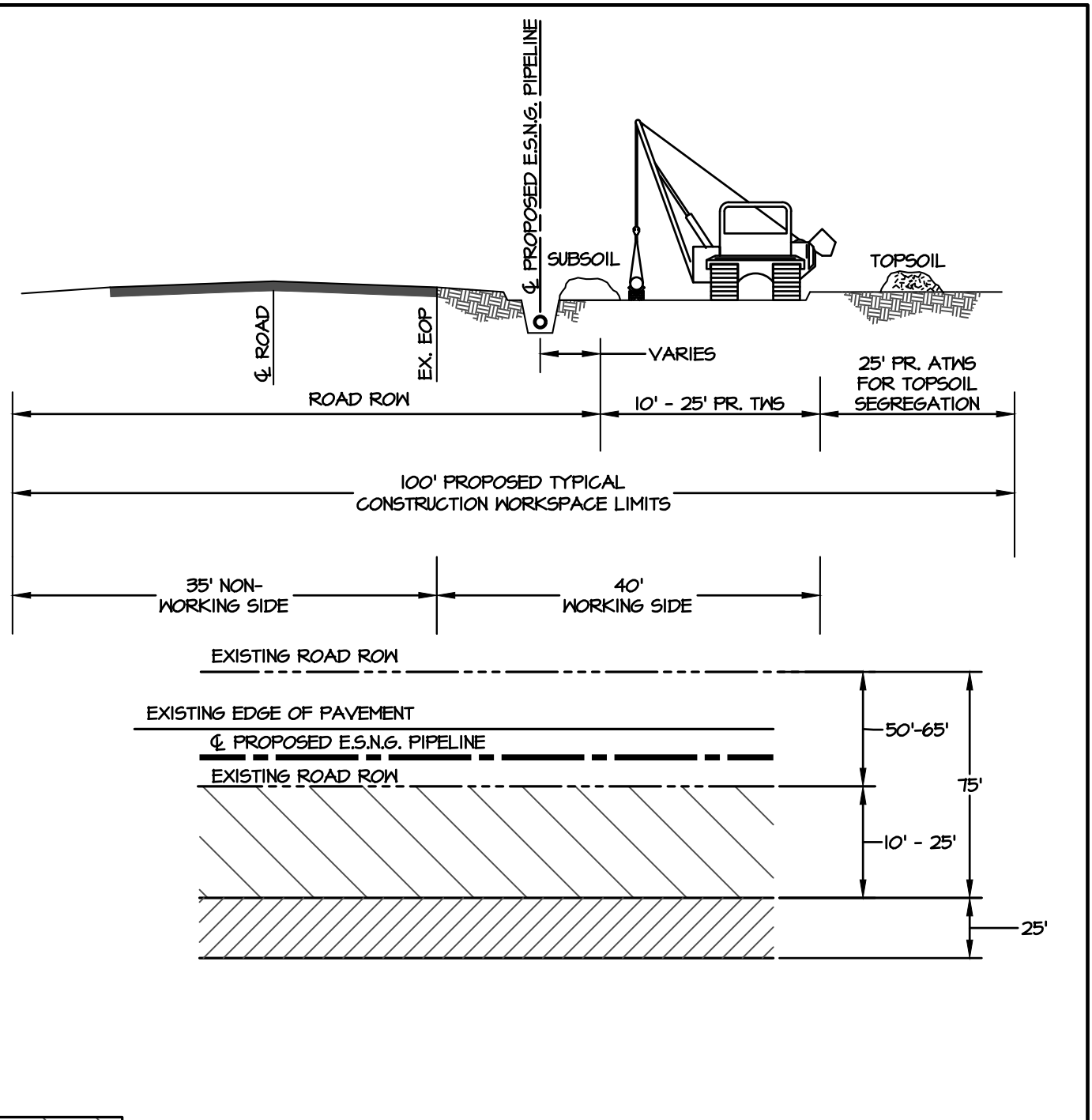
18 BOULDEN CIRCLE, SUITE: 36, WILMINGTON, DE 19720
(302) 326-2200, FAX: (302) 326-2399

EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

EASTERN SHORE NATURAL GAS
2017 EXPANSION PROJECT
TYPICAL CONSTRUCTION SECTION #2
ROADSIDE WITH NEW PE
CROSS SECTION & OVERVIEW

SCALE: N.T.S.	DATE: 10/14/2016	DRAWN BY: BKS	DESIGN BY: CWB	REVIEW BY: CWB	JOB NO. : 18854



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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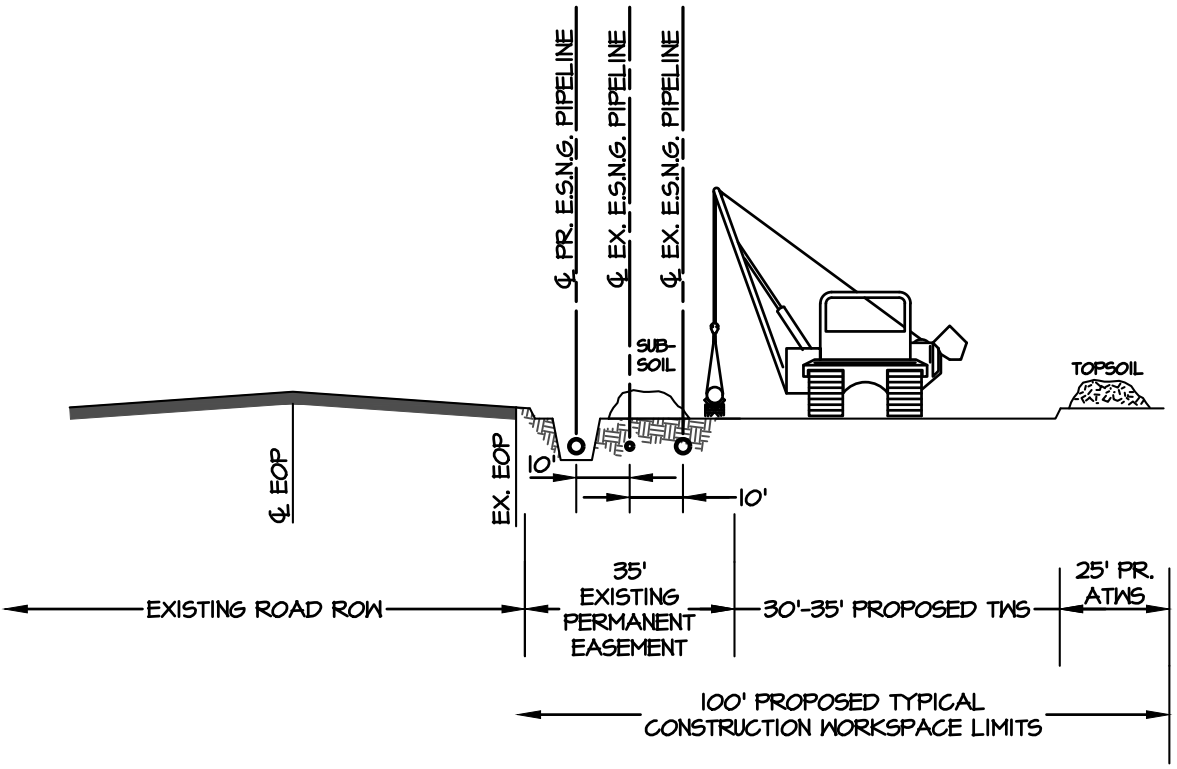
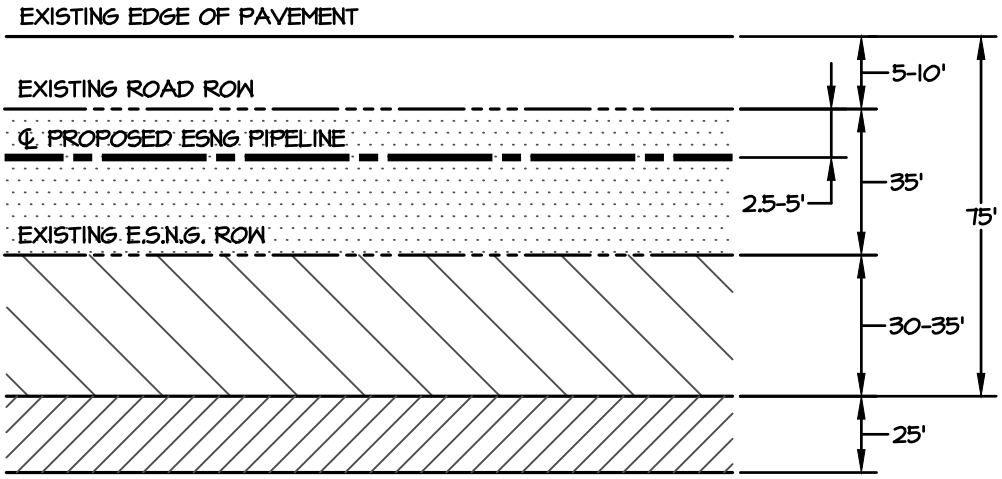
MORRIS & RITCHIE ASSOCIATES, INC.
ENGINEERS, ARCHITECTS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
18 BOULDEN CIRCLE, SUITE: 36, WILMINGTON, DE 19720
(302) 326-2200, FAX: (302) 326-2399

EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

EASTERN SHORE NATURAL GAS
2017 EXPANSION PROJECT
TYPICAL CONSTRUCTION SECTION #3
ROADSIDE WITHOUT NEW PE
CROSS SECTION & OVERVIEW

SCALE: N.T.S.	DATE: 10/14/2016	DRAWN BY: BKS	DESIGN BY: CWB	REVIEW BY: CWB	JOB NO. : 18854





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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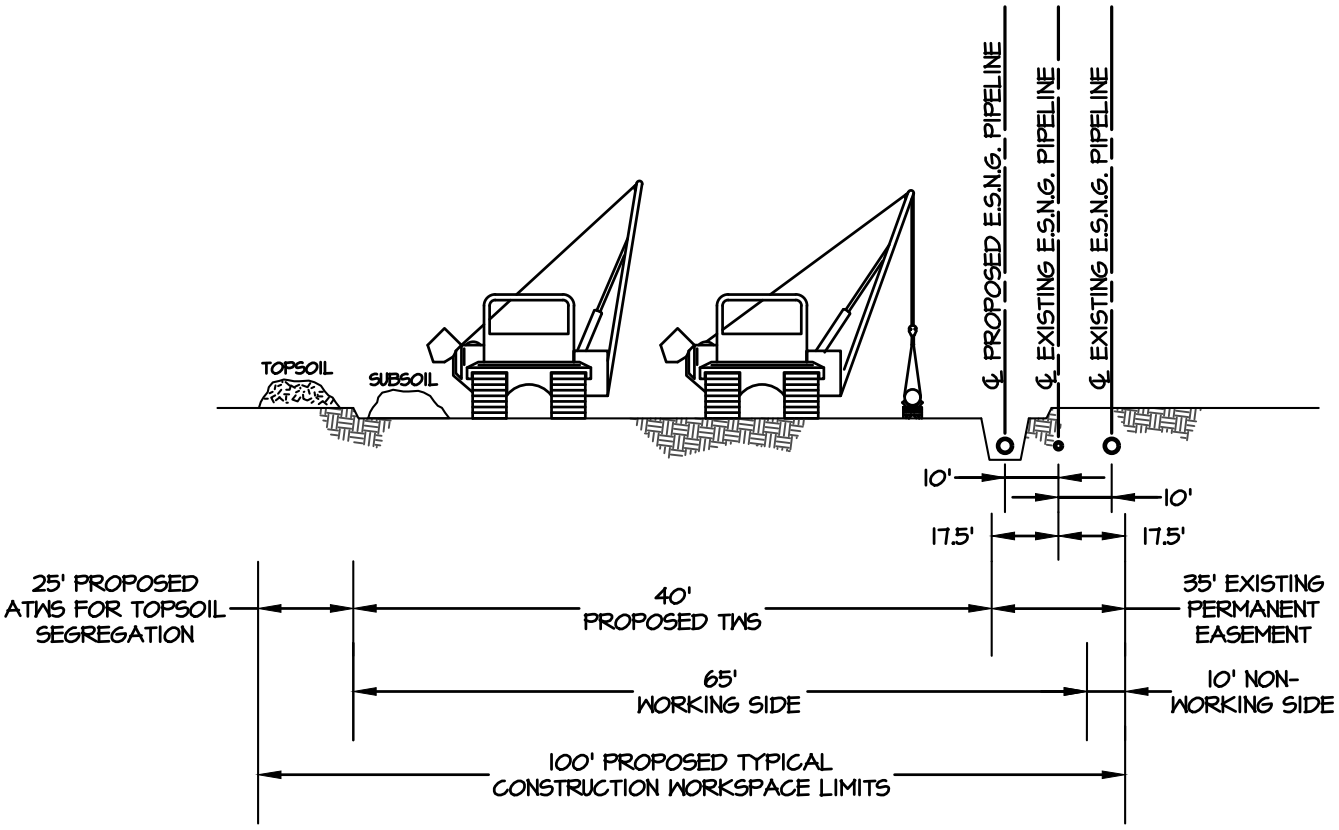
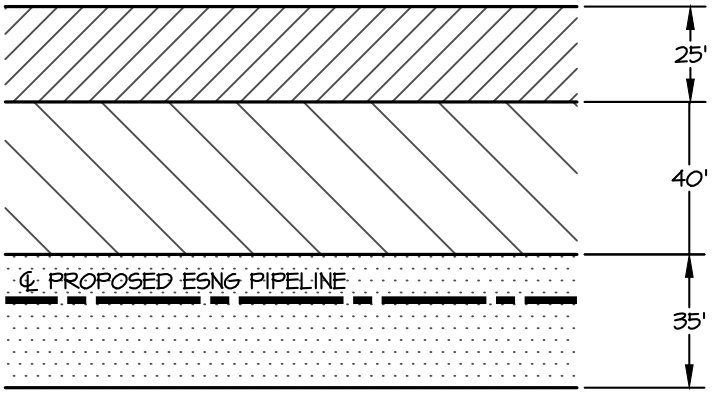
(302) 326-2200, FAX: (302) 326-2399

EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

EASTERN SHORE NATURAL GAS
2017 EXPANSION PROJECT
TYPICAL CONSTRUCTION SECTION #4
APPLETON ROAD
CROSS SECTION & OVERVIEW

SCALE: N.T.S.	DATE: 10/14/2016	DRAWN BY: BKS	DESIGN BY: CWB	REVIEW BY: CWB	JOB NO. : 18854





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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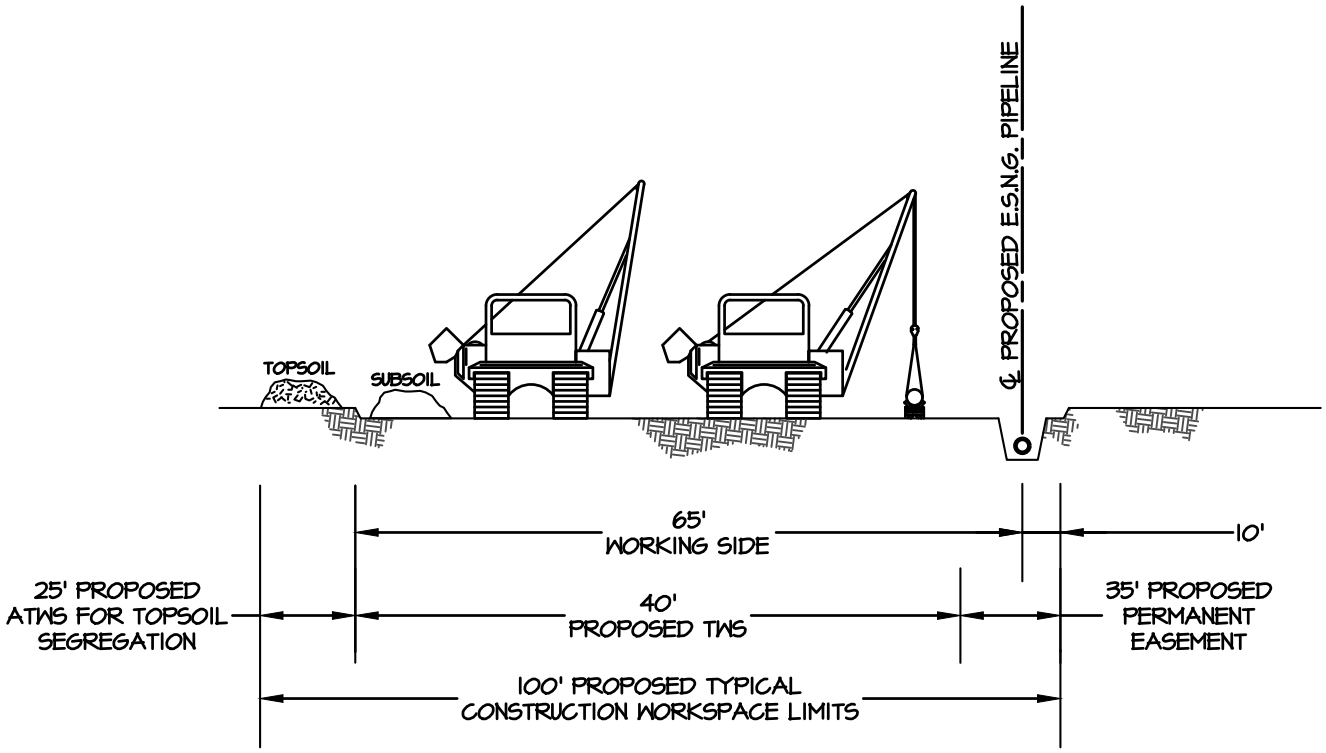
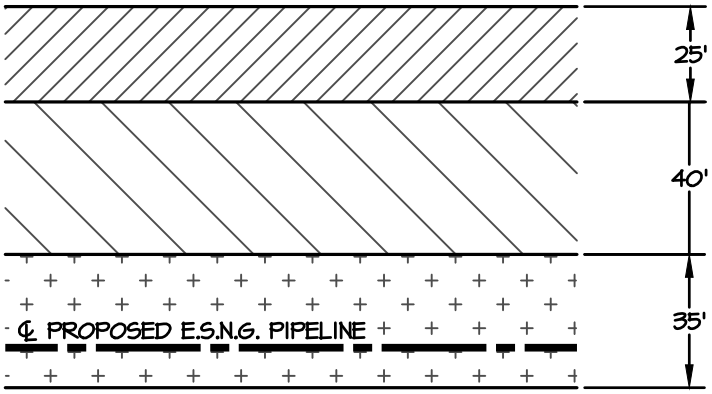
18 BOULDEN CIRCLE, SUITE: 36, WILMINGTON, DE 19720
(302) 326-2200, FAX: (302) 326-2399

EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

EASTERN SHORE NATURAL GAS
2017 EXPANSION PROJECT
TYPICAL CONSTRUCTION SECTION #5
CROSS COUNTRY WITHOUT NEW PE
CROSS SECTION & OVERVIEW

SCALE: N.T.S.	DATE: 10/14/2016	DRAWN BY: BKS	DESIGN BY: CWB	REVIEW BY: CWB	JOB NO. : 18854





PROPOSED PERMENENT 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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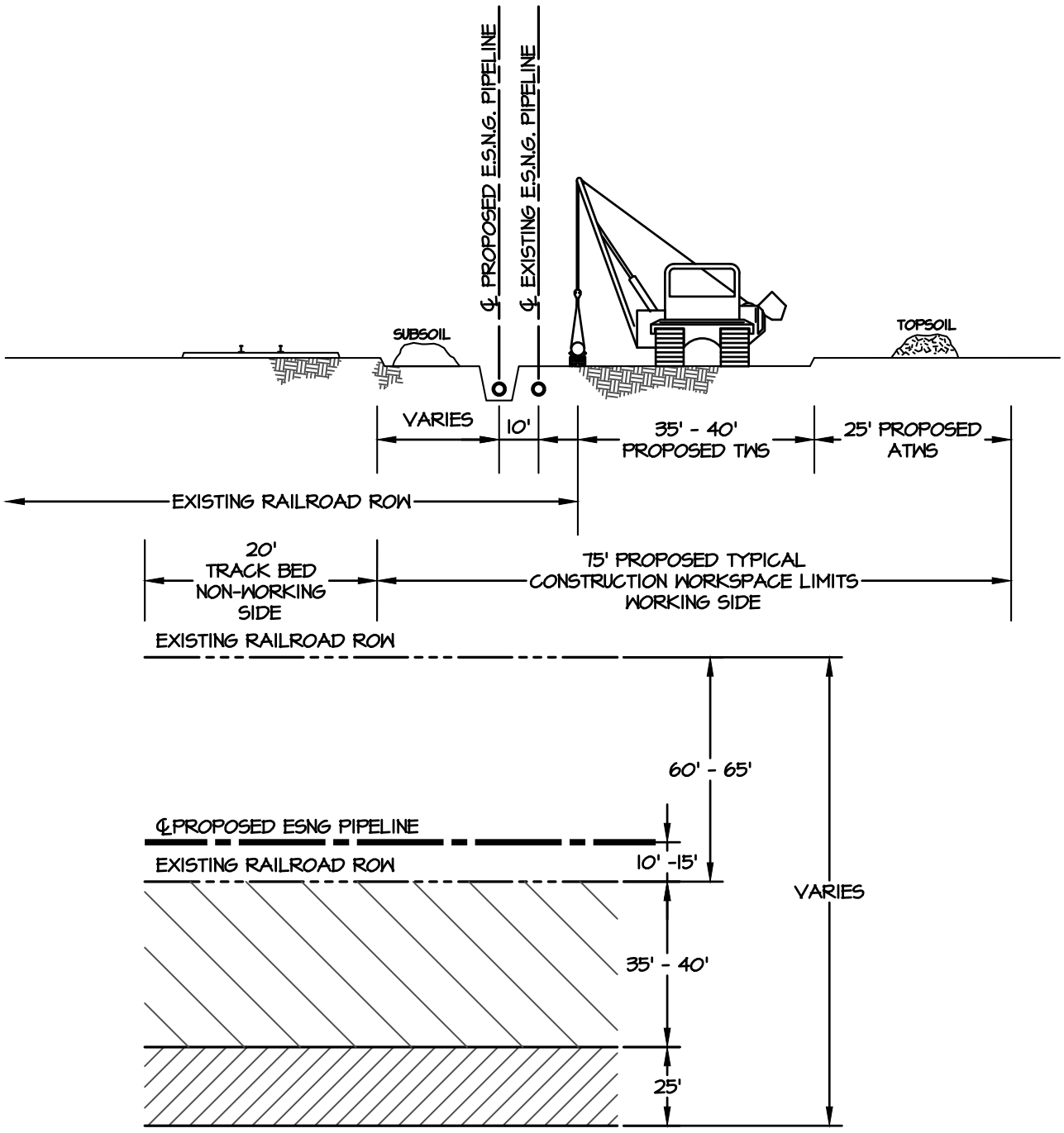
MORRIS & RITCHIE ASSOCIATES, INC.
ENGINEERS, ARCHITECTS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
18 BOULDEN CIRCLE, SUITE: 36, WILMINGTON, DE 19720
(302) 326-2200, FAX: (302) 326-2399

EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

EASTERN SHORE NATURAL GAS
2017 EXPANSION PROJECT
TYPICAL CONSTRUCTION SECTION #6
CROSS COUNTRY WITH NEW PE
CROSS SECTION & OVERVIEW

SCALE: N.T.S.	DATE: 10/14/2016	DRAWN BY: BKS	DESIGN BY: CWB	REVIEW BY: CWB	JOB NO. : 18854



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
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

EASTERN SHORE NATURAL GAS
2017 EXPANSION PROJECT
TYPICAL CONSTRUCTION SECTION #7
ALONG RAILROAD
CROSS SECTION & OVERVIEW

SCALE: N.T.S.	DATE: 10/14/2016	DRAWN BY: BKS	DESIGN BY: CWB	REVIEW BY: CWB	JOB NO. : 18854

APPENDIX 3

LIST OF RESIDENCES AND SITE SPECIFIC PLANS

Appendix 3
Existing Residences/Structures within 50 feet of Construction Workspace
2017 Expansion Project

Project Component	County and State	Milepost	Description of Structure	Distance from Pipeline Centerline (feet)	Distance from Construction Work Space (feet)	Offset Direction Right/Left
Parkesburg Loop	Chester County, PA	0.03	Shed	56	26	Right
		0.05	Shed	64	34	Right
		0.05	Shed	49	19	Right
		0.09	Residence	49	42	Left
		0.09	Residence	54	16	Right
		0.13	Shed	84	47	Right
		0.13	Garage	0	4	Left
		0.14	Shed	9	15	Left
		0.16	Shed	41	24	Left
		0.20	Residence	41	23	Left
		0.43	Residence	198	29	Left
		0.44	Commercial	191	36	Right
		0.87	Residence	47	24	Left
		1.79	Barn	20	9	Right
		2.89	Residence	61	41	Right
		2.90	Garage	38	18	Right
		3.34	Shed	30	8	Right
		3.35	Residence	42	20	Right
Jennersville Loop	Chester County, PA	0.40	Garage	54	46	Right
		0.41	Shed	86	45	Left
		0.41	Residence	50	9	Left
		0.48	Shed	105	15	Left
		0.52	Residence	86	46	Left
		1.79	Residence	146	46	Right
		1.79	Shed	7	0	Left
		1.80	Residence	143	7	Right
		1.83	Shed	96	16	Left
		1.85	Shed	28	17	Right
		1.91	Residence	38	28	Right
		2.95	Residence	48	18	Left
		4.40	Residence	51	7	Right
		5.94	Shed	150	48	Left
		5.95	Shed	110	19	Left
		5.96	Residence	12	4	Left

Appendix 3
Existing Residences/Structures within 50 feet of Construction Workspace
2017 Expansion Project

Project Component	County and State	Milepost	Description of Structure	Distance from Pipeline Centerline (feet)	Distance from Construction Work Space (feet)	Offset Direction Right/Left
		6.21	Garage	49	39	Right
		6.21	Shed	7	0	Inside
Fair Hill Loop	Chester County, PA & Cecil County, MD	0.40	Residence	112	32	Left
		0.43	Residence	106	26	Left
		0.86	Residence	48	12	Right
Summit Loop	New Castle County, DE	0.24	Residence	69	39	Left
		0.30	Residence	62	32	Left
		0.31	Residence	68	47	Right
		0.33	Residence	56	36	Right
		0.34	Residence	58	28	Left
		0.36	Residence	63	43	Right
		0.38	Residence	52	22	Left
		0.41	Residence	18	5	Left
		0.41	Garage	74	45	Left
		0.42	Residence	8	4	Left
		0.44	Residence	7	0	Left
		0.46	Garage	48	18	Left
		0.46	Residence	0	1	Left
		0.47	Residence	59	38	Right
		0.48	Residence	0	7	Left
Hearns Pond Loop	Sussex County, DE	0.00	Residence	257	38	Left
		0.00	Shed	151	48	Left
		0.01	Shed	119	17	Left
		0.03	Residence	130	23	Left
		0.28	Commercial	80	30	Left
		0.61	Commercial	100	45	Left
		0.71	Commercial	75	30	Left
		0.81	Commercial	100	50	Left
		0.95	Commercial	70	20	Left
Seaford-Millsboro Connector	Sussex County, DE	0.25	Residence	99	44	Right
		0.29	Residence	85	30	Right
		0.33	Garage	90	45	Left
		0.35	Residence	98	46	Right
		0.49	Residence	44	8	Right
		0.51	Carport	78	42	Right

Appendix 3
Existing Residences/Structures within 50 feet of Construction Workspace
2017 Expansion Project

Project Component	County and State	Milepost	Description of Structure	Distance from Pipeline Centerline (feet)	Distance from Construction Work Space (feet)	Offset Direction Right/Left
		0.51	Residence	44	8	Right
		0.56	Building	65	20	Left
		0.56	Shed	79	34	Left
		0.58	Residence	44	8	Right
		0.58	Residence	61	16	Left
		0.60	Residence	82	37	Left
		0.62	Residence	50	14	Right
		0.67	Commercial	49	13	Right
		0.72	Residence	89	33	Right
		0.80	Residence	174	13	Right
		0.94	Residence	52	11	Right
		1.09	Residence	46	3	Right
		1.17	Residence	71	25	Left
		1.33	Residence	93	48	Left
		1.34	Garage	86	41	Left
		1.51	Residence	86	40	Left
		1.54	Residence	88	41	Left
		1.64	Shed	78	33	Left
		1.67	Gazeebo	84	39	Left
		2.19	Residence	94	49	Left
		2.29	Residence	93	48	Left
		4.17	Residence	44	22	Left
		4.22	Residence	83	28	Left
		4.36	Garage	100	45	Left
		4.38	Shed	63	9	Left
		4.54	Commercial	85	45	Left
		4.56	Commercial	56	16	Left
		4.60	Residence	53	13	Left
		4.62	Residence	44	4	Left
		4.70	Residence	53	4	Left
		4.71	Residence	54	4	Left
		5.20	Barn	94	49	Left
		5.24	Residence	87	42	Left
		5.48	Residence	74	29	Left
		6.00	Residence	104	49	Left

Appendix 3
Existing Residences/Structures within 50 feet of Construction Workspace
2017 Expansion Project

Project Component	County and State	Milepost	Description of Structure	Distance from Pipeline Centerline (feet)	Distance from Construction Work Space (feet)	Offset Direction Right/Left
		6.06	Residence	99	54	Right
		6.10	Commercial	31	10	Left
		6.12	Commercial	33	10	Left
		6.12	Commercial	70	25	Right
		6.34	Commercial	27	12	Left
		6.36	Commercial	55	39	Left
		6.42	Residence	45	10	Right
		6.91	Garage	47	11	Right
		7.25	Residence	67	23	Left
		7.25	Residence	27	8	Right
		7.28	Residence	76	32	Left
		7.71	Residence	39	9	Right
		7.75	Residence	59	29	Right
		7.81	Residence	82	37	Left
		7.84	Residence	92	46	Left
		8.02	Residence	67	22	Left
		8.30	Residence	73	28	Left
		8.77	Residence	52	7	Right
		8.79	Shed	79	34	Right
		9.06	Residence	84	38	Left
		9.15	Residence	80	33	Right
		9.41	Residence	58	5	Left
		9.42	Garage	142	27	Left
		9.83	Residence	45	10	Right
		9.84	Garage	54	19	Right
		10.23	Residence	66	9	Left

Appendix 3
Existing Residences/Structures within 50 feet of Construction Workspace
2017 Expansion Project

Project Component	County and State	Milepost	Description of Structure	Distance from Pipeline Centerline (feet)	Distance from Construction Work Space (feet)	Offset Direction Right/Left
		10.29	Garage	99	44	Left
		10.32	Residence	97	42	Left
		10.37	Residence	90	30	Left
		11.45	Residence	100	43	Left
		11.84	Residence	97	48	Right
		12.20	Residence	78	32	Left
		12.55	Shed	94	47	Left
		12.57	Shed	52	44	Left
		12.58	Residence	28	21	Left
		12.66	Residence	69	16	Right
		12.75	Commercial	40	12	Left
		12.76	Residence	69	17	Right
		12.79	Commercial	50	22	Left
		12.81	Commercial	47	20	Left
		12.93	Residence	56	29	Left
		13.05	Residence	70	43	Left
		13.09	Commercial	25	8	Left
		14.93	Residence	86	30	Left
		14.99	Commercial	85	41	Right
		16.93	Residence	91	35	Left
Laurel Loop	Sussex County, DE	0.09	Commercial	70	40	Left
		0.19	Commercial	40	30	Left
		1.65	Commercial	80	40	Left
		1.78	Commercial	30	2	Left
		1.88	Commercial	100	20	Left
		2.42	Commercial	75	48	Left
		2.55	Commercial	60	35	Left
		2.90	Commercial	275	20	Left

Appendix 3
Existing Residences/Structures within 50 feet of Construction Workspace
2017 Expansion Project

Project Component	County and State	Milepost	Description of Structure	Distance from Pipeline Centerline (feet)	Distance from Construction Work Space (feet)	Offset Direction Right/Left
		2.93	Commercial	70	40	Left
		2.95	Commercial	70	40	Left
		2.97	Commercial	70	40	Left
		2.99	Commercial	70	40	Left
		3.01	Commercial	70	40	Left
		3.03	Commercial	70	40	Left
		3.10	Commercial	65	40	Left
		3.12	Commercial	60	40	Left
		3.14	Commercial	50	20	Left
		3.35	Commercial	40	25	Left
		3.82	Commercial	60	40	Left
		3.88	Commercial	55	30	Left
		3.91	Commercial	60	30	Left
		3.92	Commercial	60	35	Left
		3.93	Commercial	60	30	Left
		3.96	Commercial	65	40	Left
		4.00	Commercial	50	25	Left
		4.03	Commercial	60	35	Left
		4.09	Commercial	40	2	Left
		4.13	Commercial	60	5	Left
		4.14	Commercial	80	30	Left
		4.22	Commercial	50	15	Left
		4.48	Commercial	50	30	Left
		4.55	Commercial	70	45	Left
		4.92	Commercial	60	40	Left
		4.96	Commercial	70	45	Left
		5.05	Commercial	60	40	Left
		5.07	Commercial	60	40	Left
		5.11	Commercial	120	30	Left
		5.13	Commercial	220	30	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 — 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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NO.	DATE	DESCRIPTION

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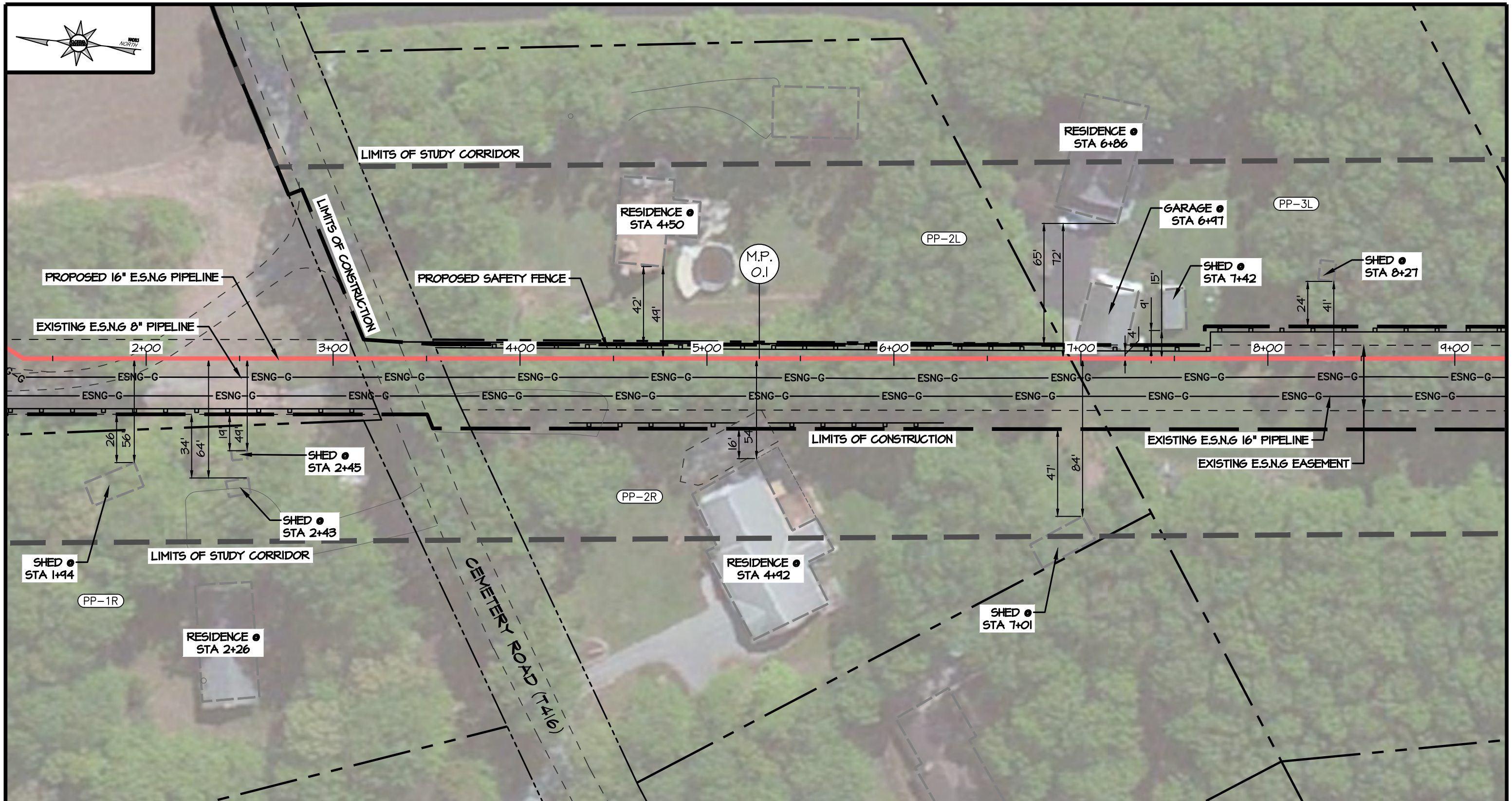
TEL: (302) 326-2200 FAX: (302) 326-2399
MRAGTA.COM

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

RESIDENTIAL MAP
2017 EXPANSION PROJECT
CHESTER COUNTY, PENNSYLVANIA; CECIL COUNTY, MARYLAND;
NEW CASTLE, KENT & SUSSEX COUNTIES, DELAWARE

PROJECT NO:	18854	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	1 OF 1



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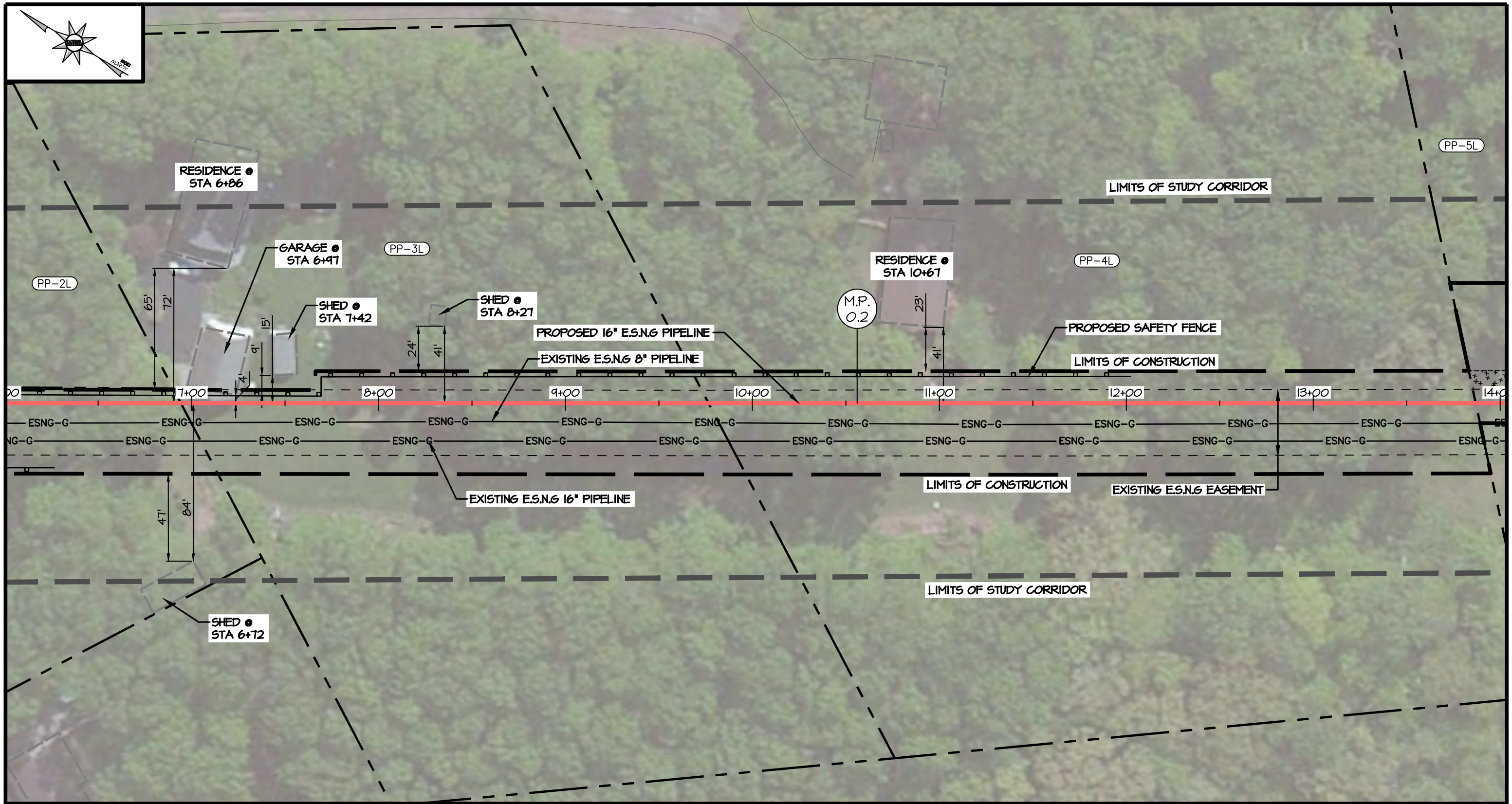

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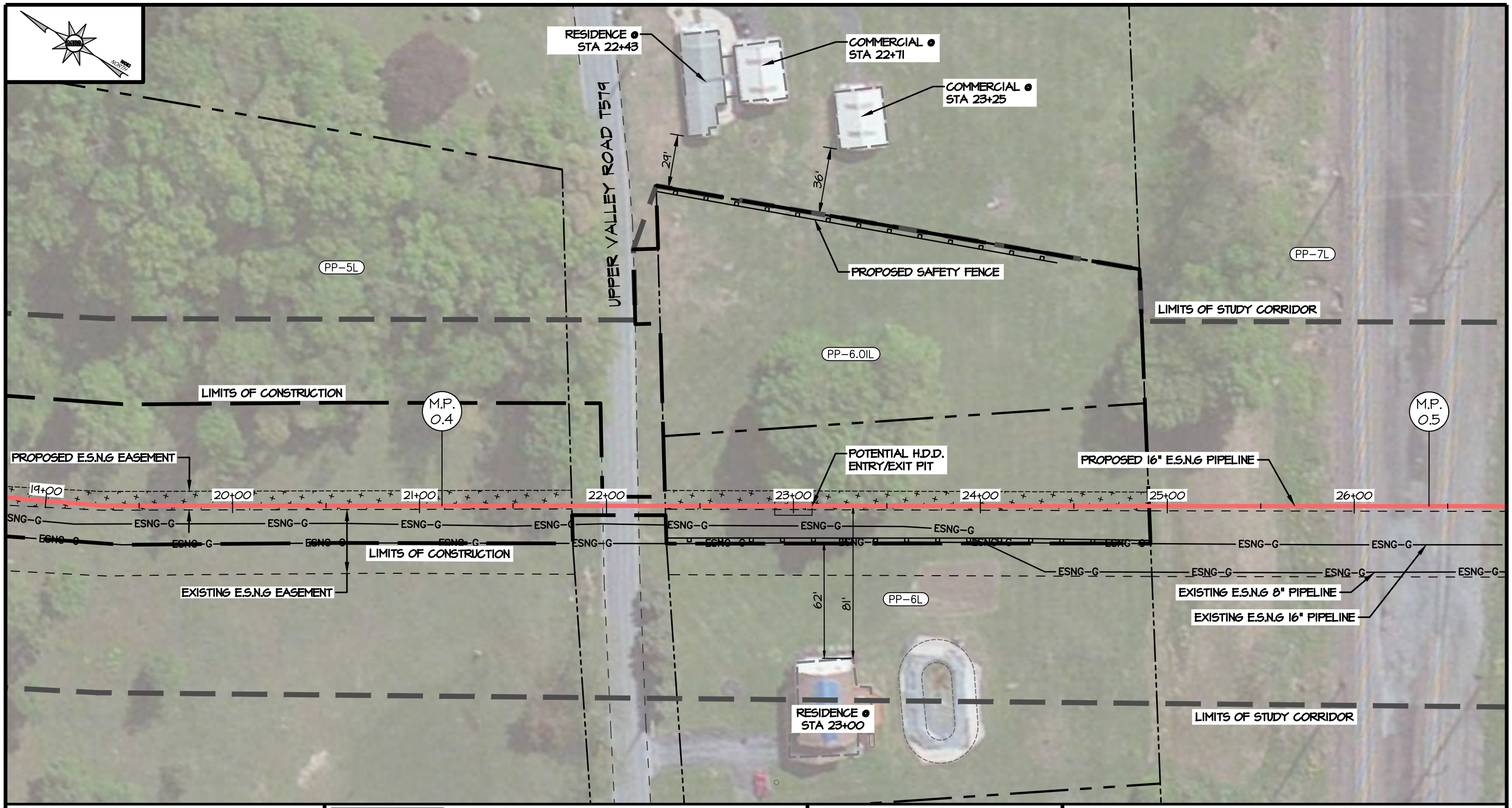

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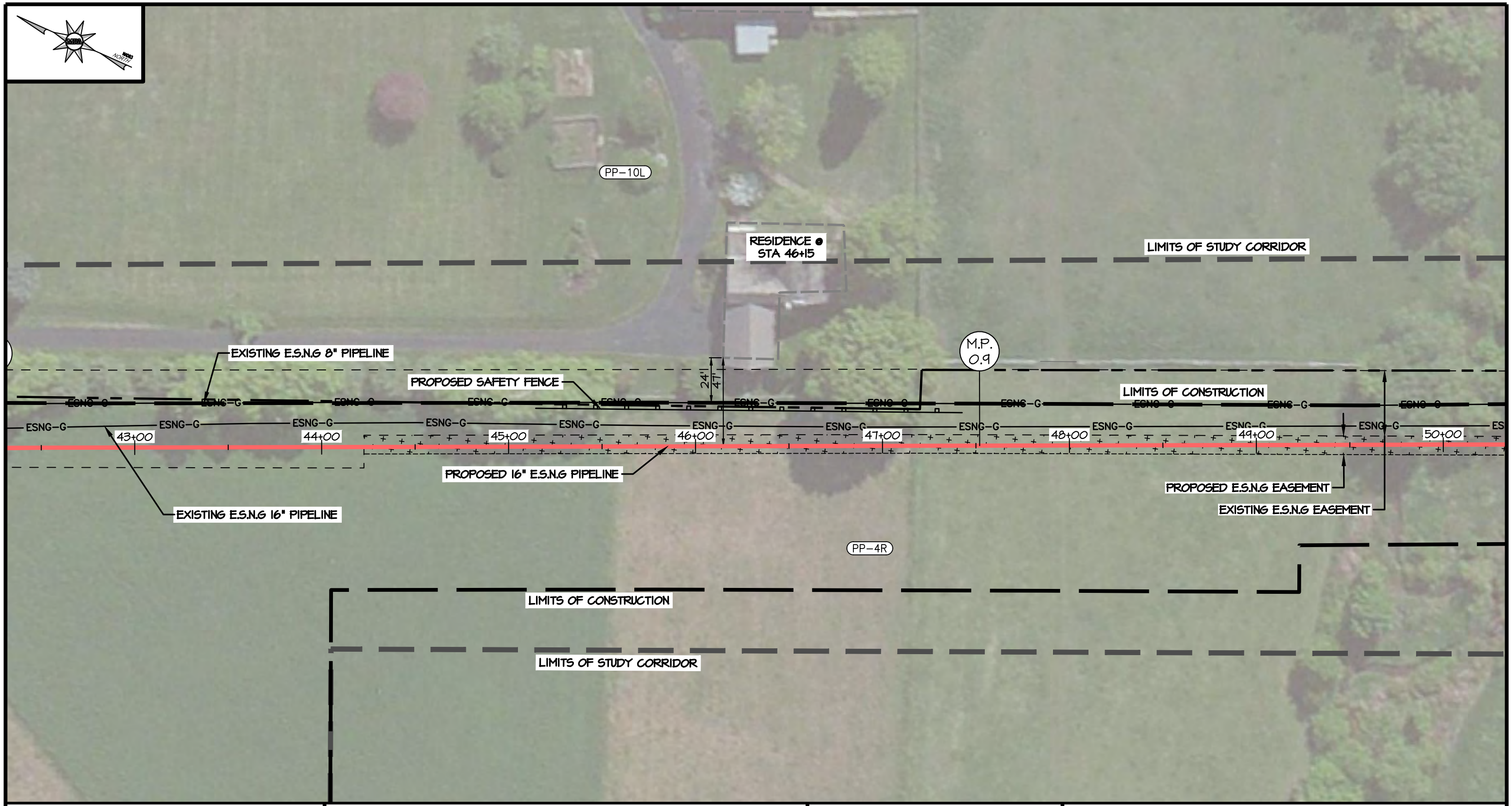

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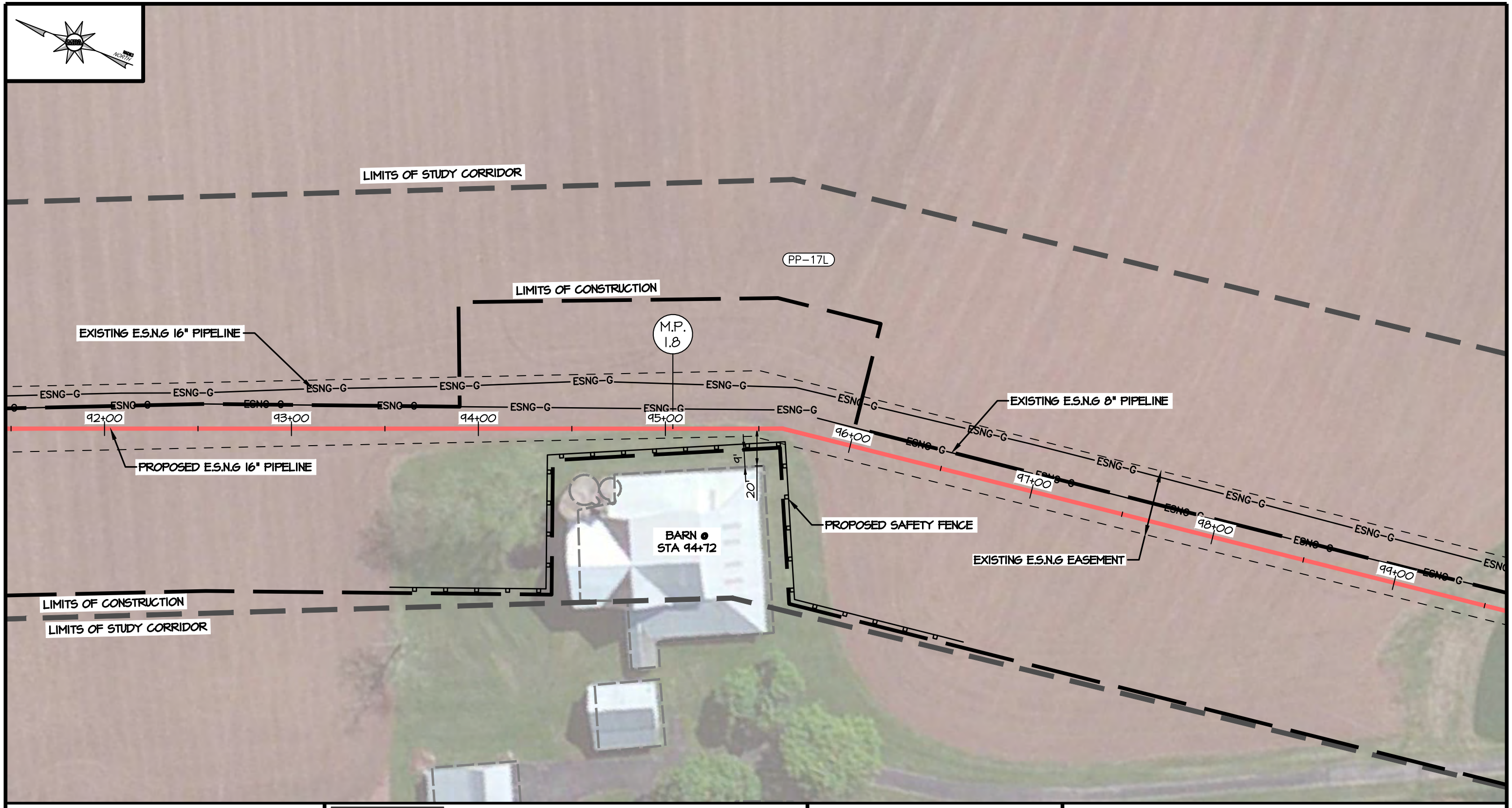

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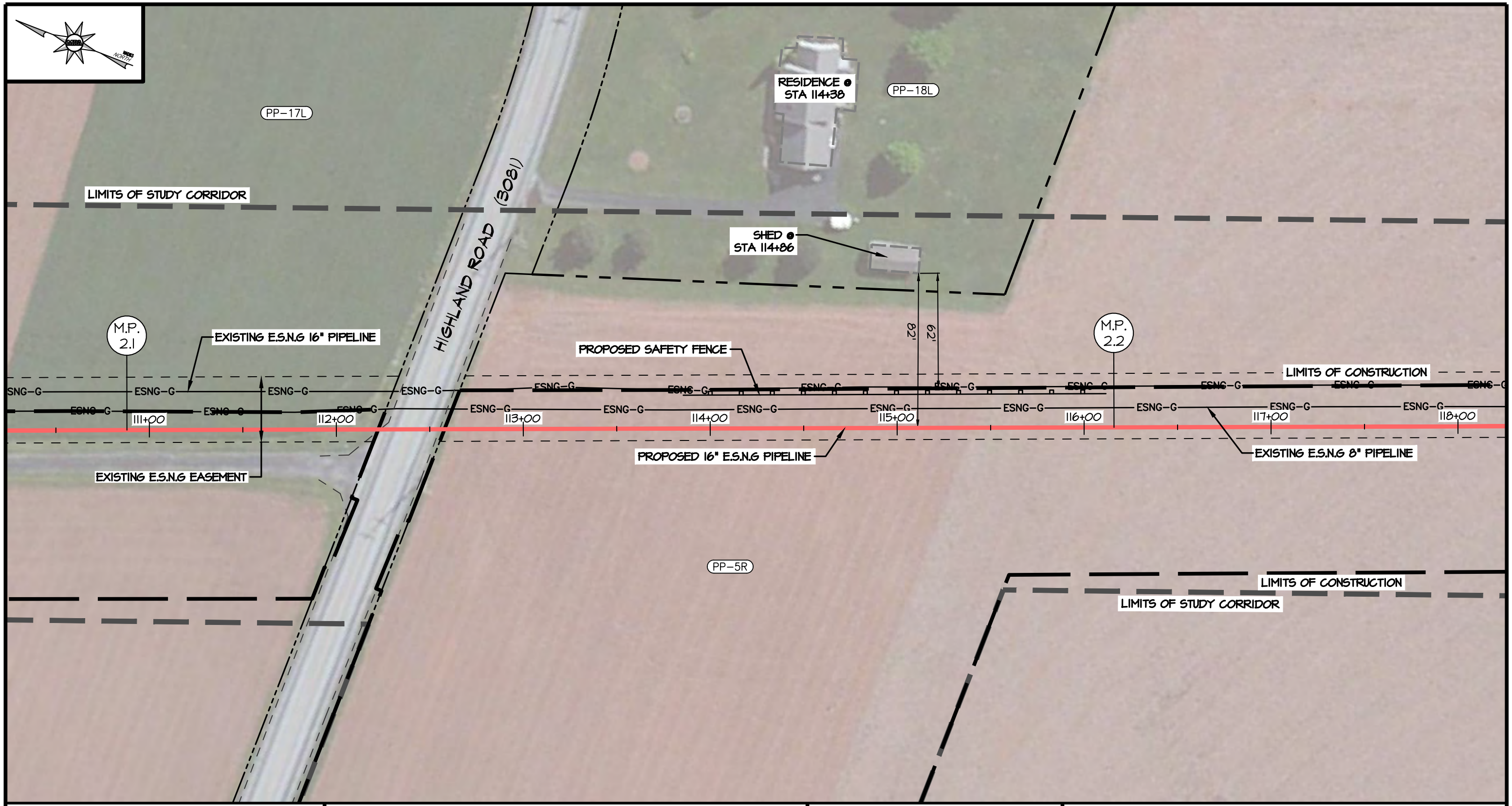

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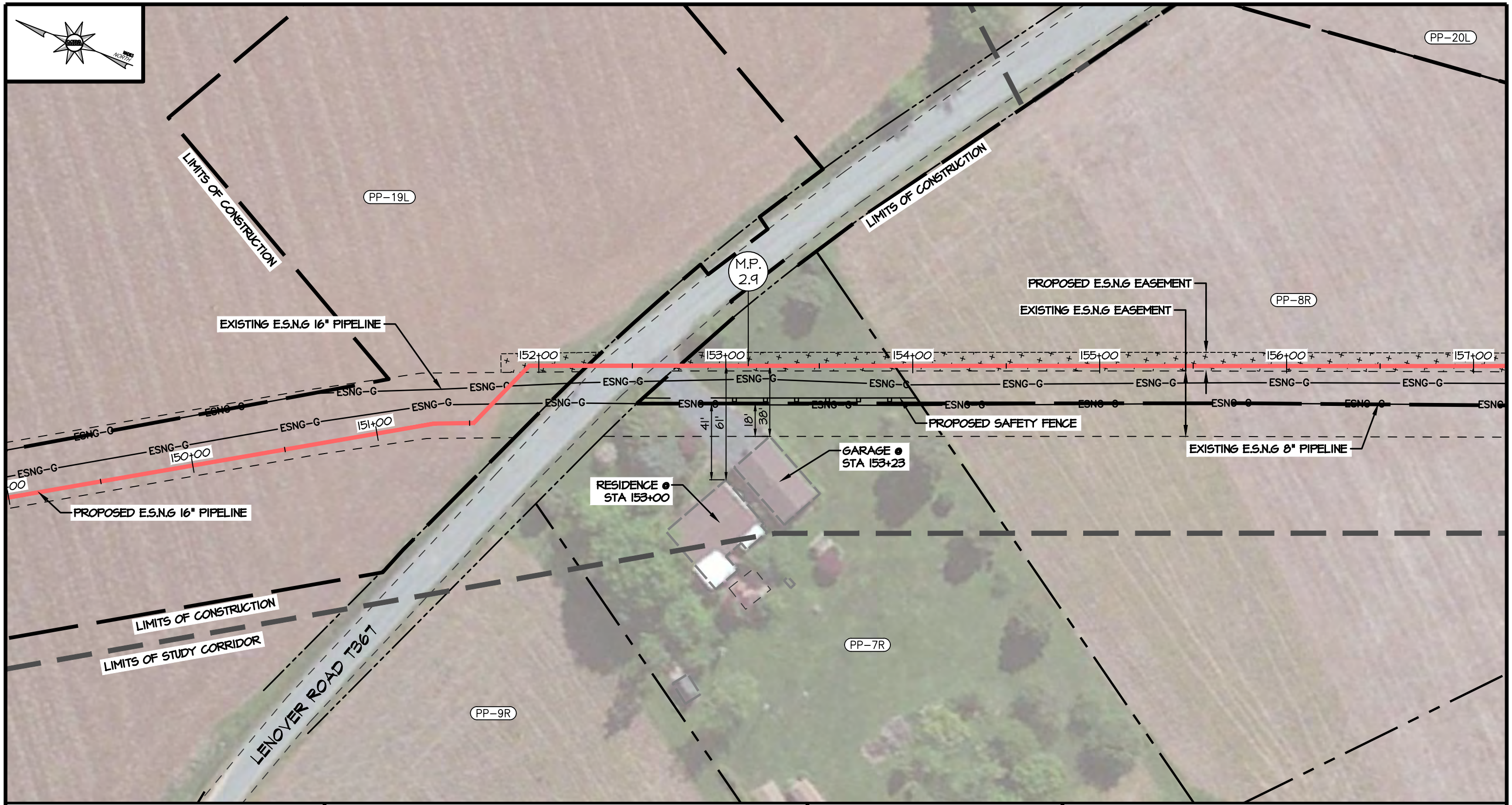

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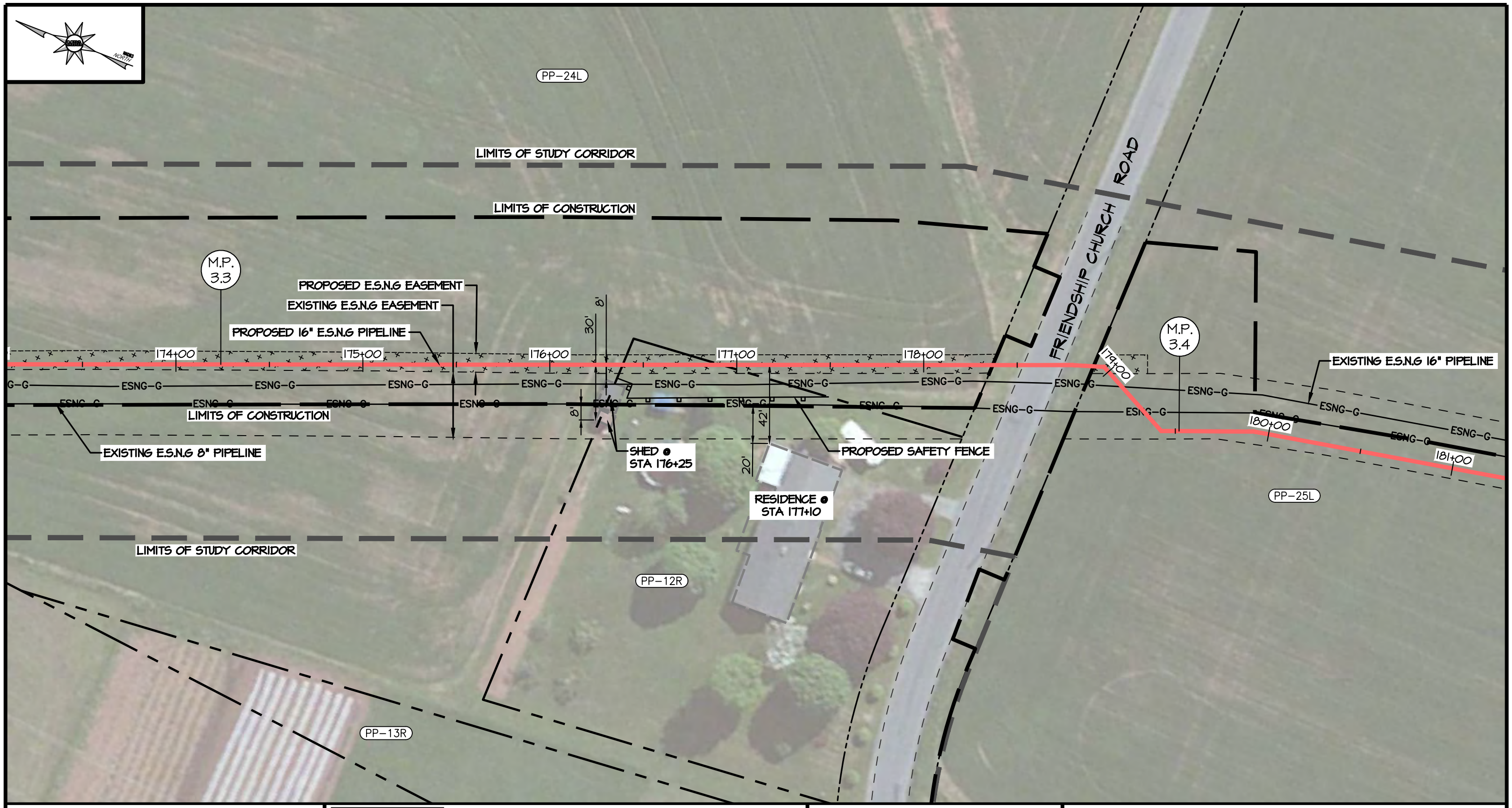

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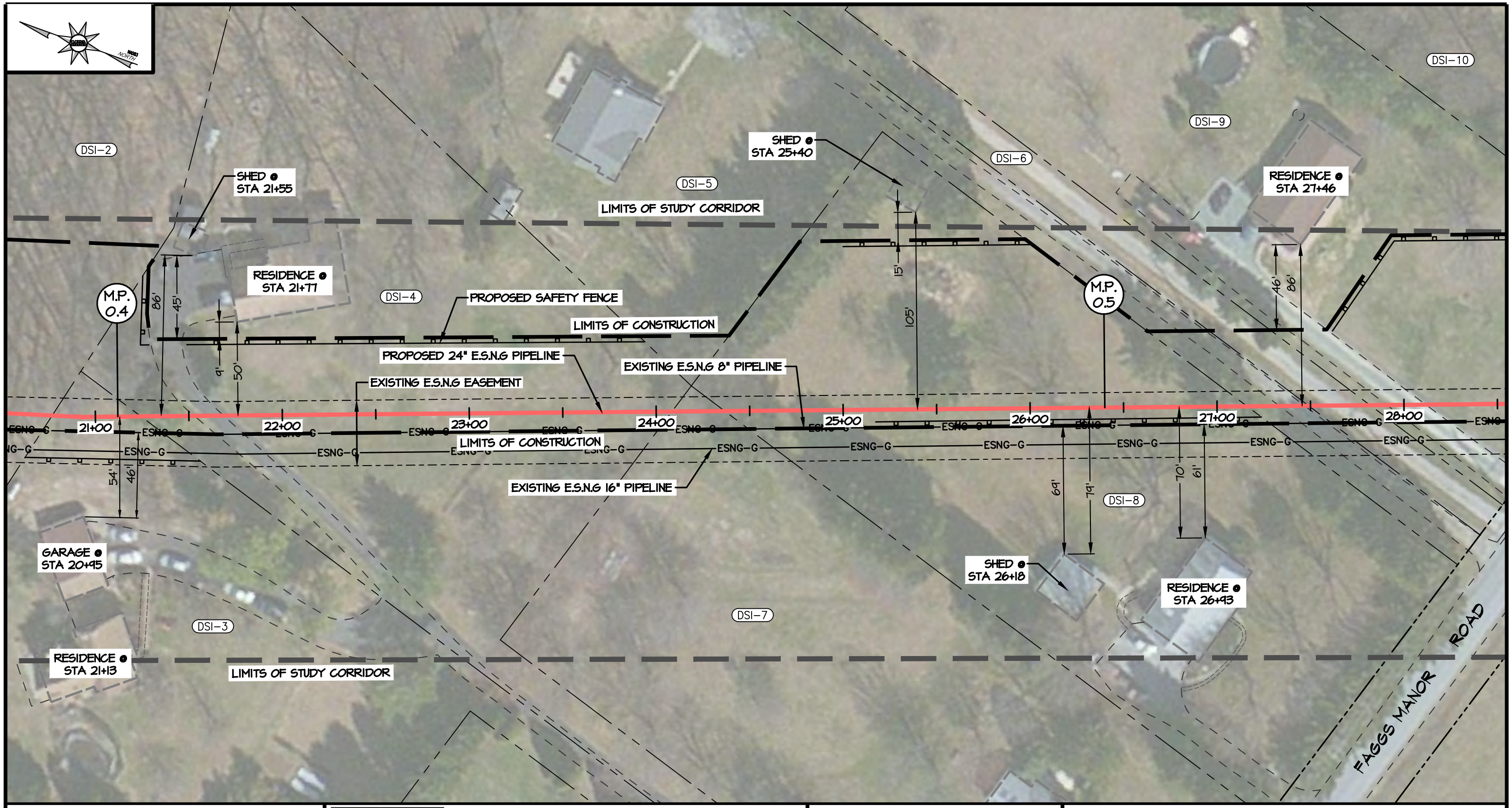

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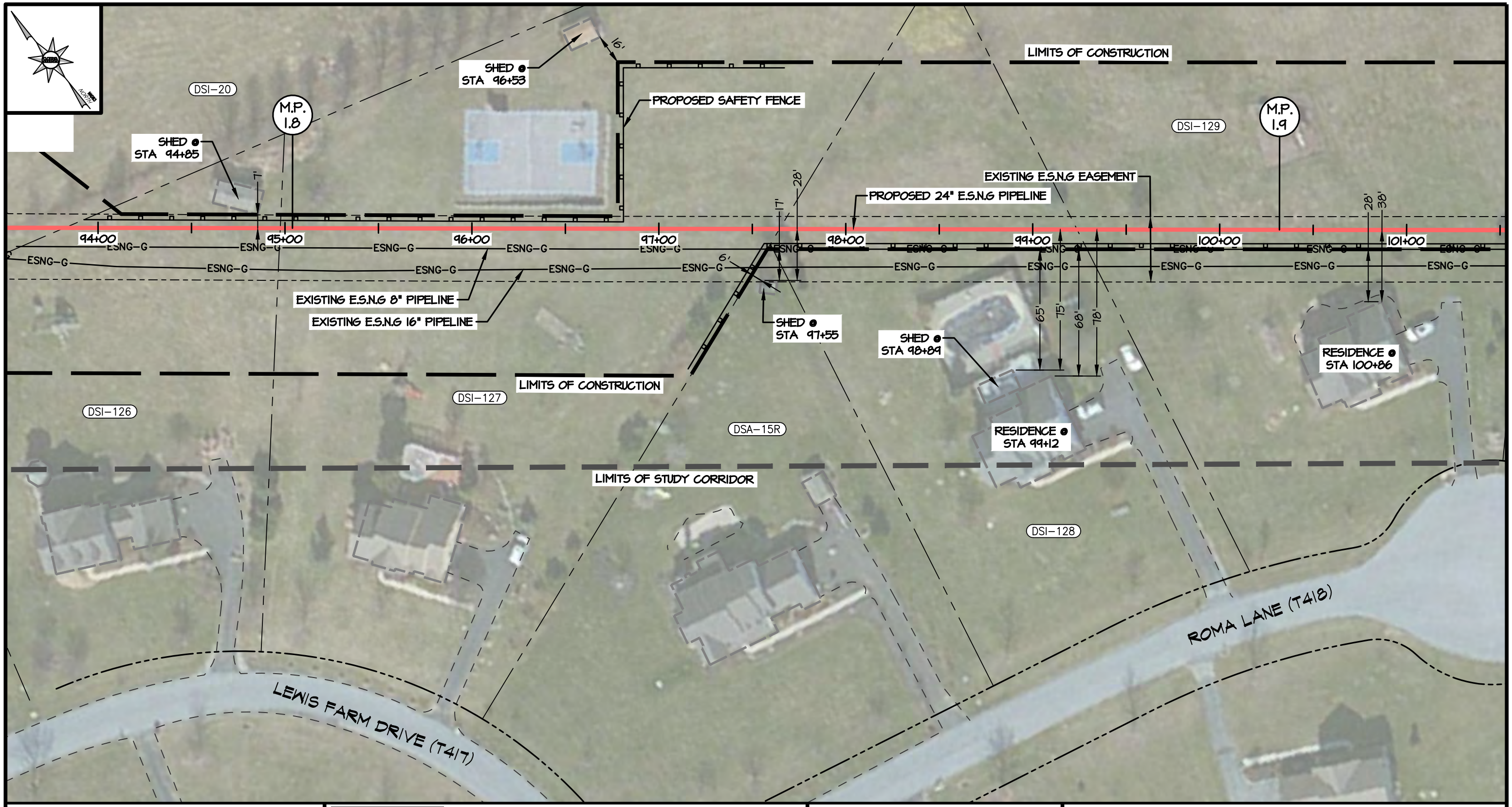

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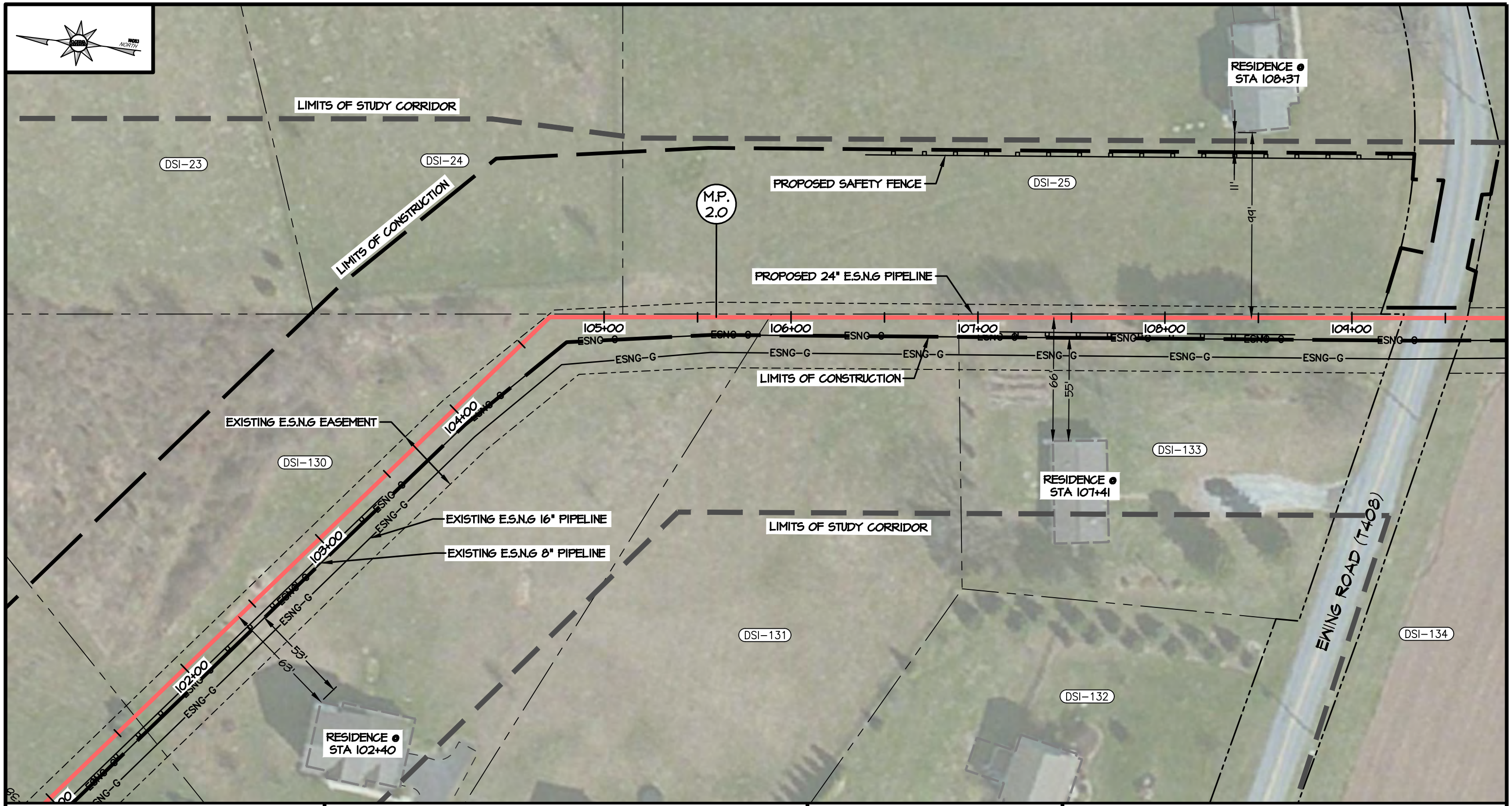

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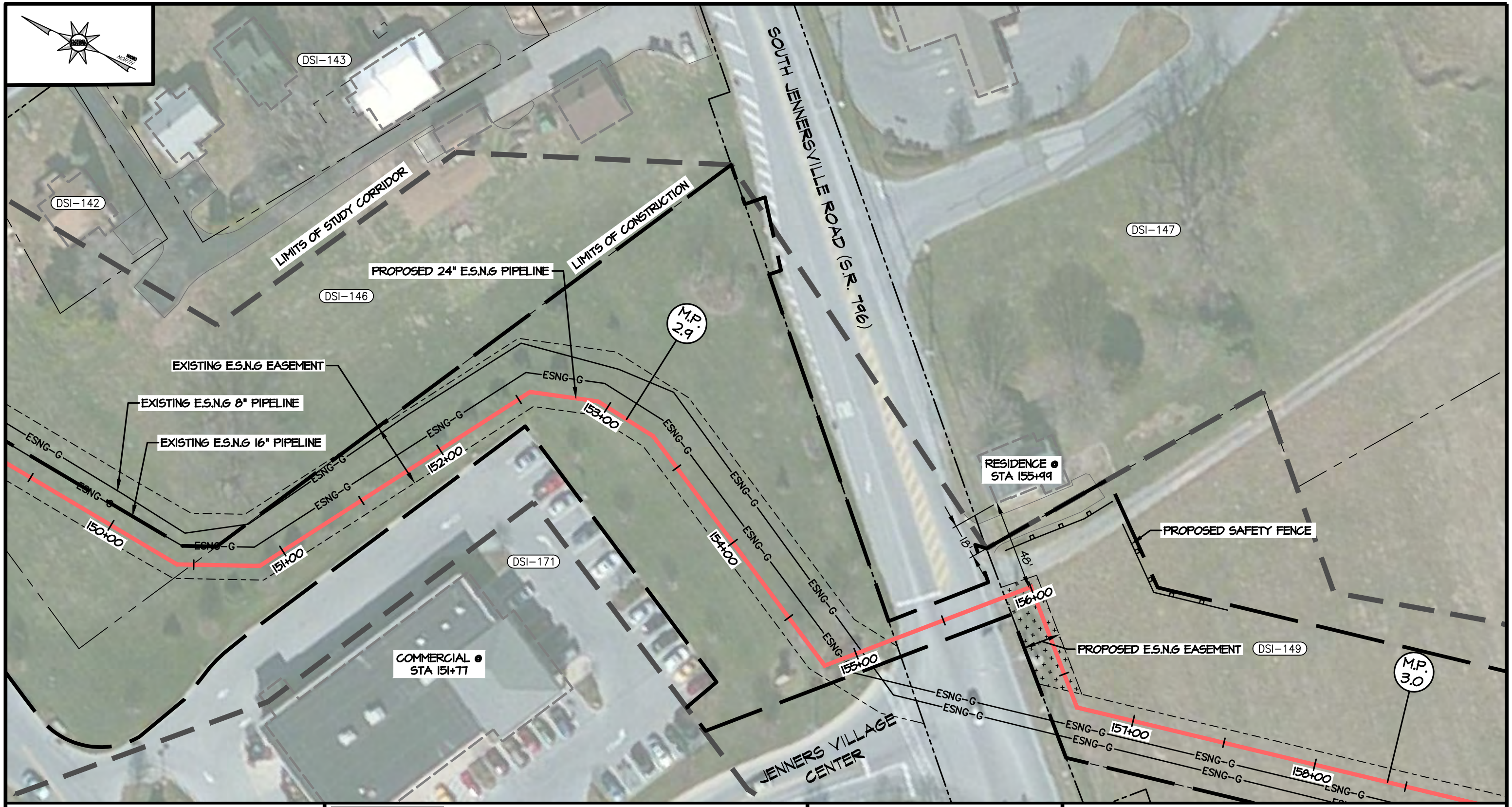

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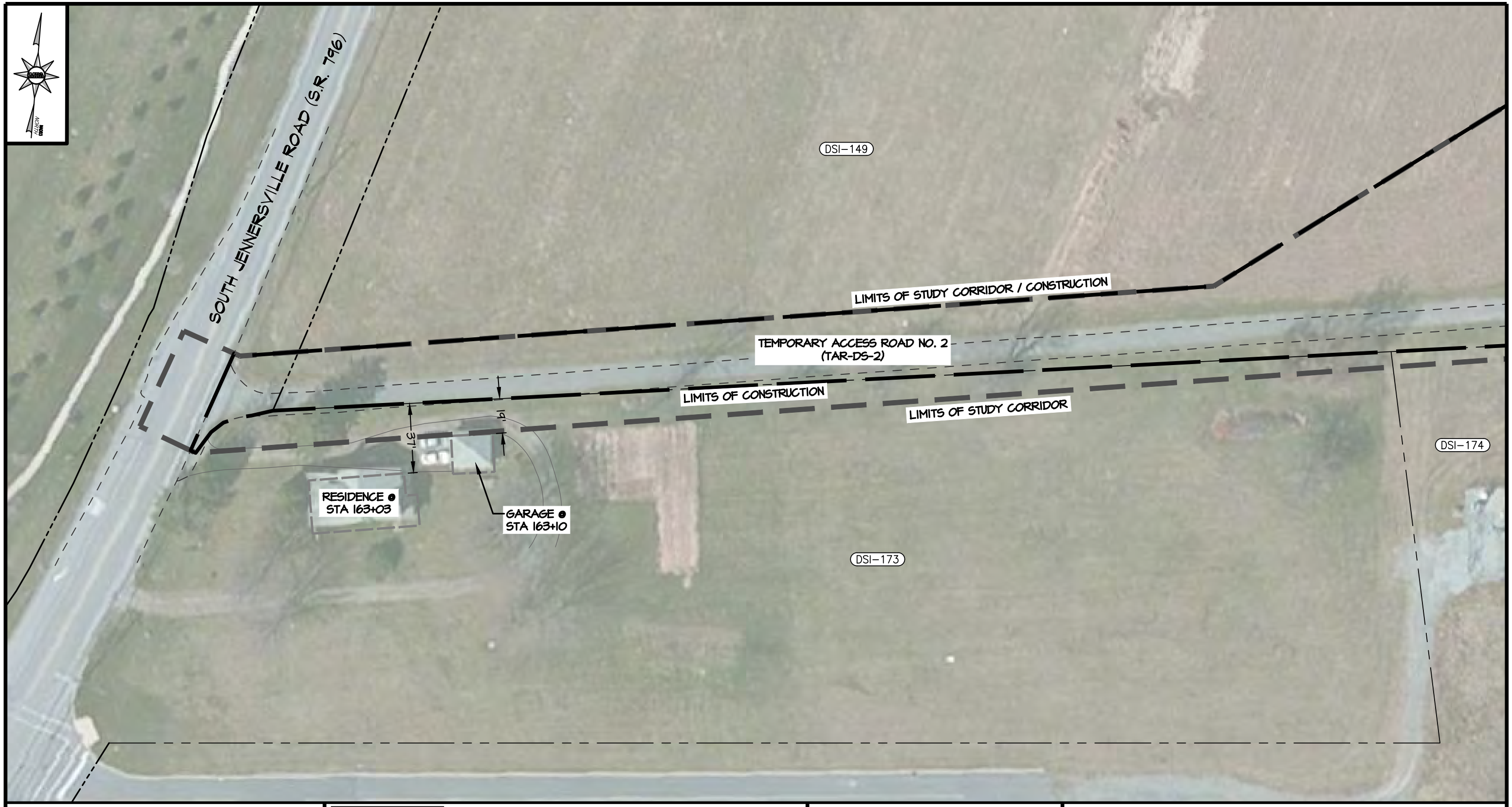

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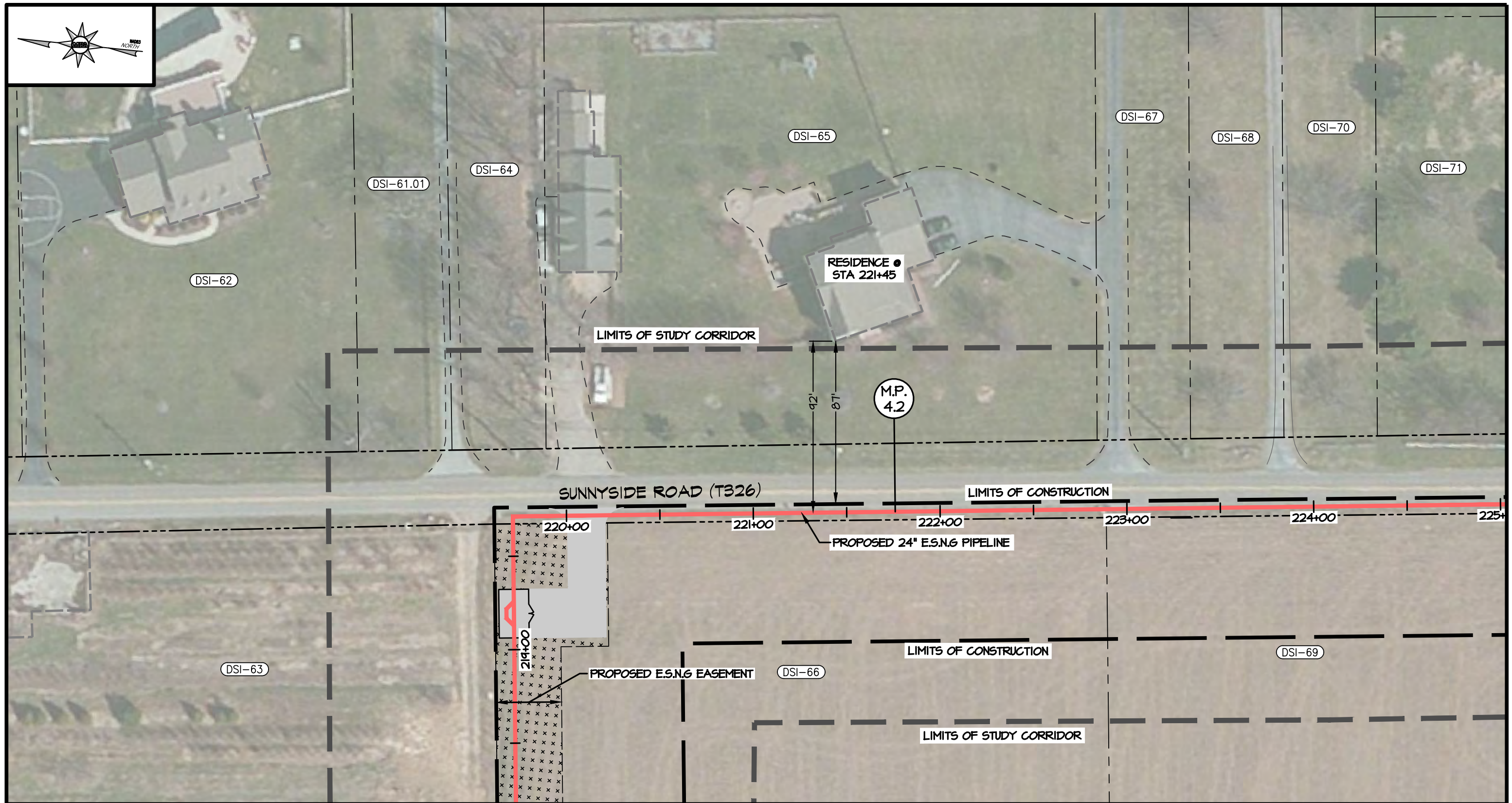

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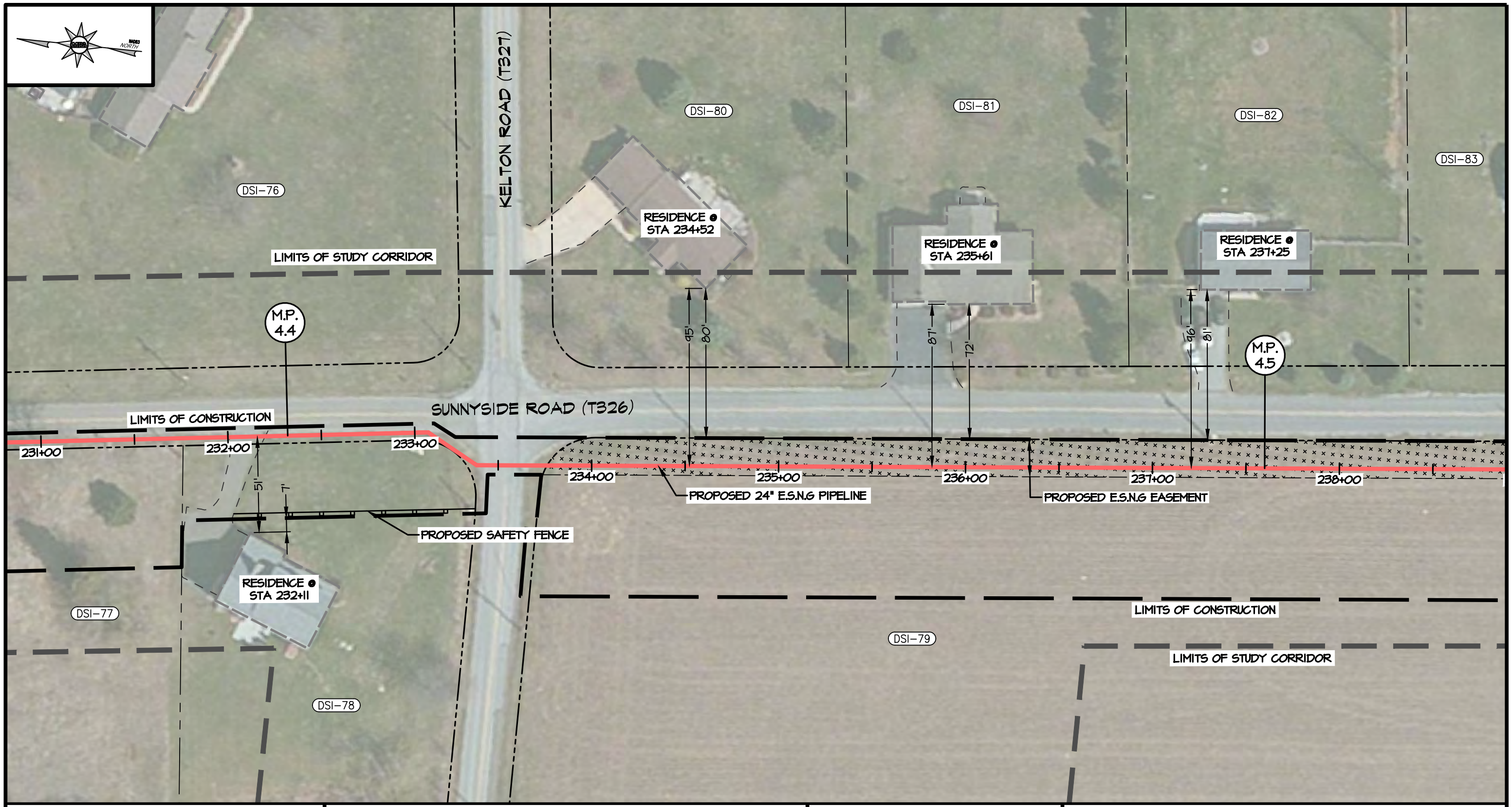

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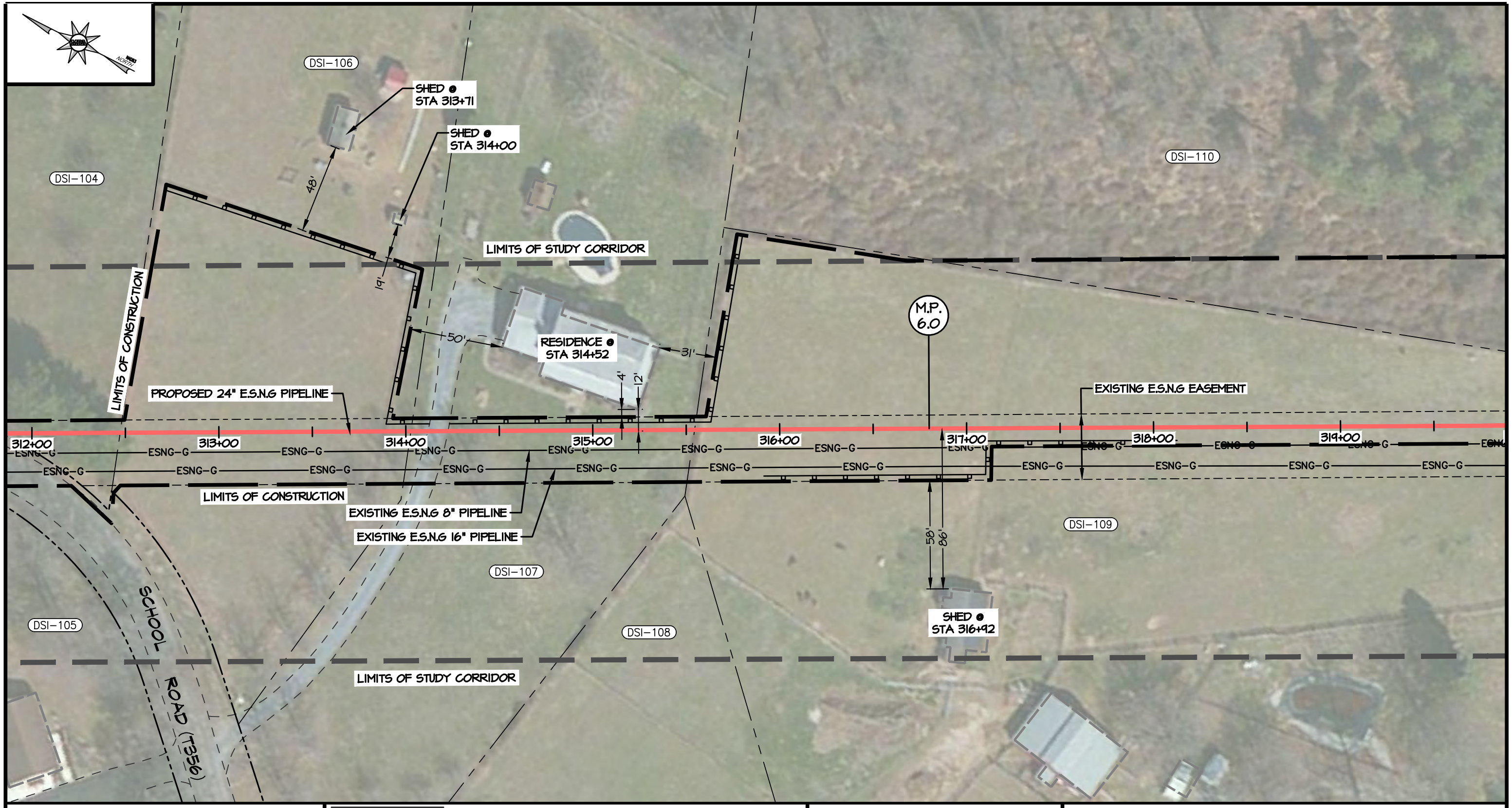
CHESTER COUNTY, PENNSYLVANIA

PROJECT NO:	18855	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	7 OF 9



REVISIONS

NO.	DATE	DESCRIPTION

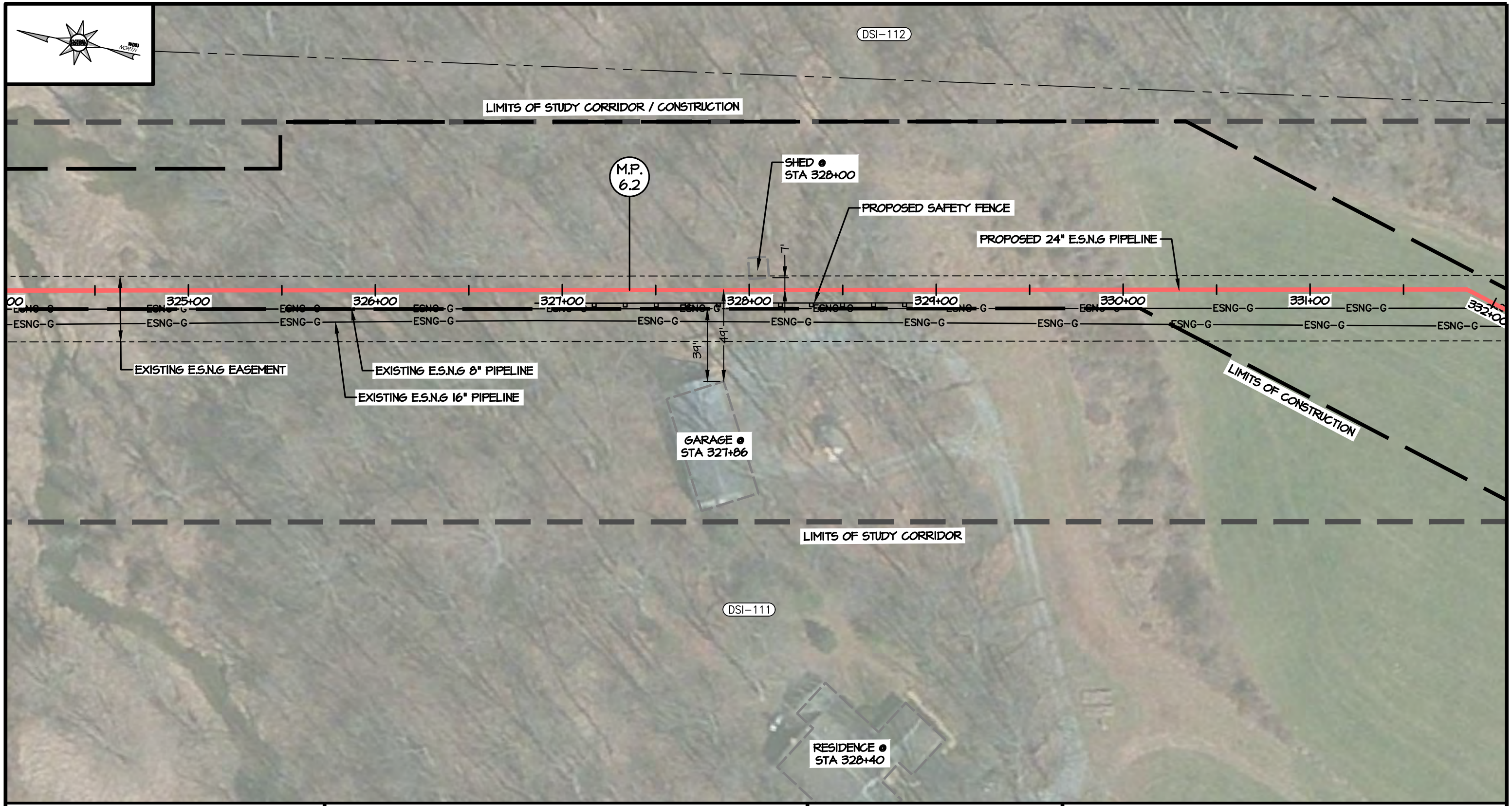
MORRIS & RITCHIE ASSOCIATES, INC.
ENGINEERS, ARCHITECTS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
18 BOULDEN CIRCLE, SUITE: 36, WILMINGTON, DE 19720
TEL: (302) 326-2200 FAX: (302) 326-2399
MRAGTA.COM

EASTERN SHORE NATURAL GAS
1110 FORREST AVE., SUITE 201 DOVER, DE 19904
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

50 25 0 25 50 100
SCALE: 1" = 50'

JENNERSVILLE LOOP
RESIDENTIAL MAP
2017 EXPANSION PROJECT
CHESTER COUNTY, PENNSYLVANIA

PROJECT NO:	18855	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	8 OF 9



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JENNERSVILLE LOOP
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2017 EXPANSION PROJECT
CHESTER COUNTY, PENNSYLVANIA

PROJECT NO:	18855	DATE:	11/18/2016
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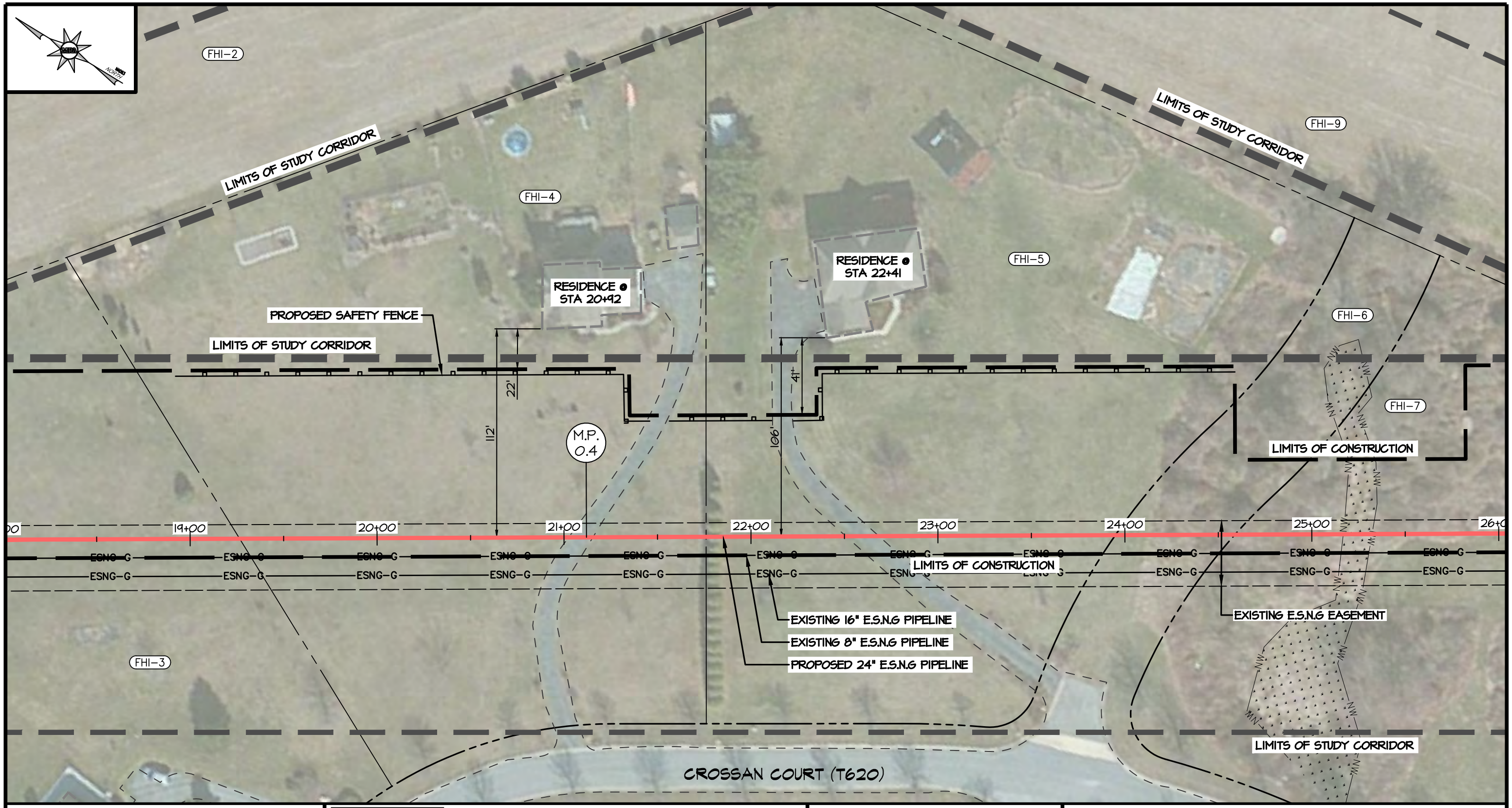
CHECKED BY:	CWB	SHEET:	9 OF 9



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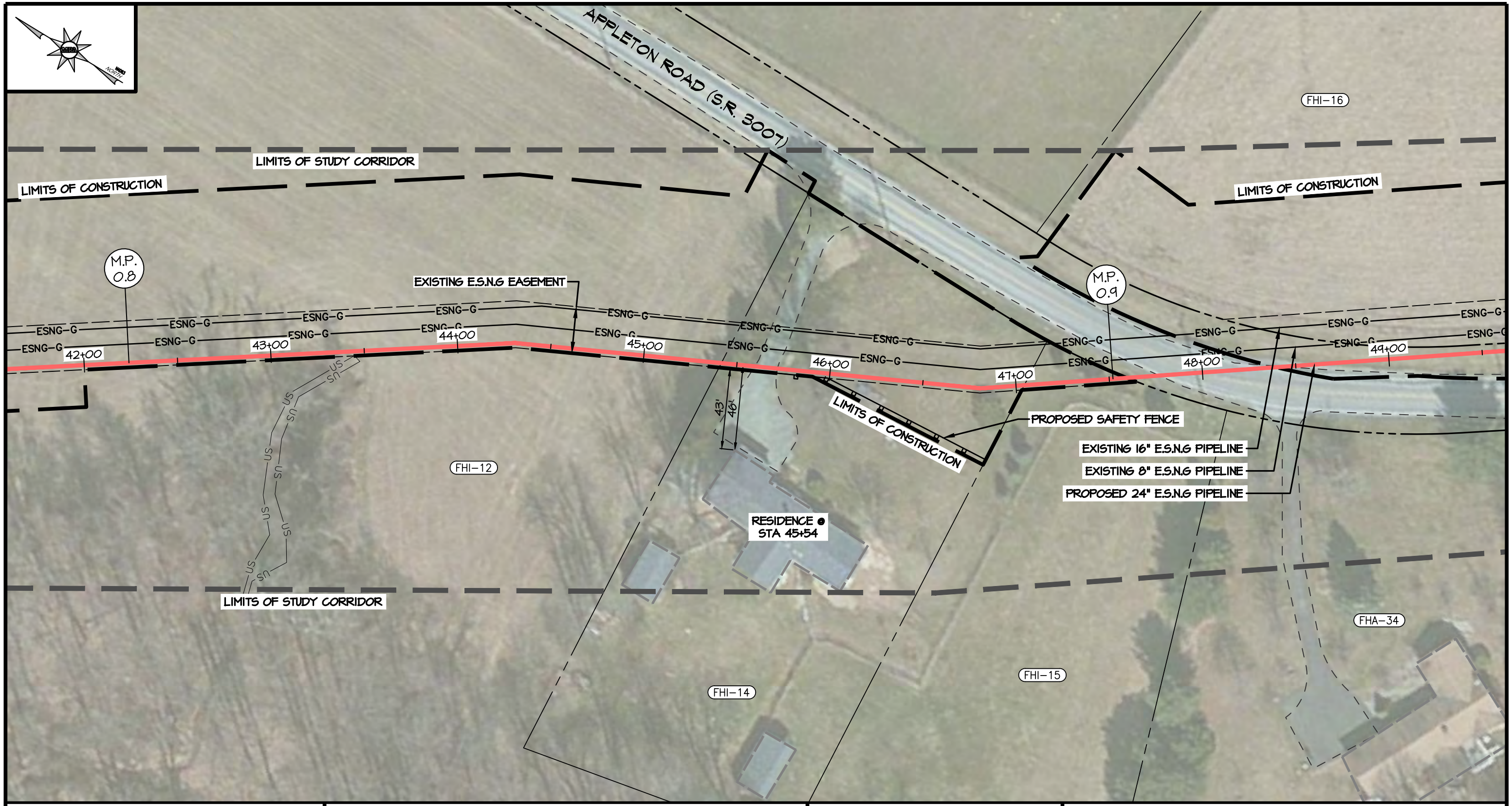
FAIR HILL LOOP
RESIDENTIAL MAP
2017 EXPANSION PROJECT
CHESTER COUNTY, PENNSYLVANIA & CECIL COUNTY, MARYLAND

PROJECT NO:	19150	DATE:	11/18/2016
DESIGN BY:	JJM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	1 OF 6



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FAIR HILL LOOP
RESIDENTIAL MAP
2017 EXPANSION PROJECT
CHESTER COUNTY, PENNSYLVANIA & CECIL COUNTY, MARYLAND

PROJECT NO:	19150	DATE:	11/18/2016
DESIGN BY:	JJM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	2 OF 6

REVISIONS		
NO.	DATE	DESCRIPTION

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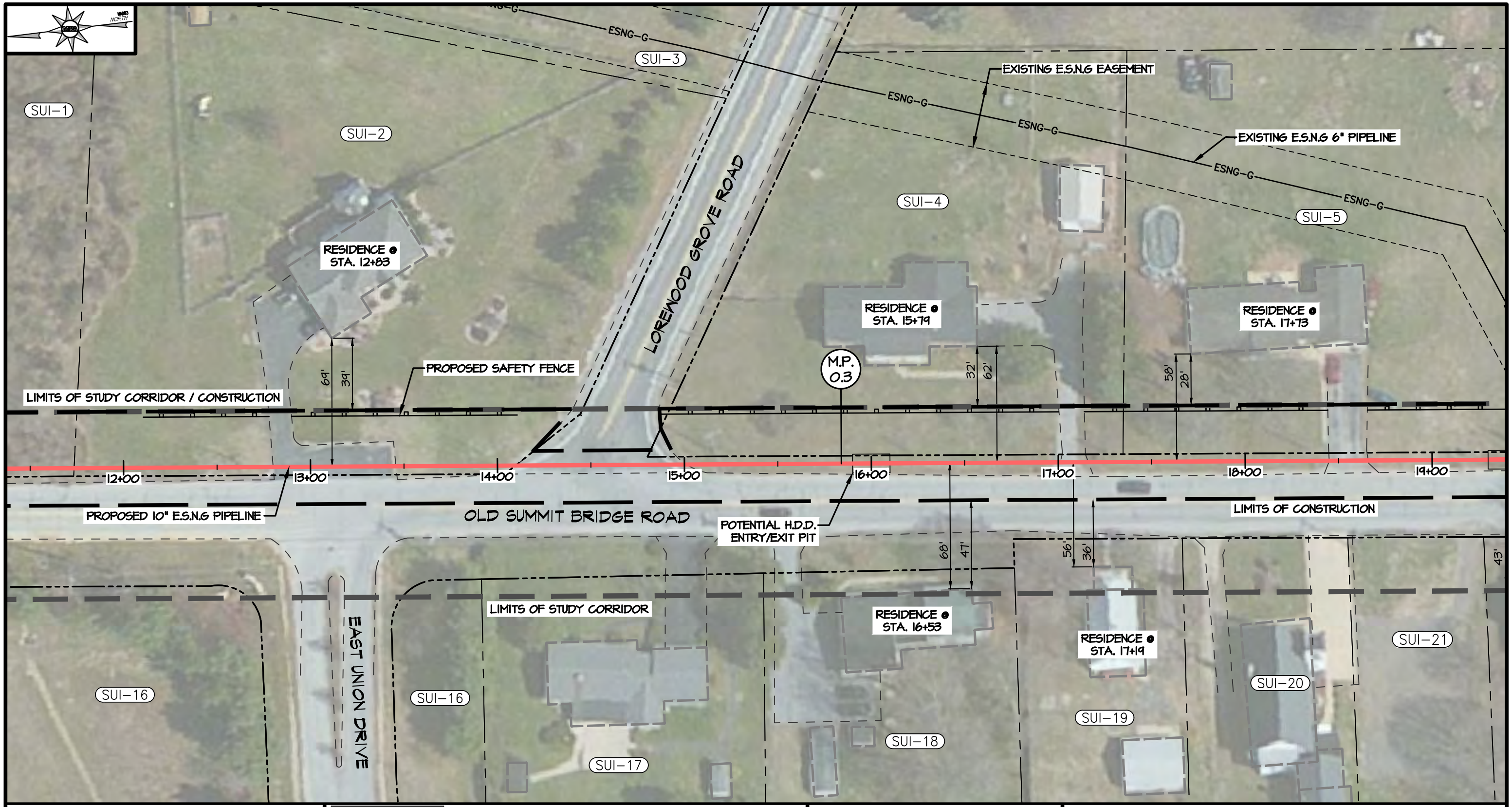
FAIR HILL LOOP
RESIDENTIAL MAP
2017 EXPANSION PROJECT
CHESTER COUNTY, PENNSYLVANIA & CECIL COUNTY, MARYLAND

PROJECT NO:	19150	DATE:	11/18/2016
DESIGN BY:	JJM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	5 OF 6



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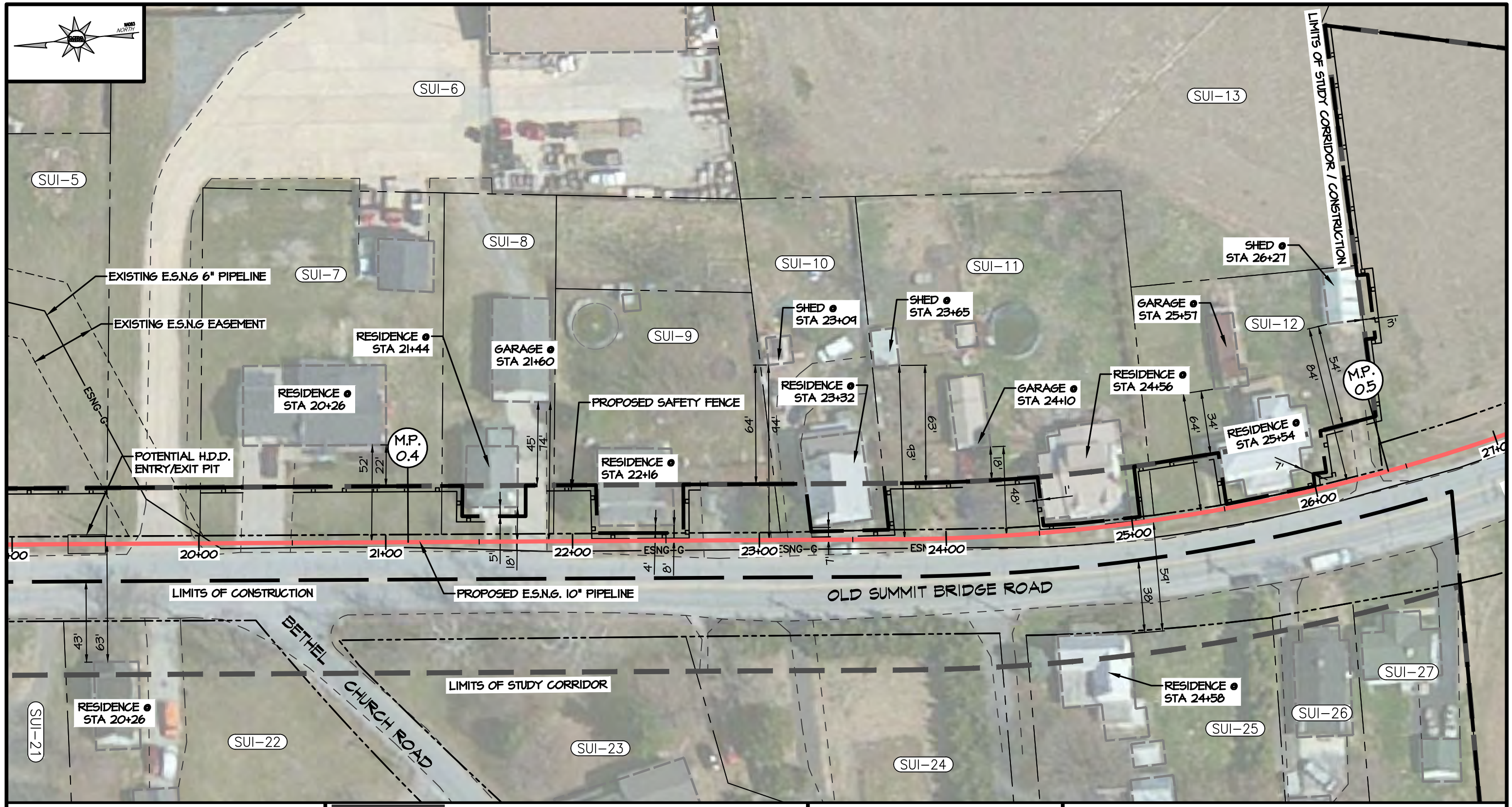
SUMMIT LOOP
RESIDENTIAL MAP
2017 EXPANSION PROJECT
NEW CASTLE COUNTY, DELAWARE

PROJECT NO:	19224	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	1 OF 2



REVISIONS

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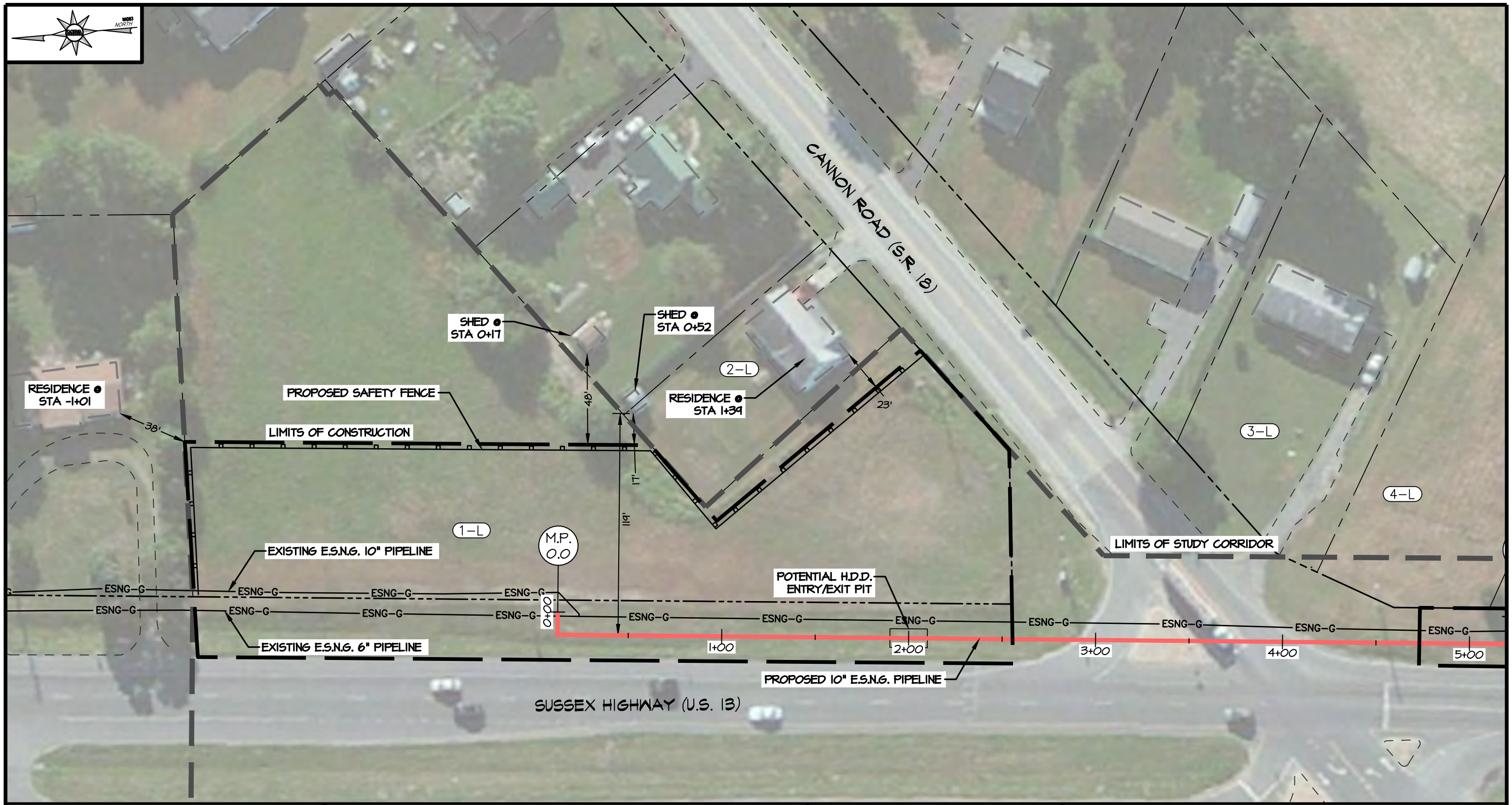
SUMMIT LOOP
RESIDENTIAL MAP
2017 EXPANSION PROJECT
NEW CASTLE COUNTY, DELAWARE

PROJECT NO:	19224	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	2 OF 2



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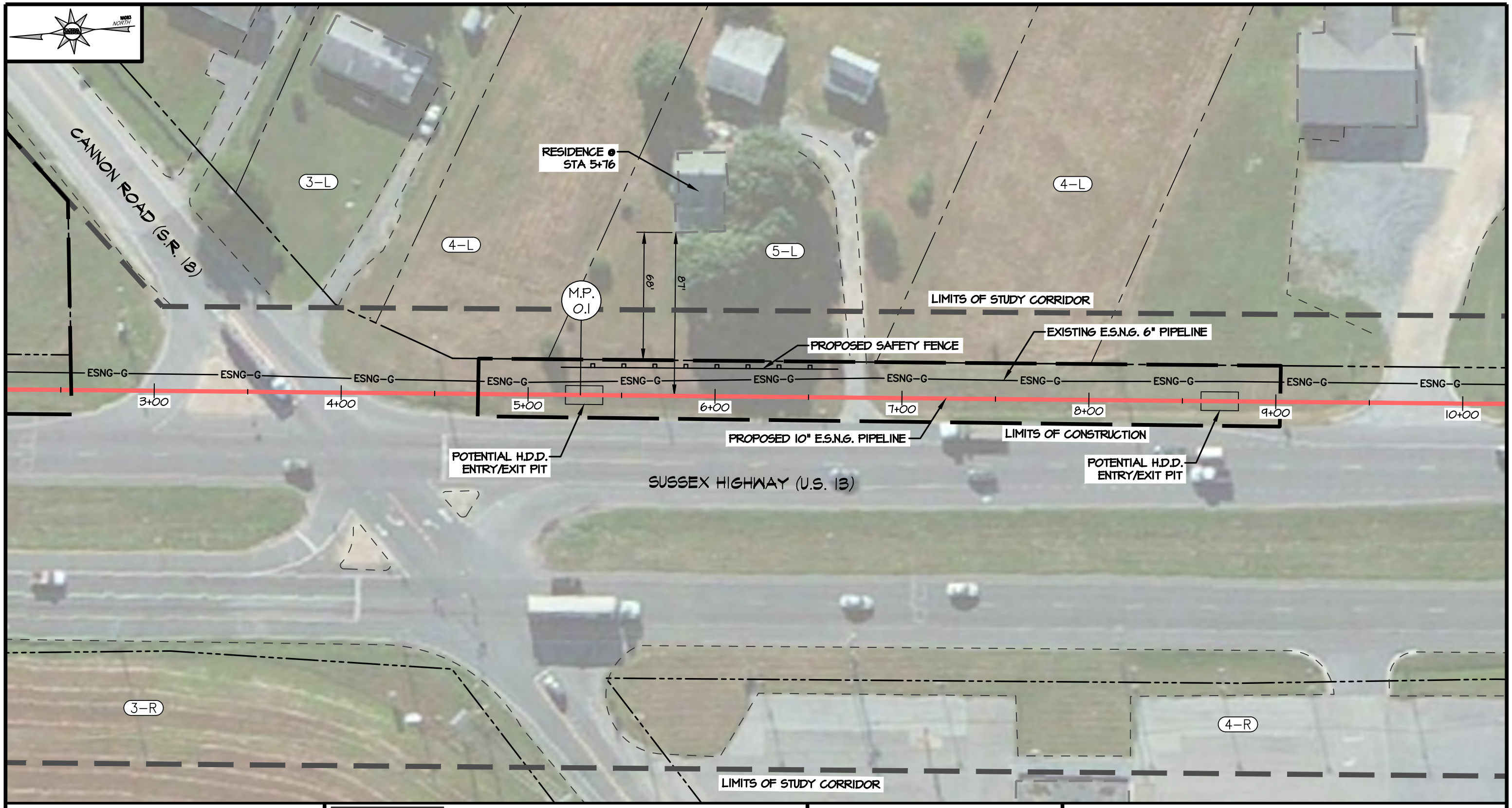
HEARNS POND LOOP
RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19228	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	1 OF 3



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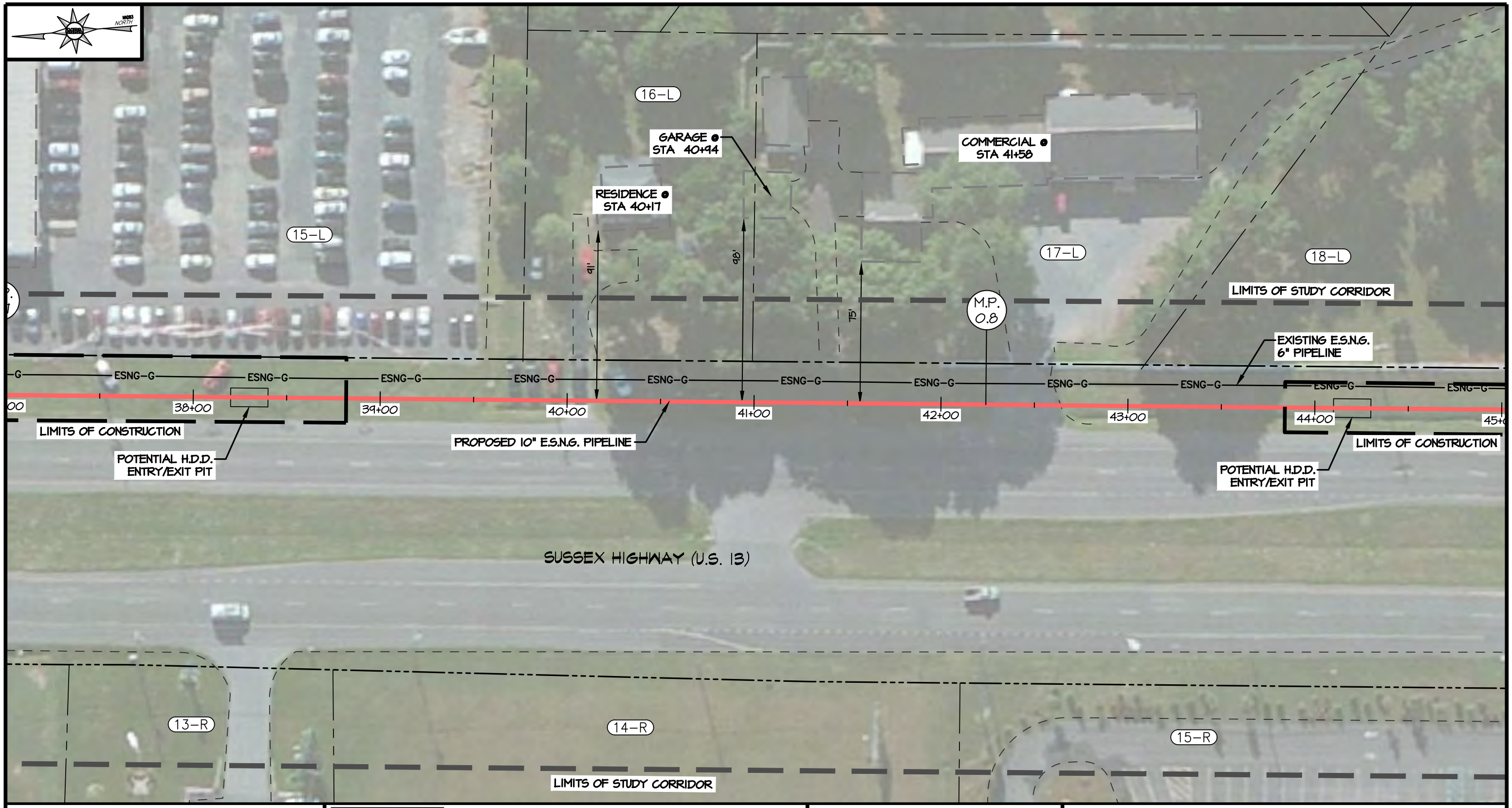
RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19228	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	2 OF 3



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RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19228	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
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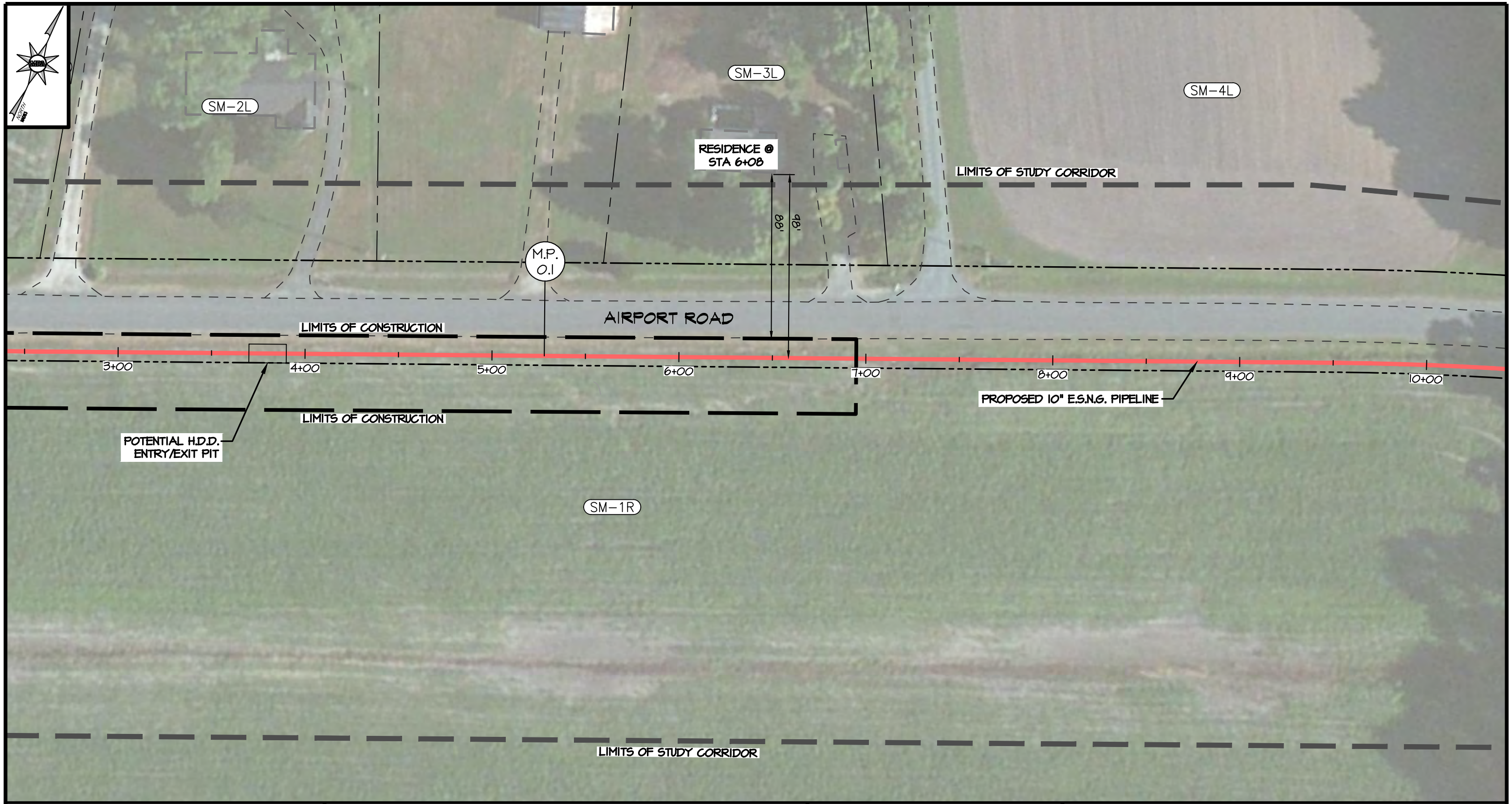

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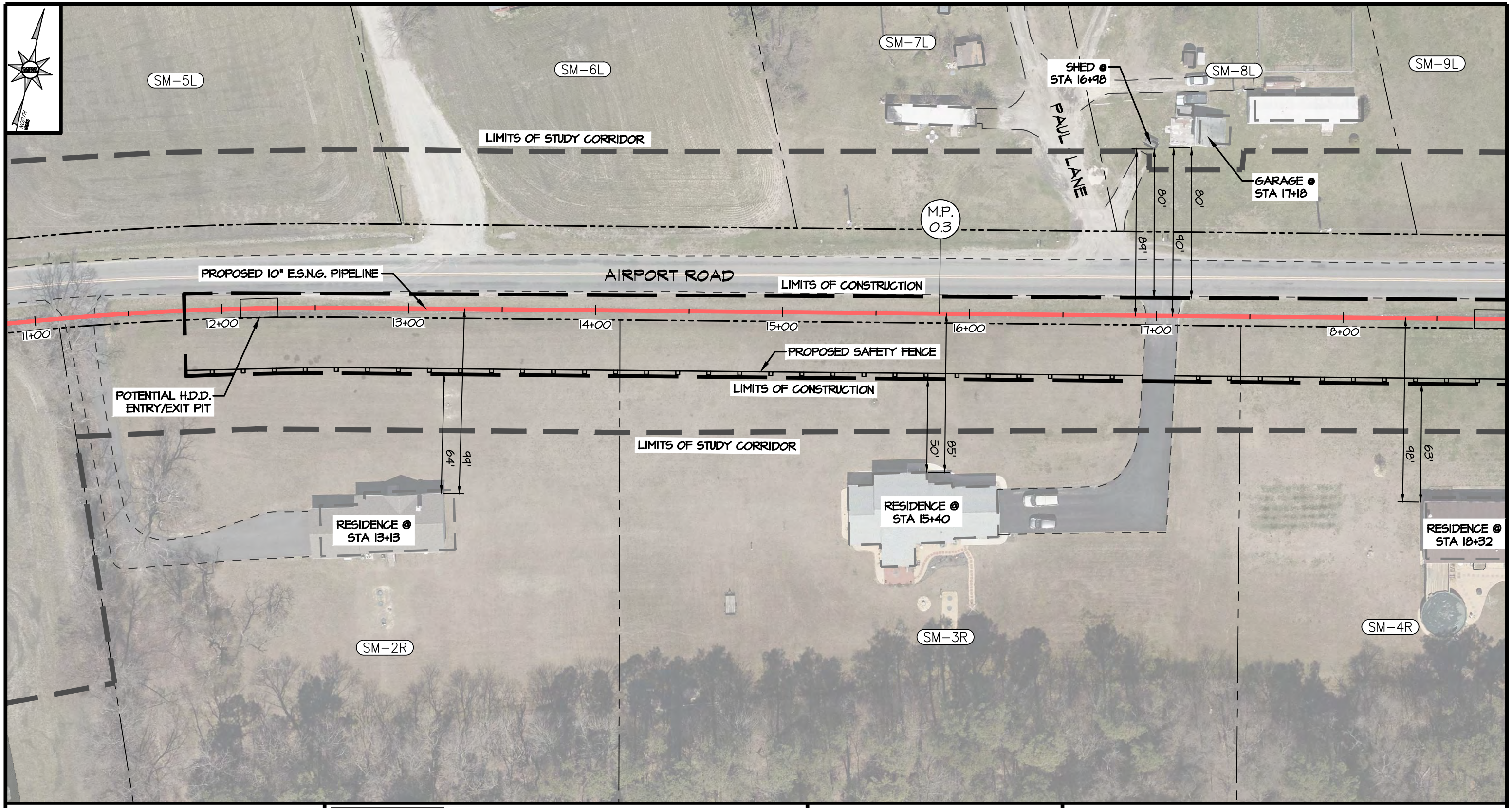
SEAFORD-MILLSBORO CONNECTOR
RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19229	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	1 OF 41



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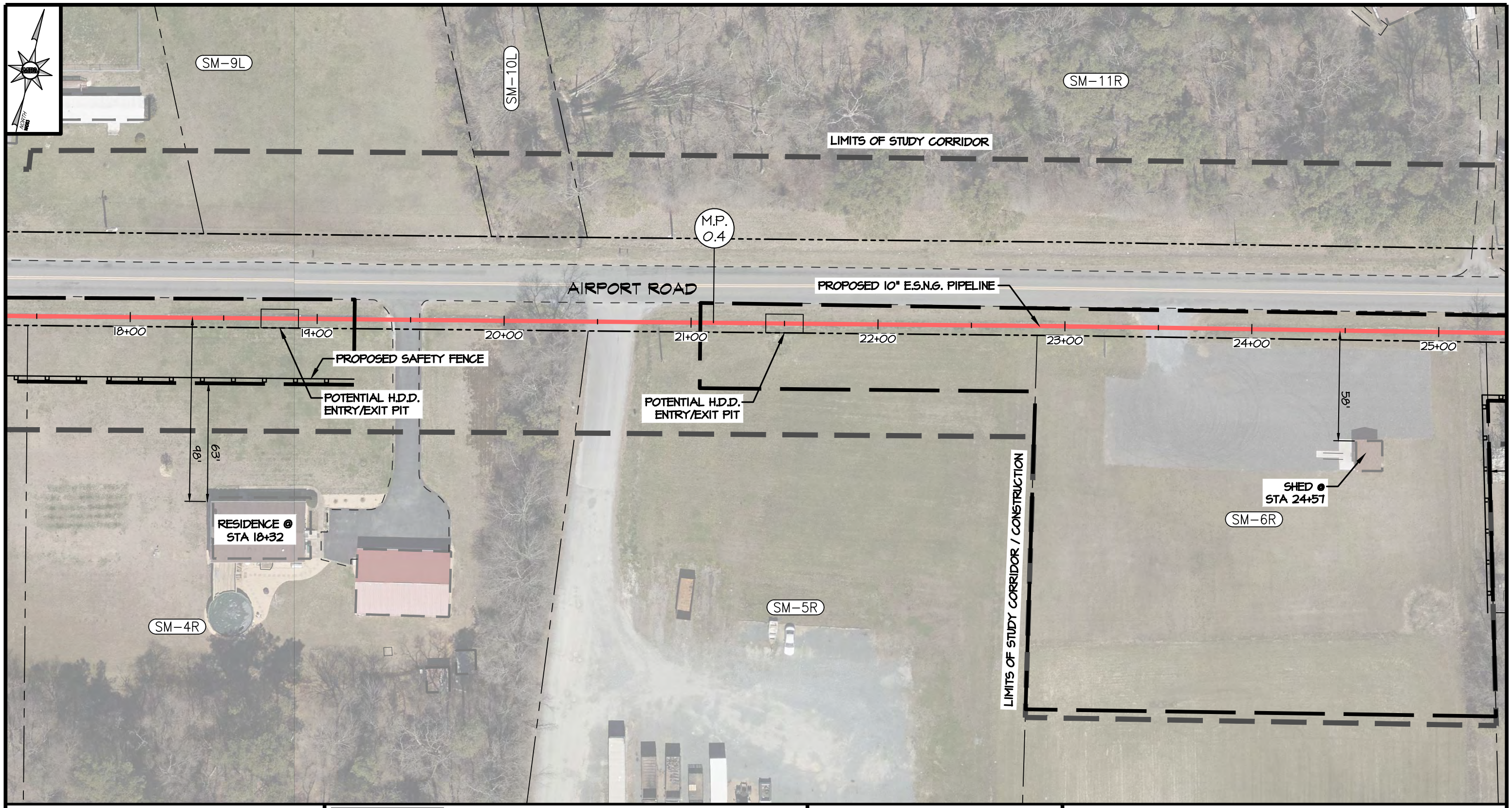
SEAFORD-MILLSBORO CONNECTOR
RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19229	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	2 OF 41



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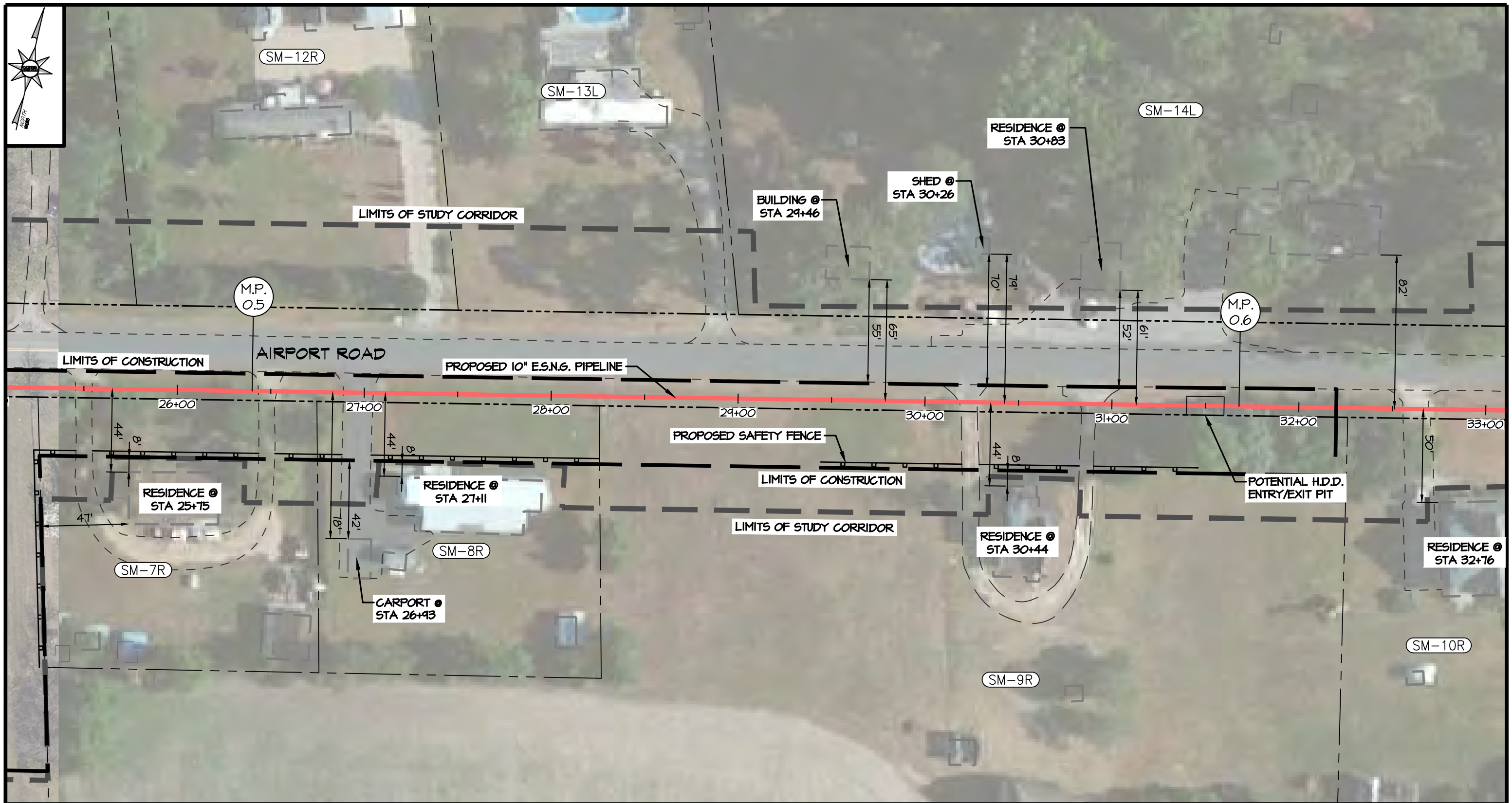
SEAFORD-MILLSBORO CONNECTOR
RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19229	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	3 OF 41



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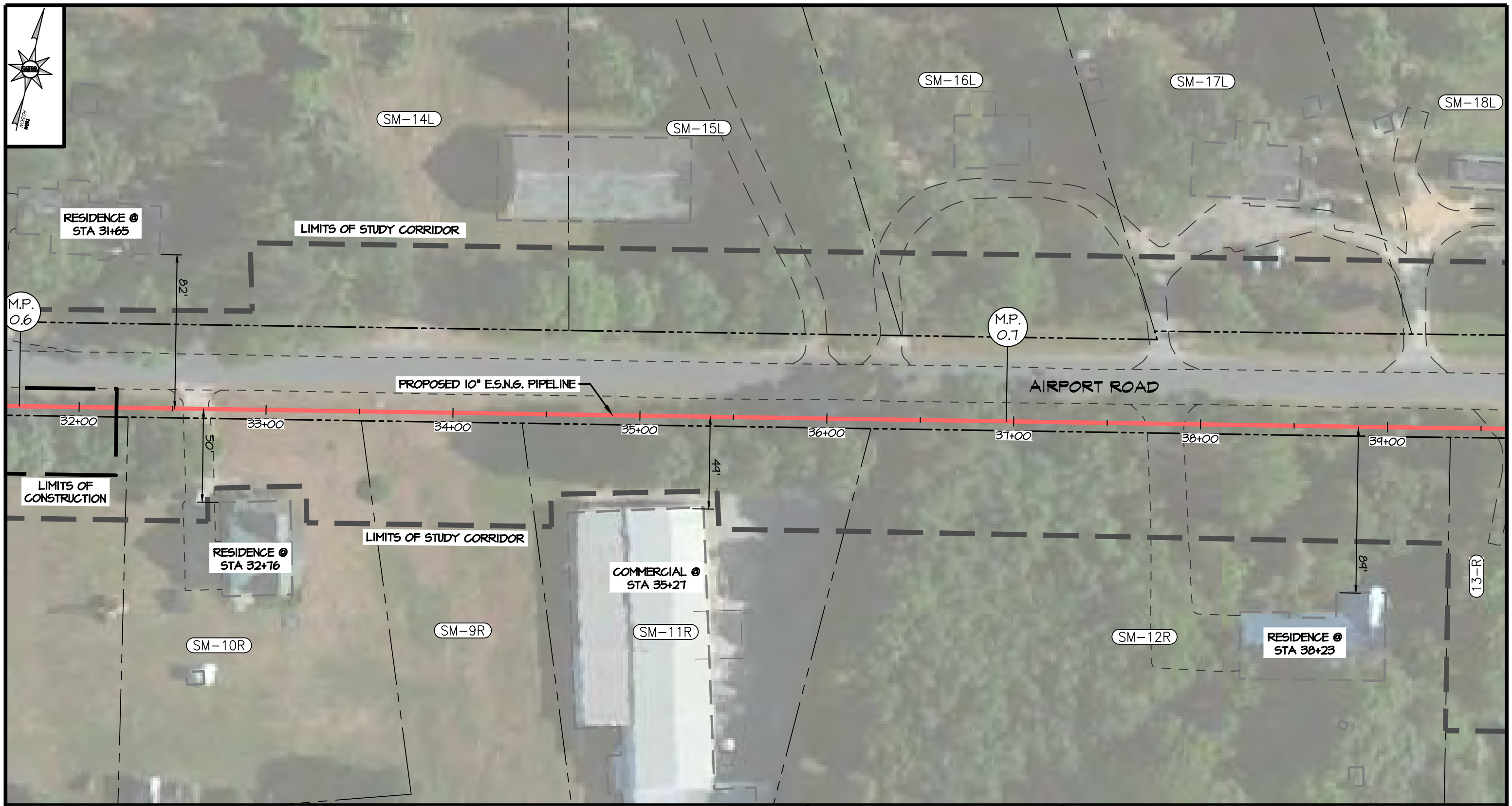
SEAFORD-MILLSBORO CONNECTOR
RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19229	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	4 OF 41



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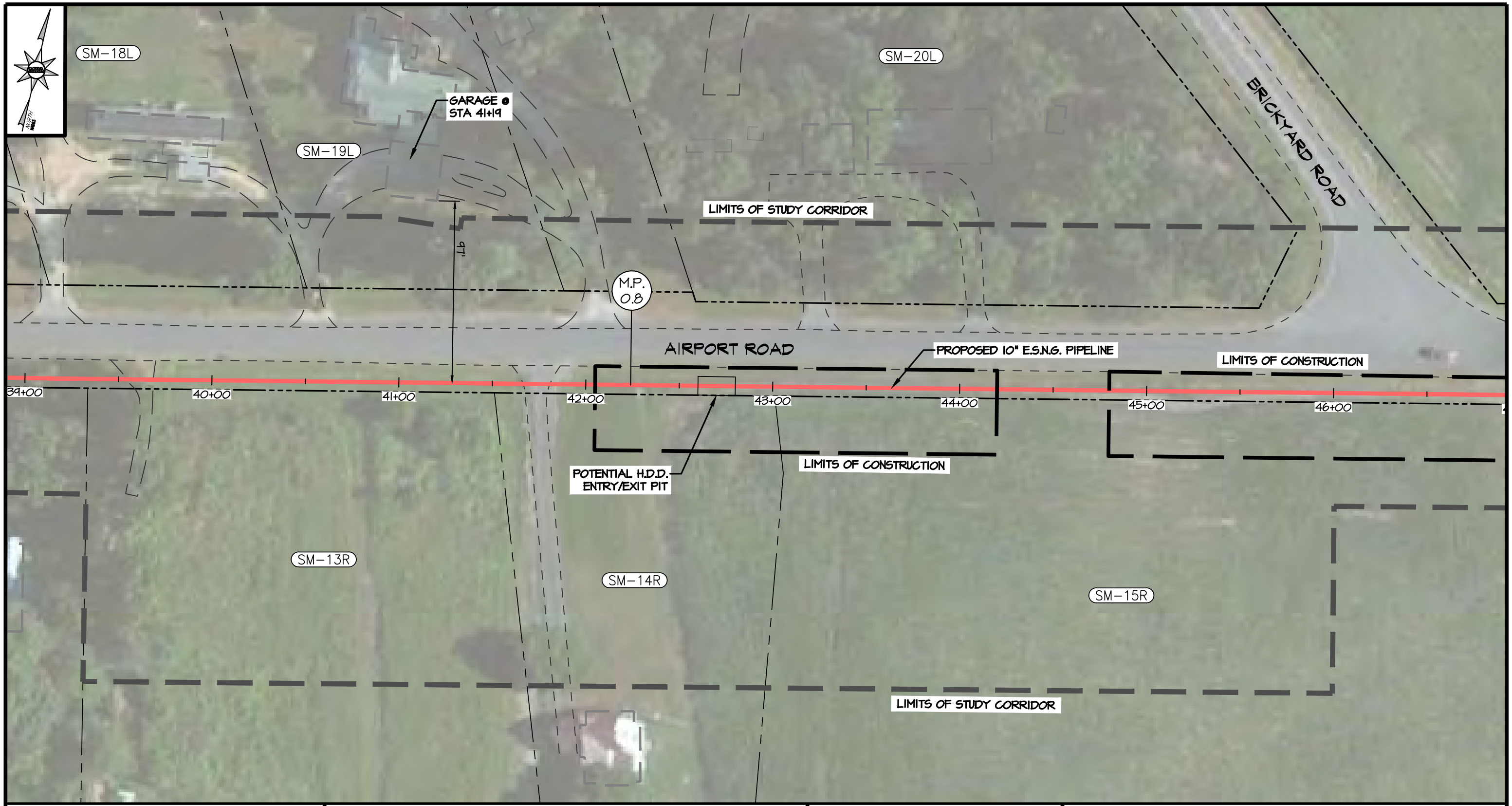
SEAFORD-MILLSBORO CONNECTOR
RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19229	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	5 OF 41



REVISIONS

NO.	DATE	DESCRIPTION

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MORRIS & RITCHIE ASSOCIATES, INC.
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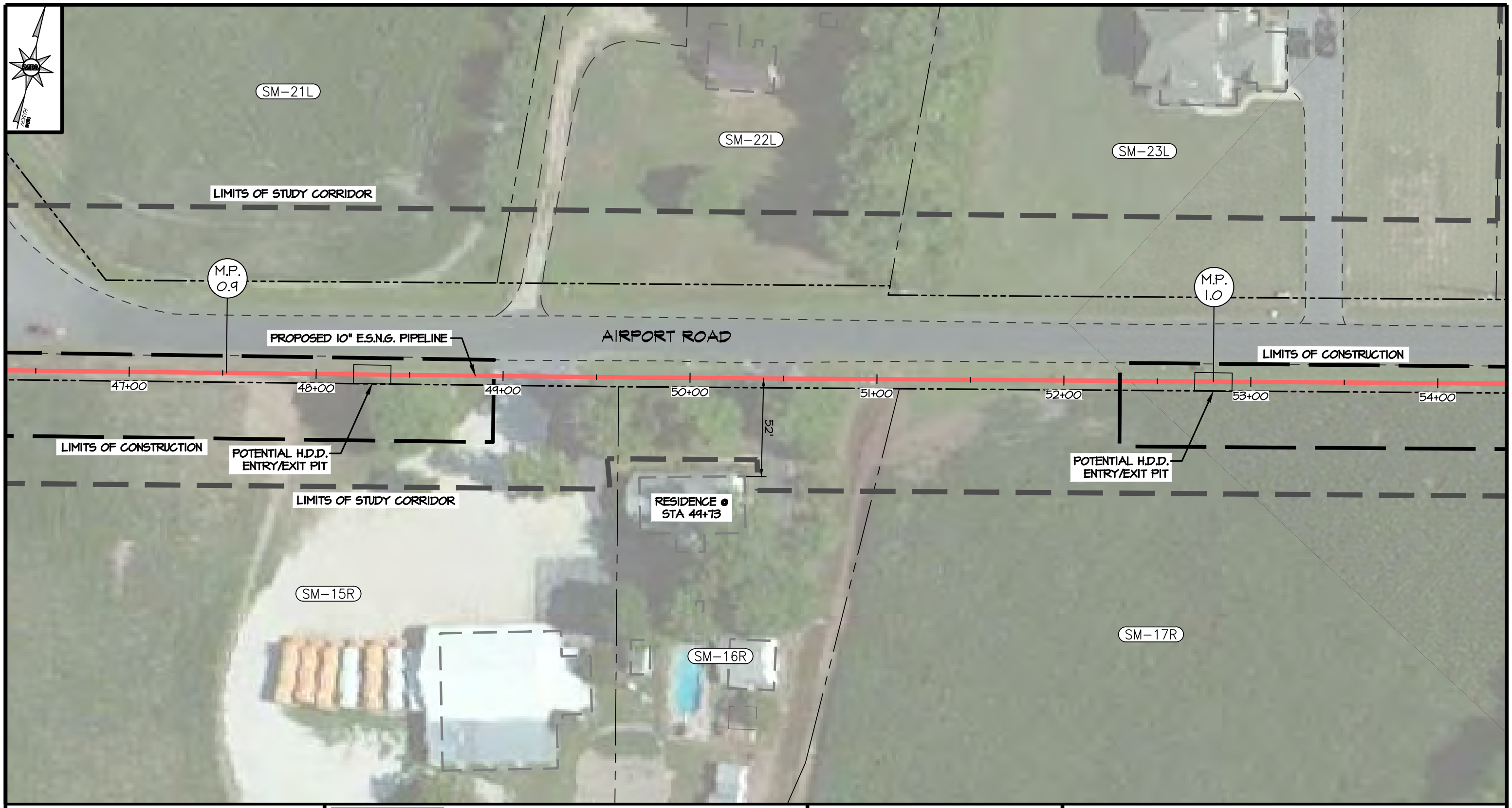
SEAFORD-MILLSBORO CONNECTOR
RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19229	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	6 OF 41



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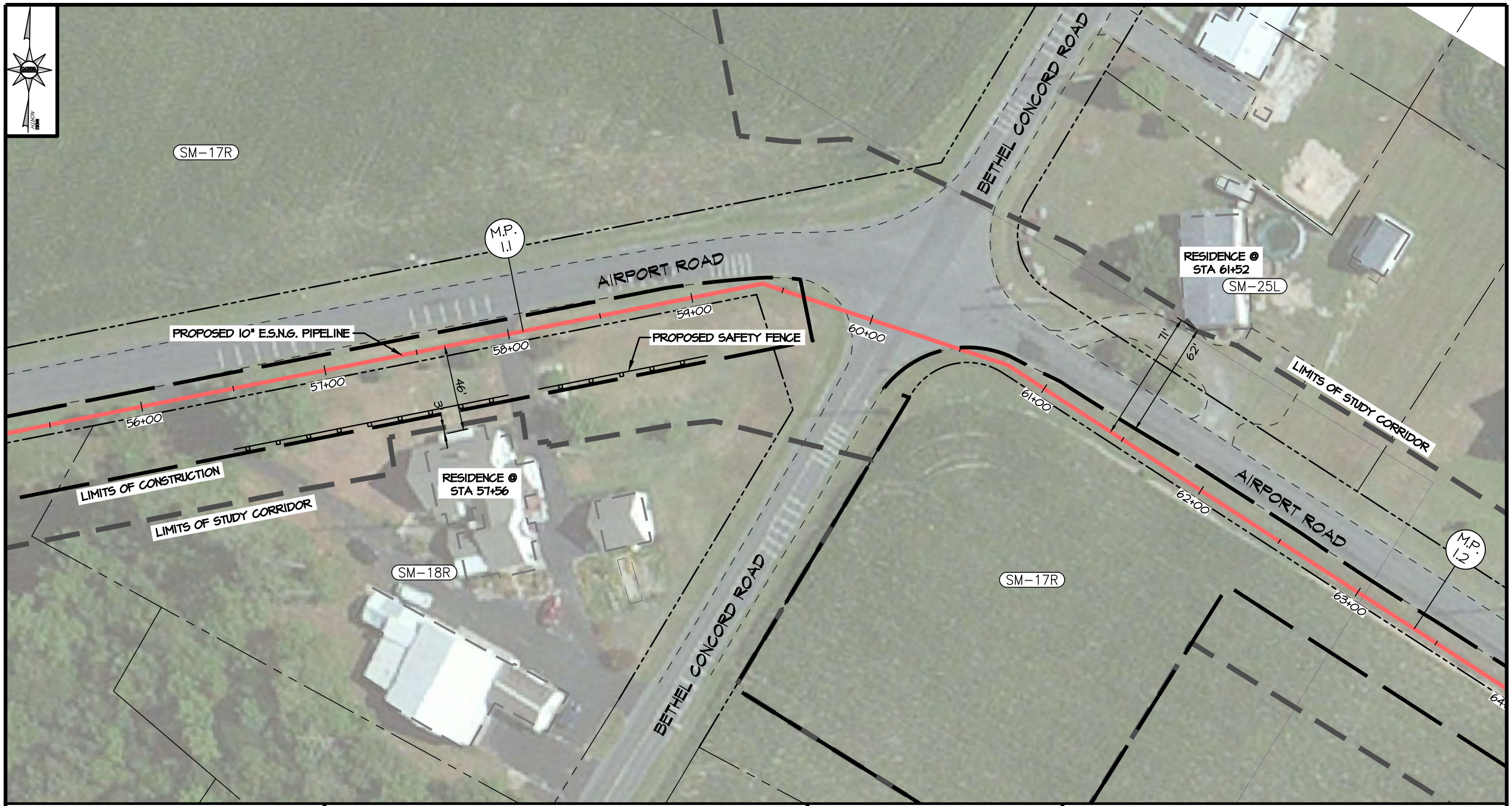
SEAFORD-MILLSBORO CONNECTOR
RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19229	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	7 OF 41



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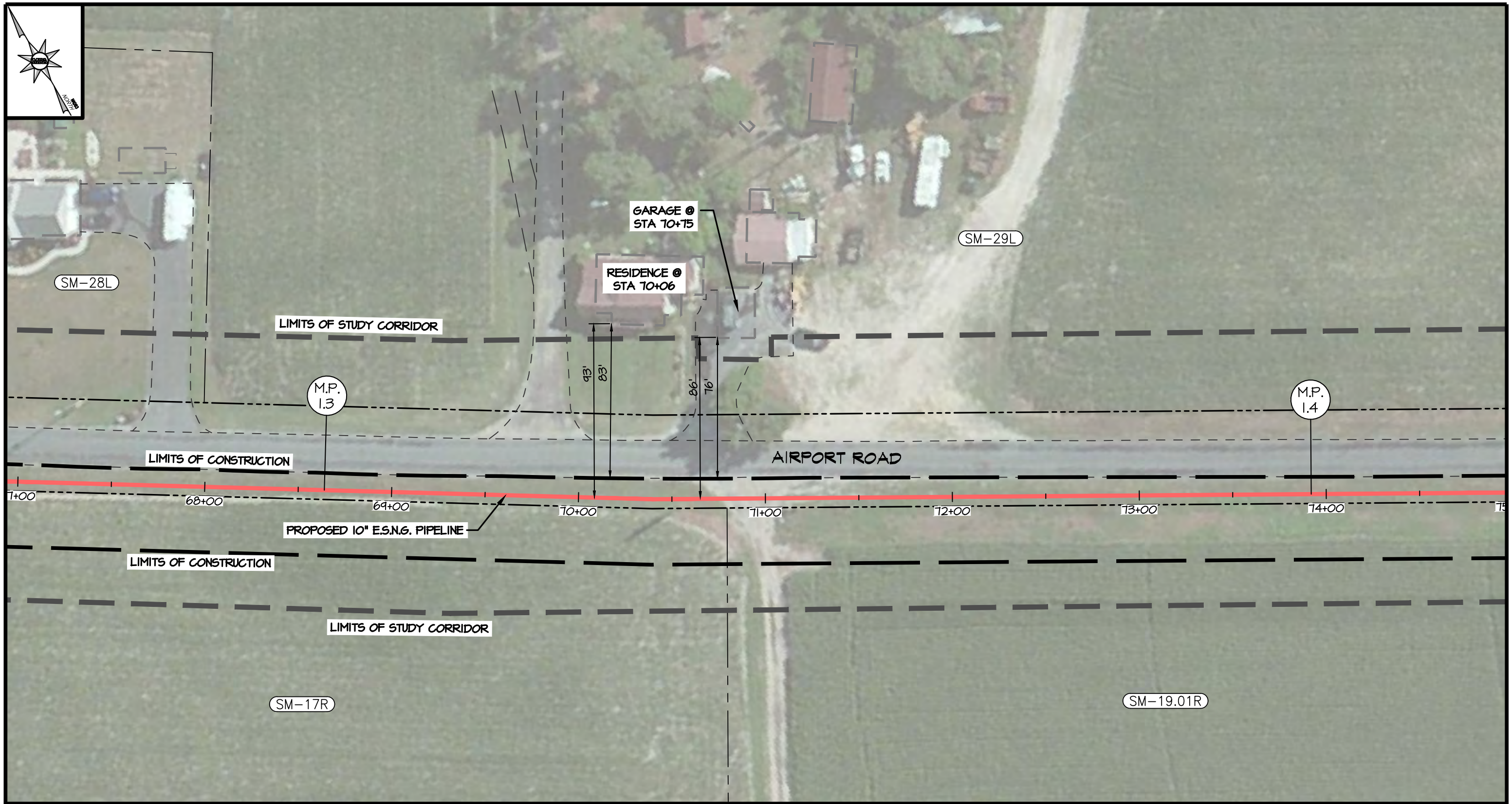
SEAFORD-MILLSBORO CONNECTOR
RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19229	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	8 OF 41



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SEAFORD-MILLSBORO CONNECTOR
RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19229	DATE:	11/18/2016
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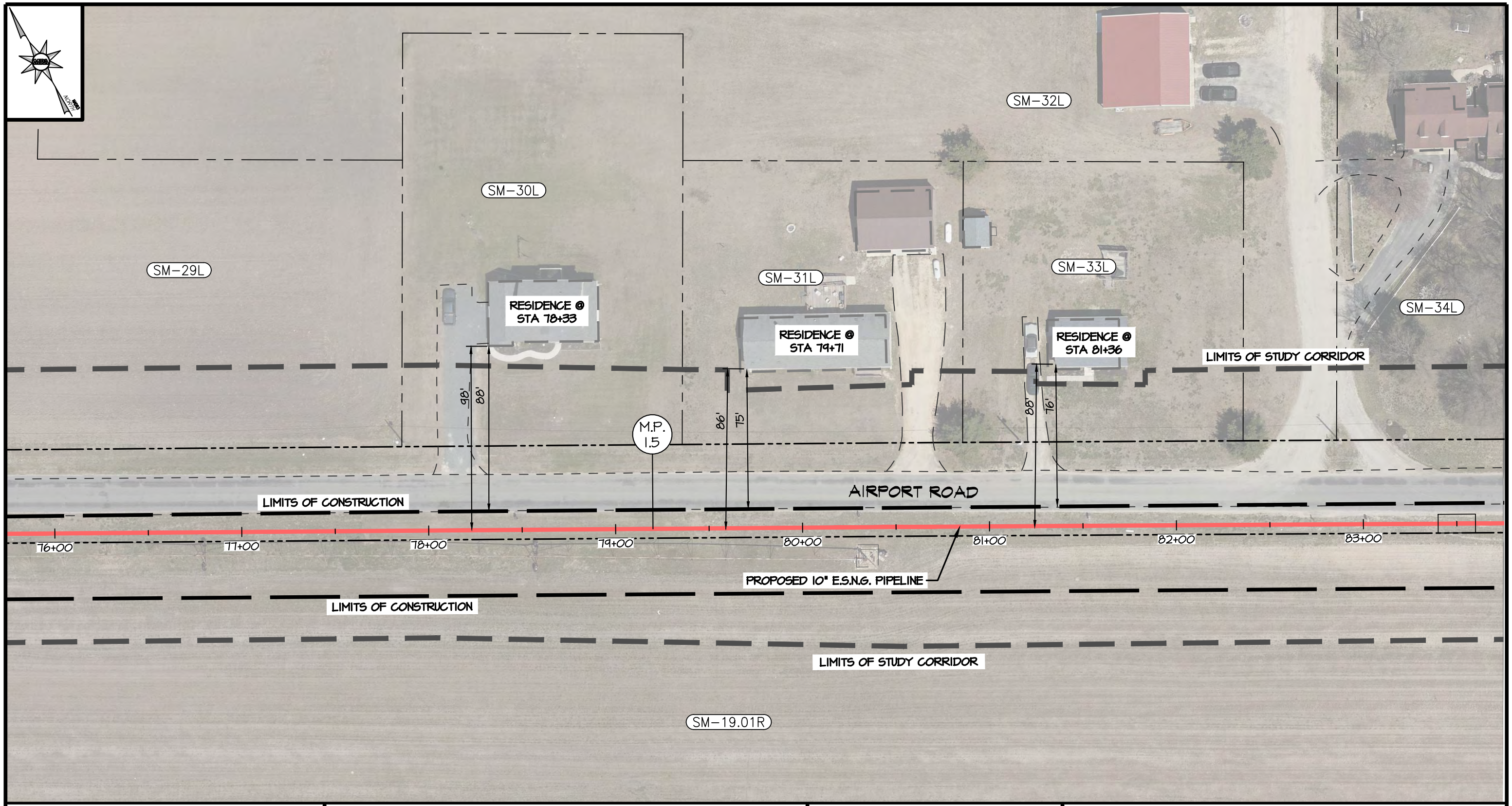

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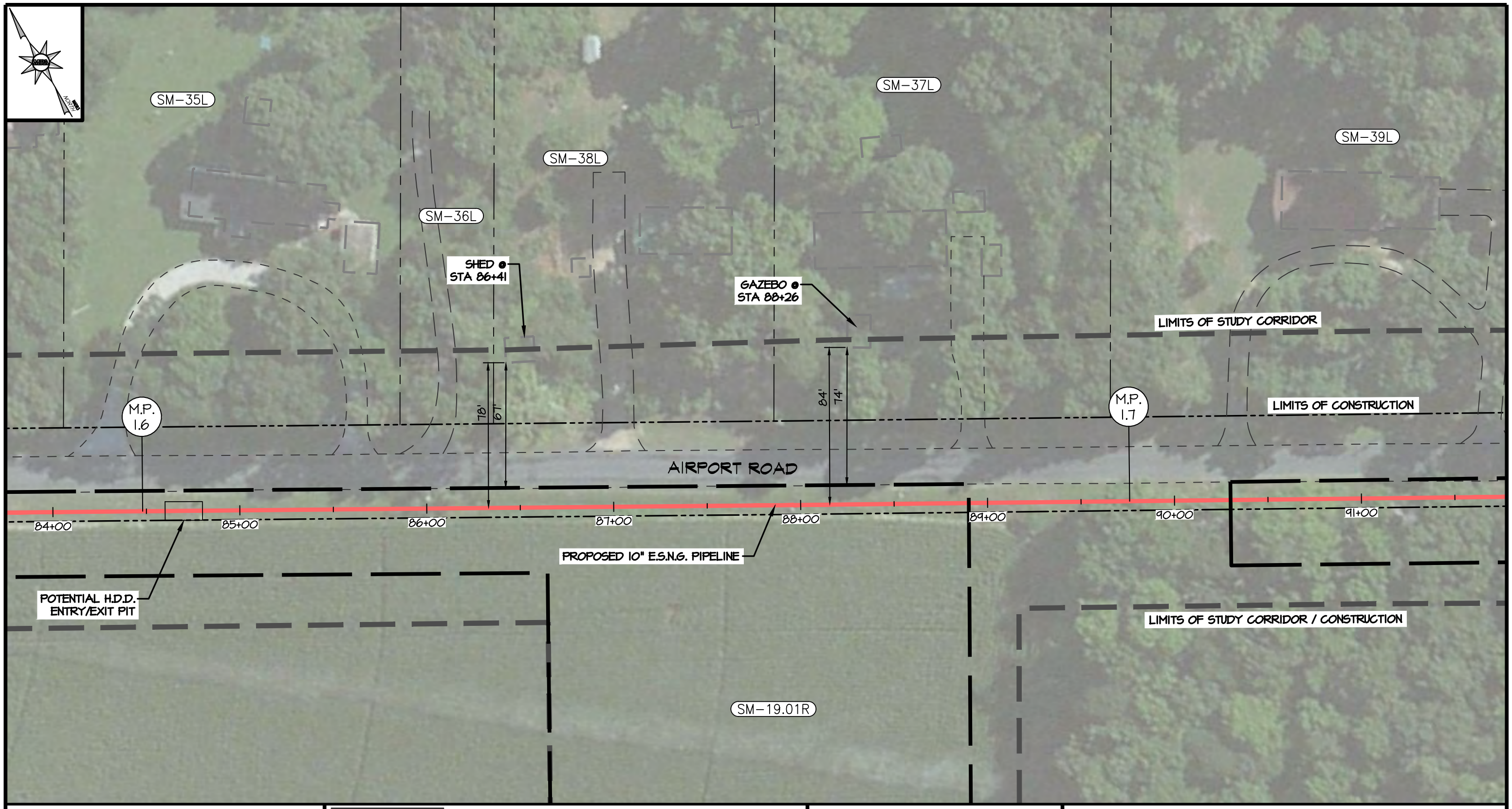
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	10 OF 41



REVISIONS

NO.	DATE	DESCRIPTION

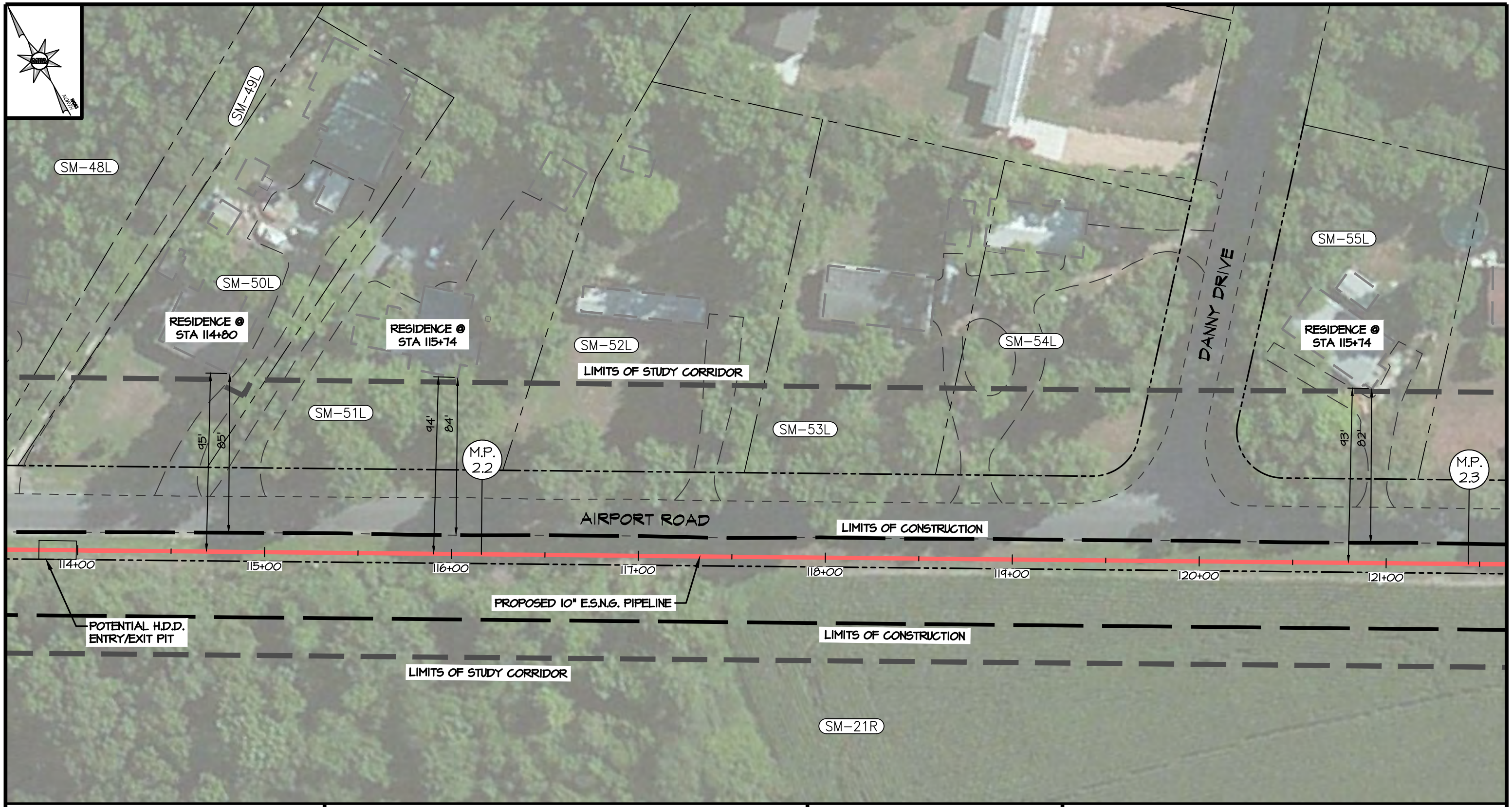
MORRIS & RITCHIE ASSOCIATES, INC.
ENGINEERS, ARCHITECTS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS
18 BOULDEN CIRCLE, SUITE: 36, WILMINGTON, DE 19720
TEL: (302) 326-2200 FAX: (302) 326-2399
MRAGTA.COM

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

SEAFORD-MILLSBORO CONNECTOR
RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19229	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	11 OF 41



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2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19229	DATE:	11/18/2016
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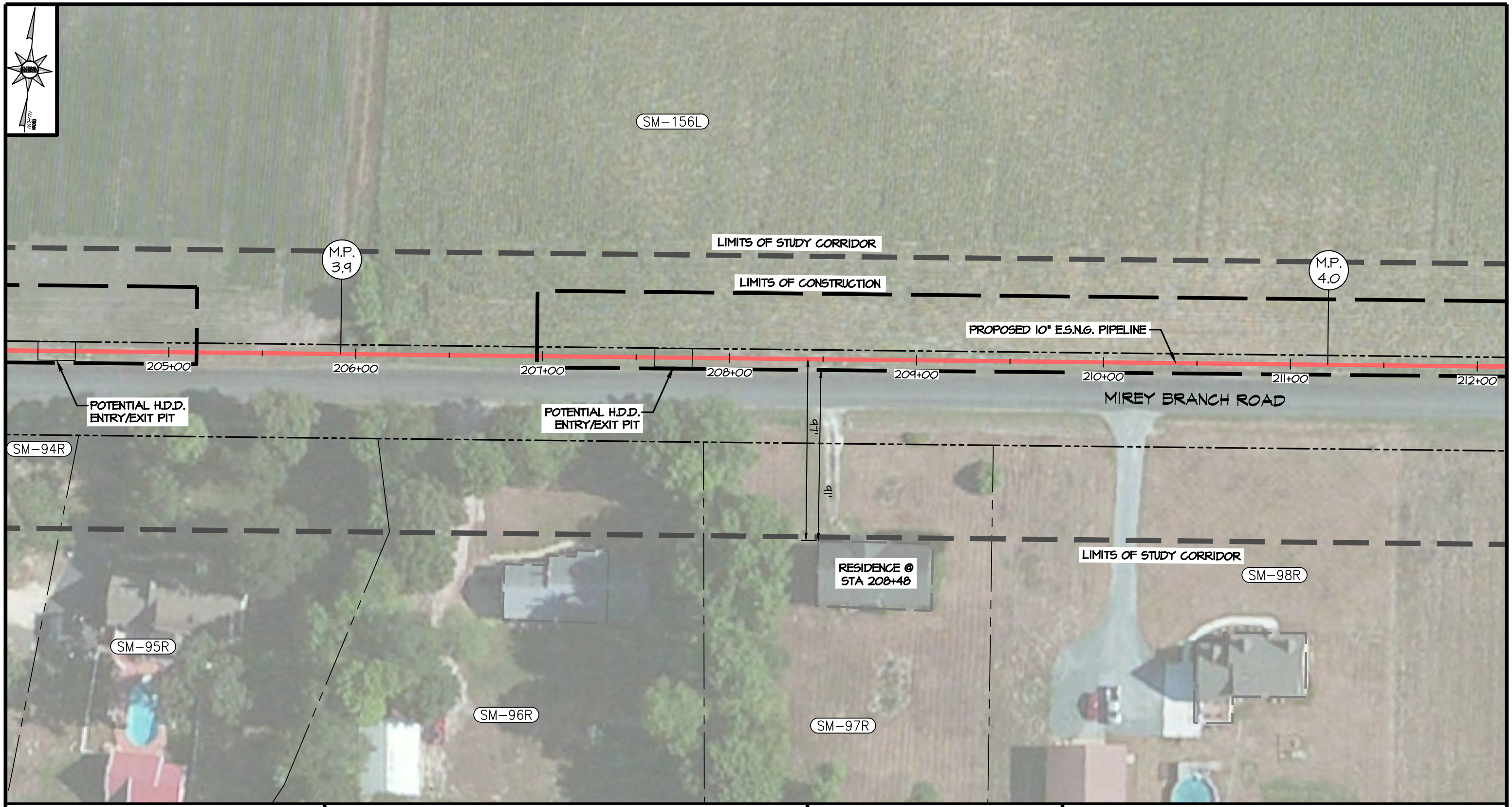

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2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19229	DATE:	11/18/2016
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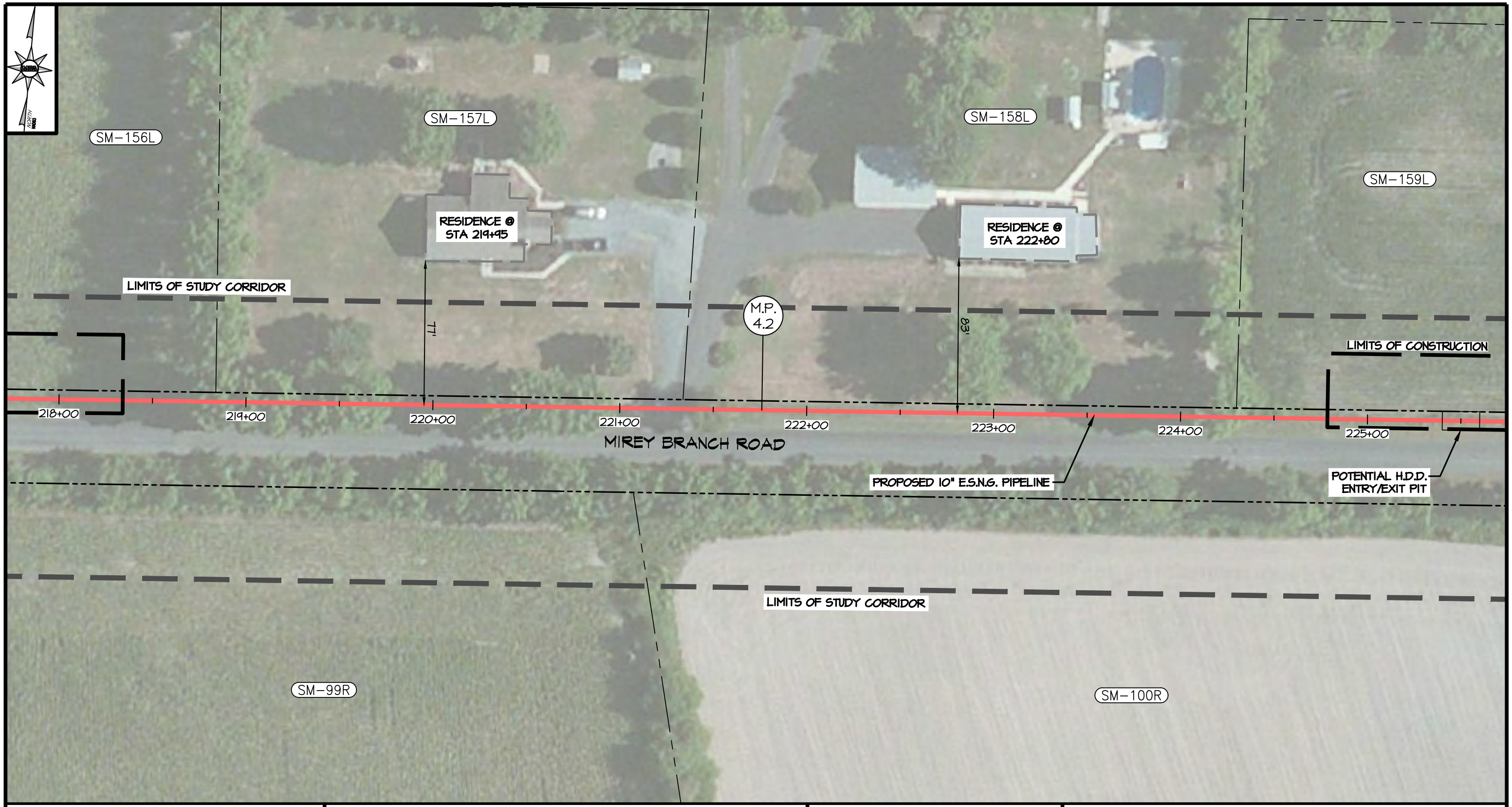

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SUSSEX COUNTY, DELAWARE

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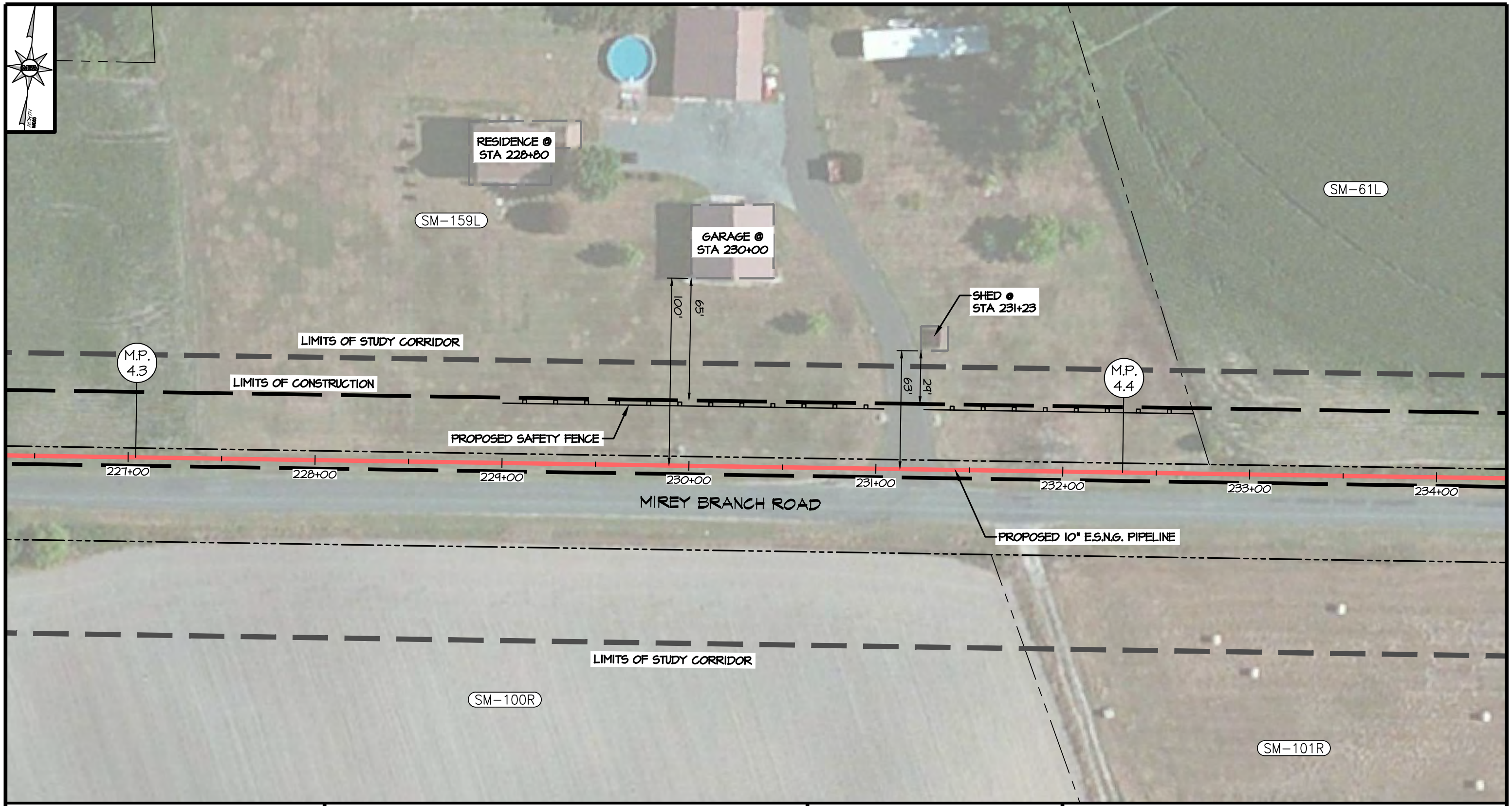

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SUSSEX COUNTY, DELAWARE

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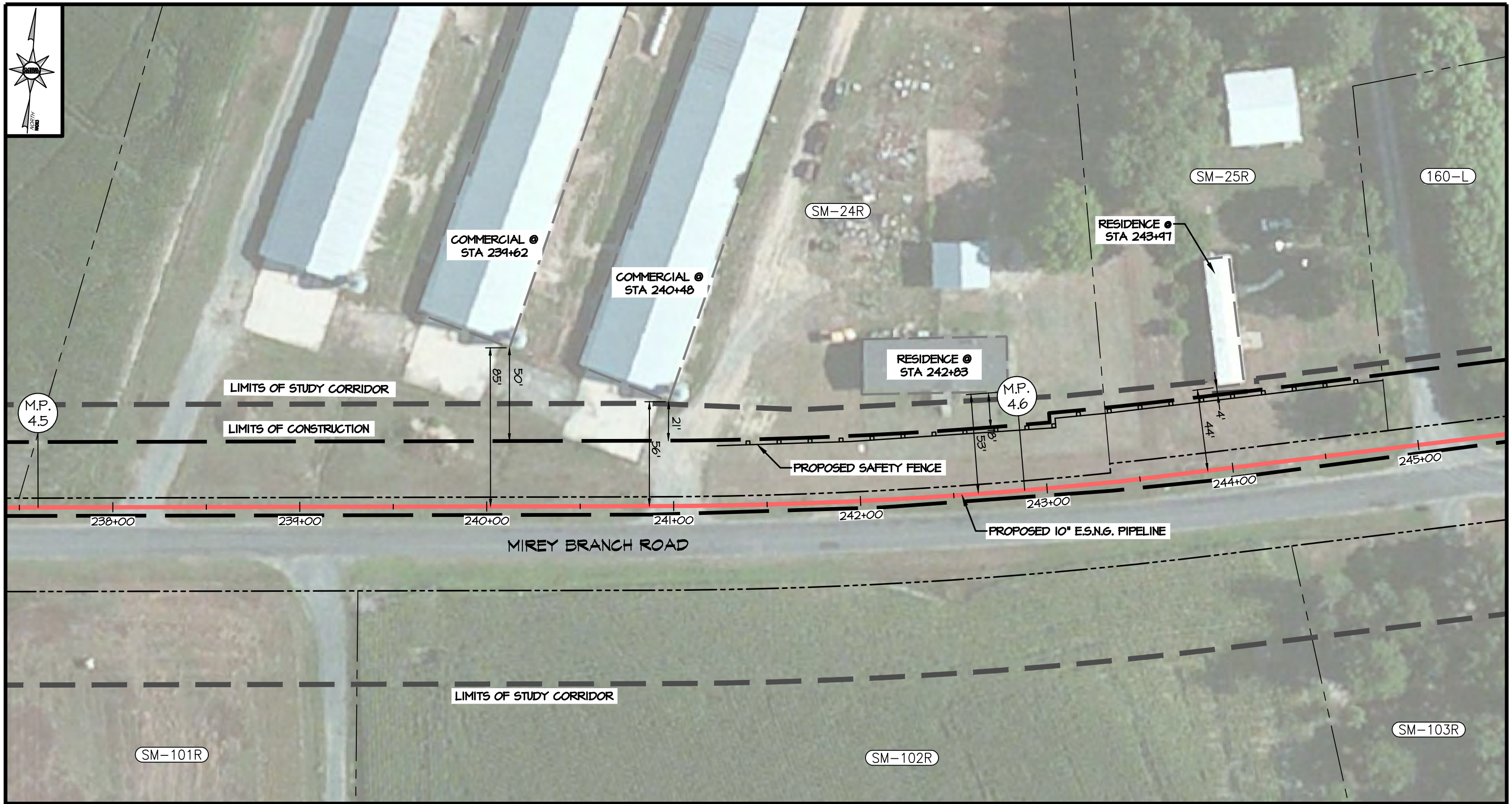

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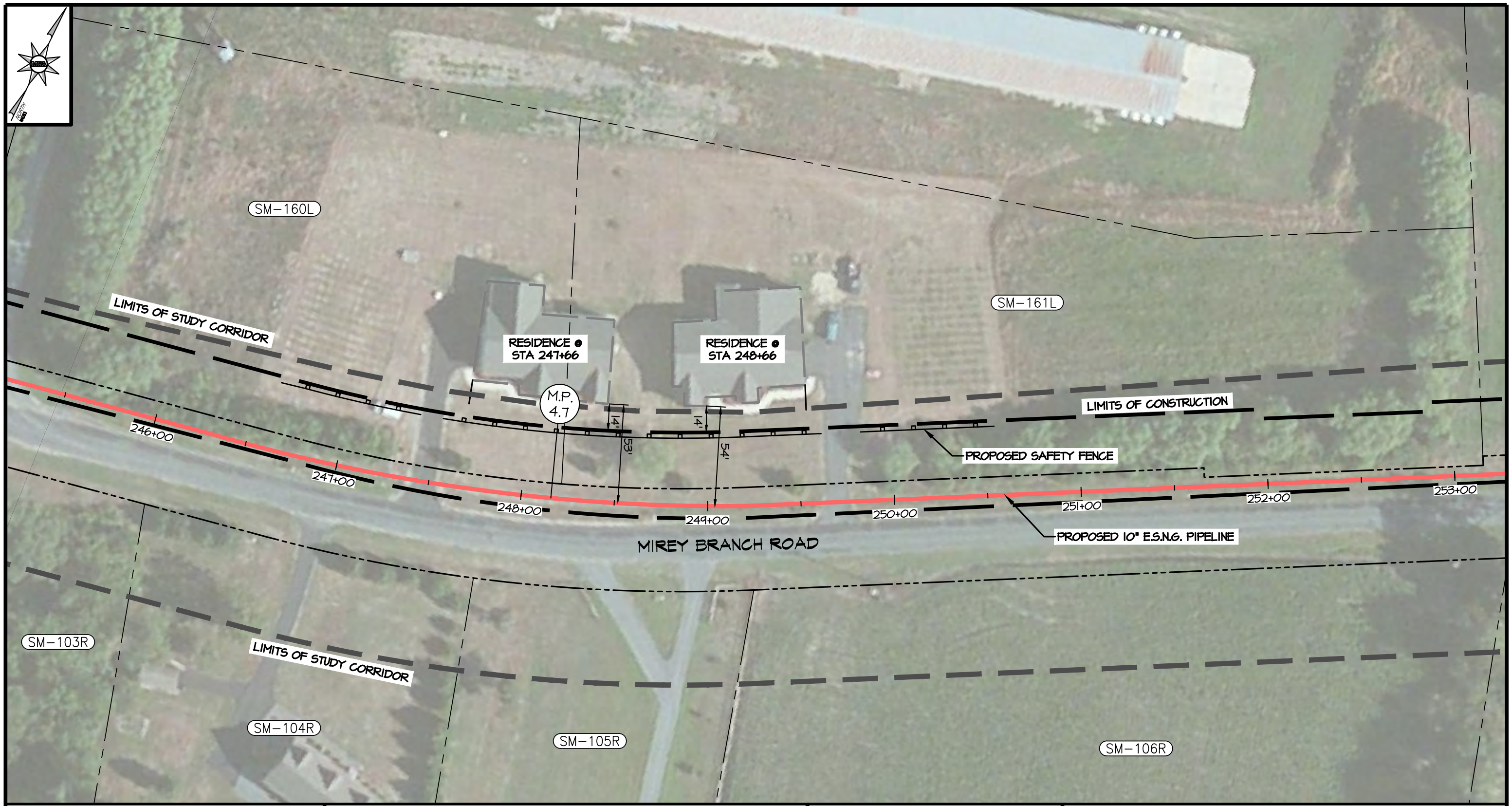

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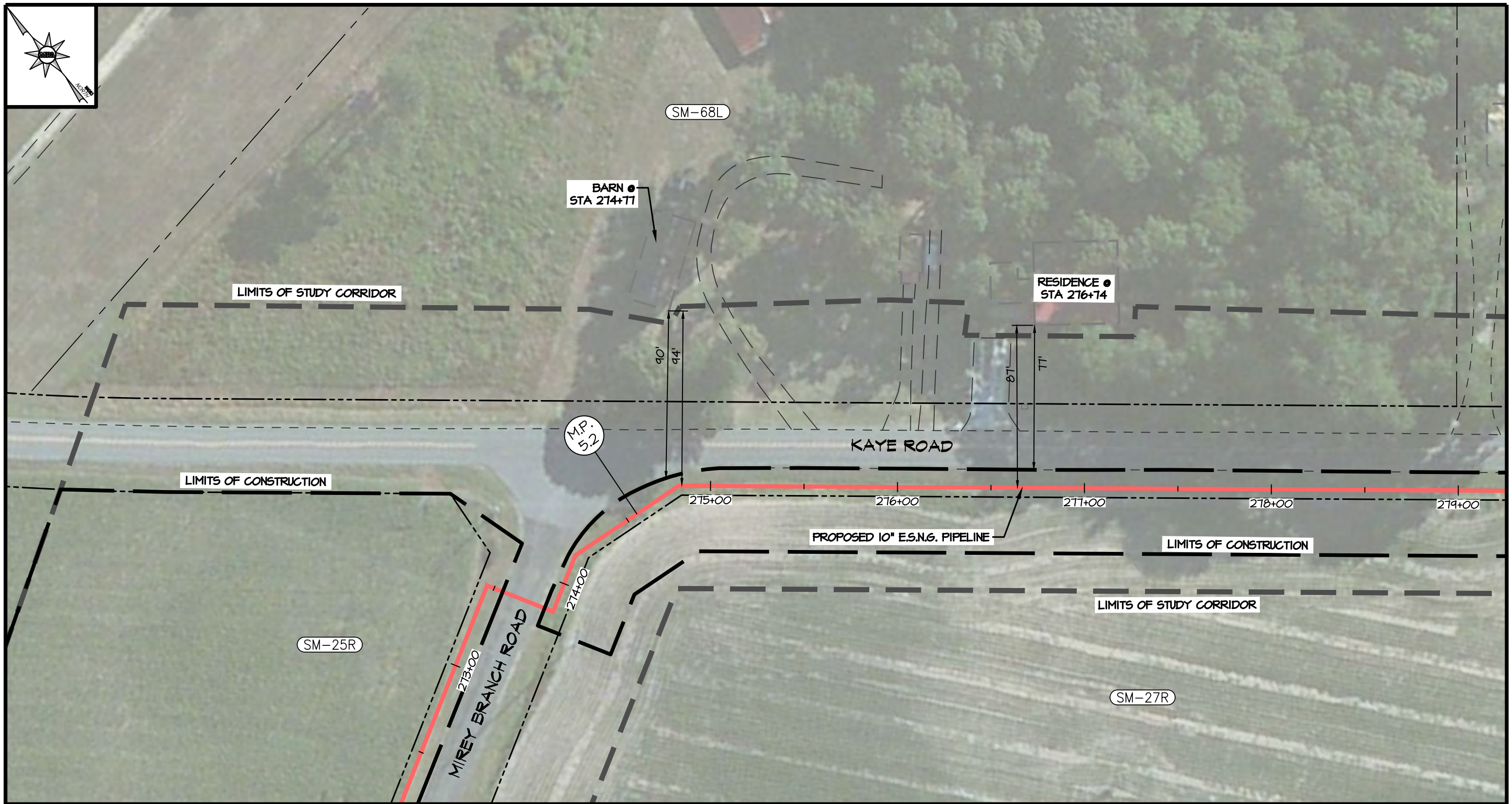

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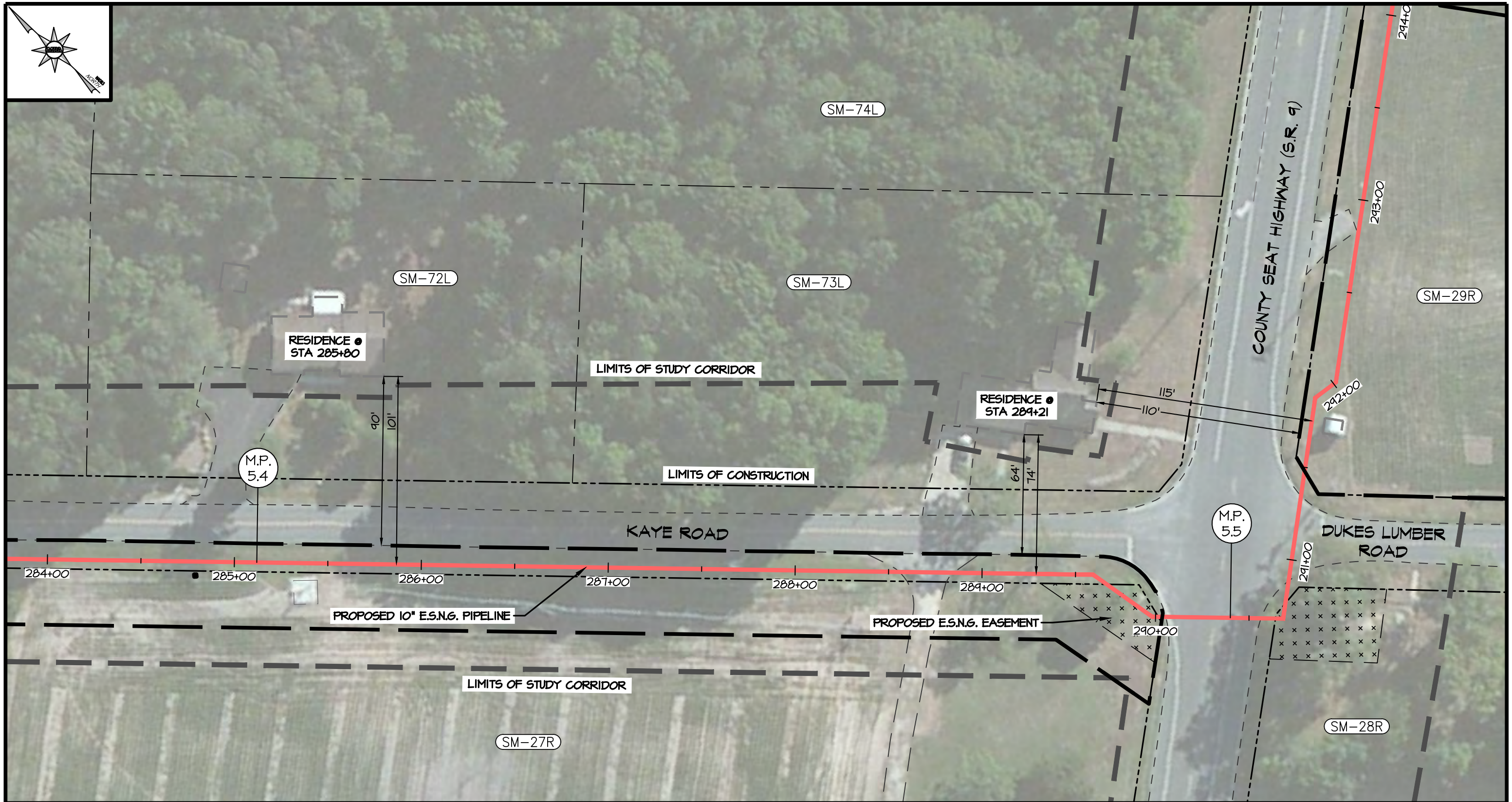

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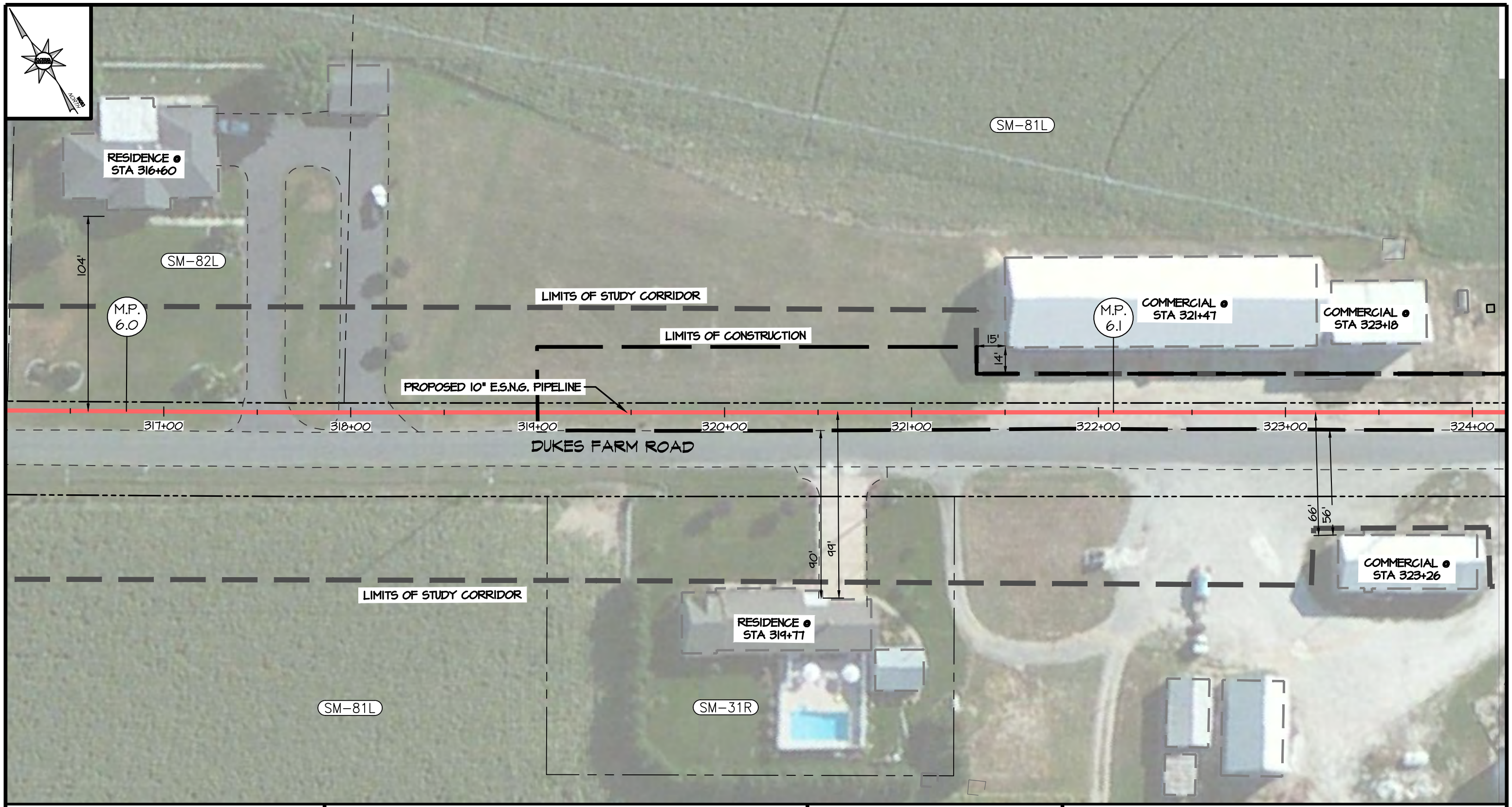

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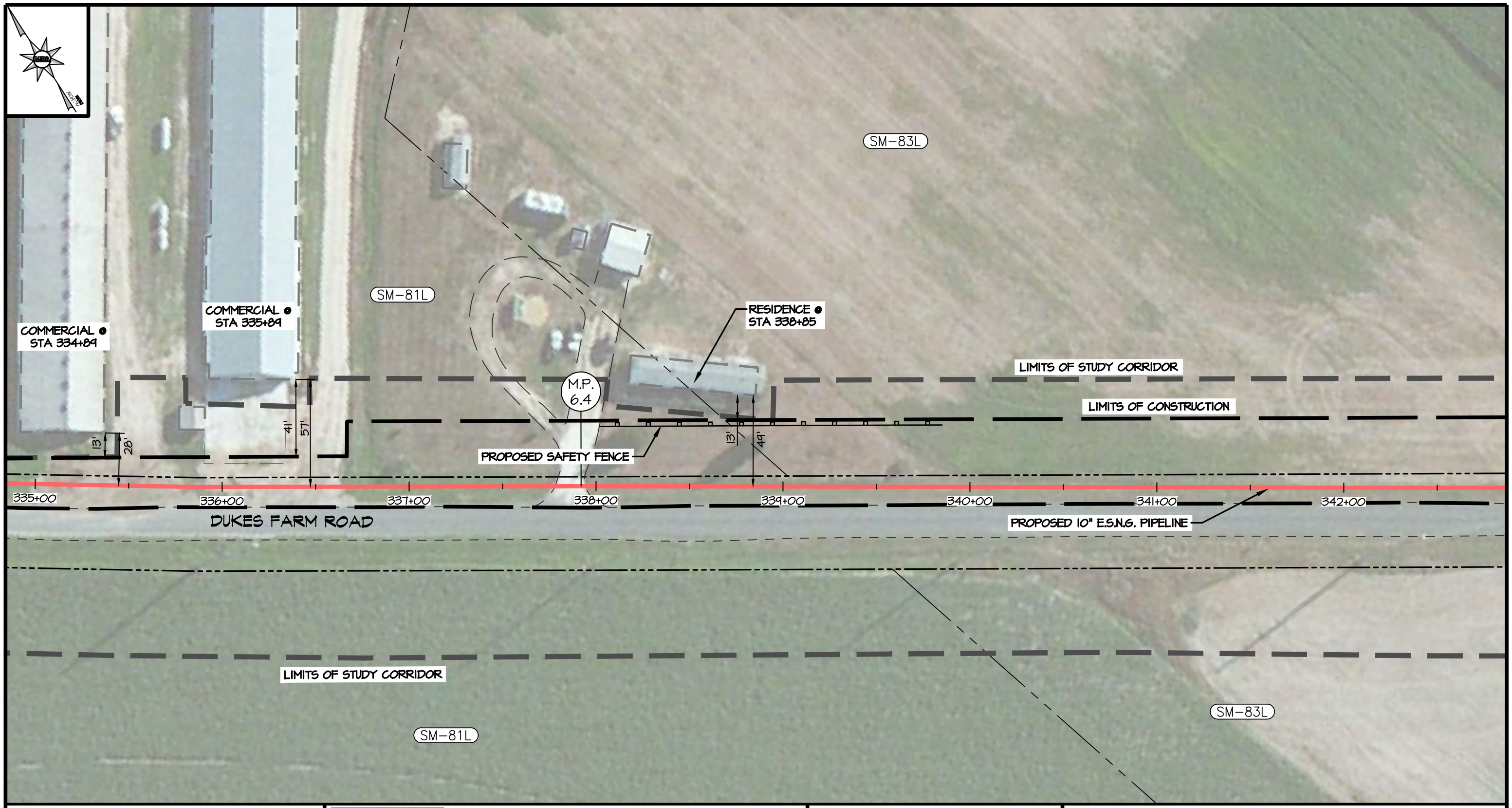

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SEAFORD-MILLSBORO CONNECTOR
RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

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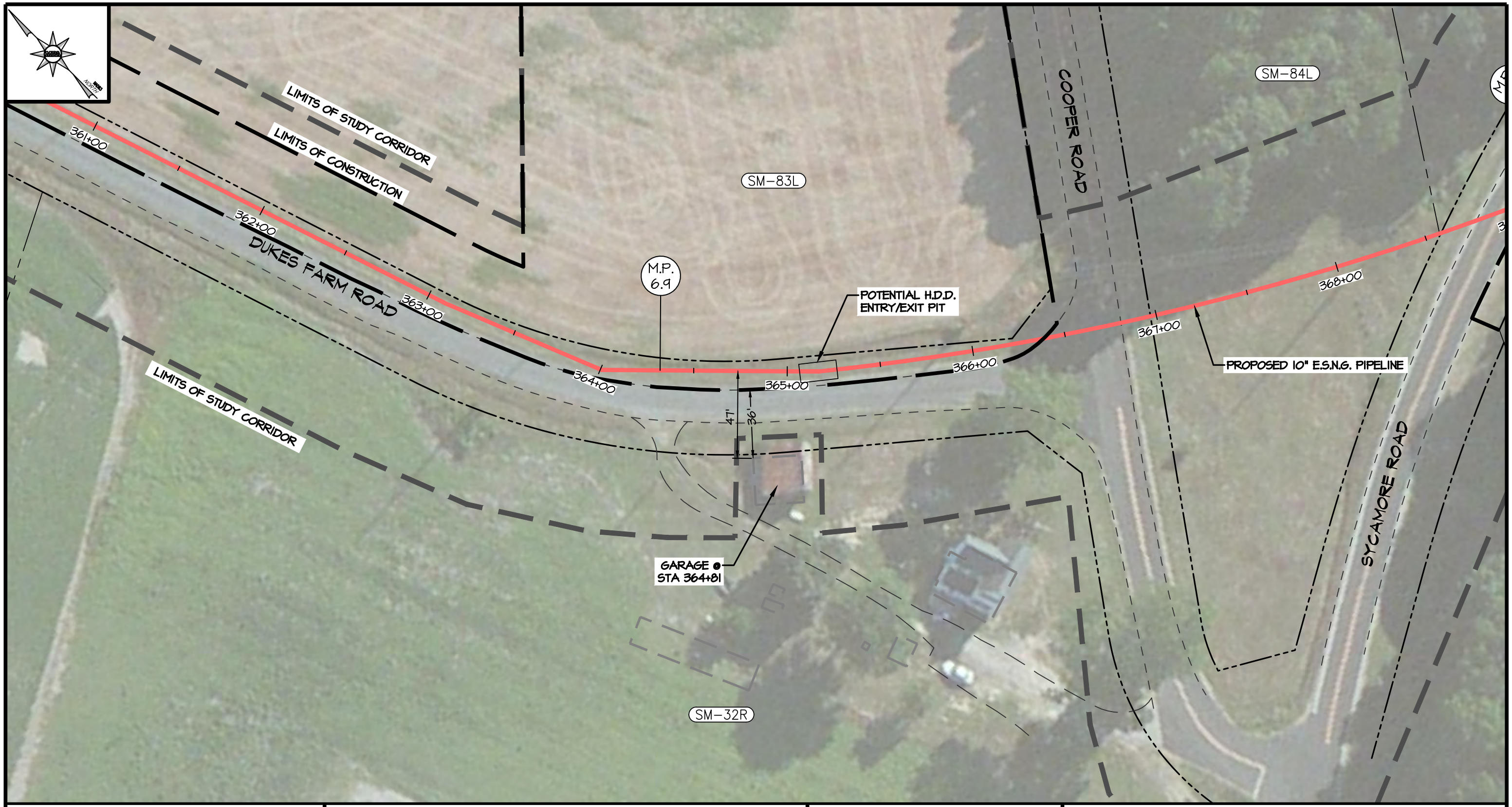

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SEAFORD-MILLSBORO CONNECTOR
RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19229	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
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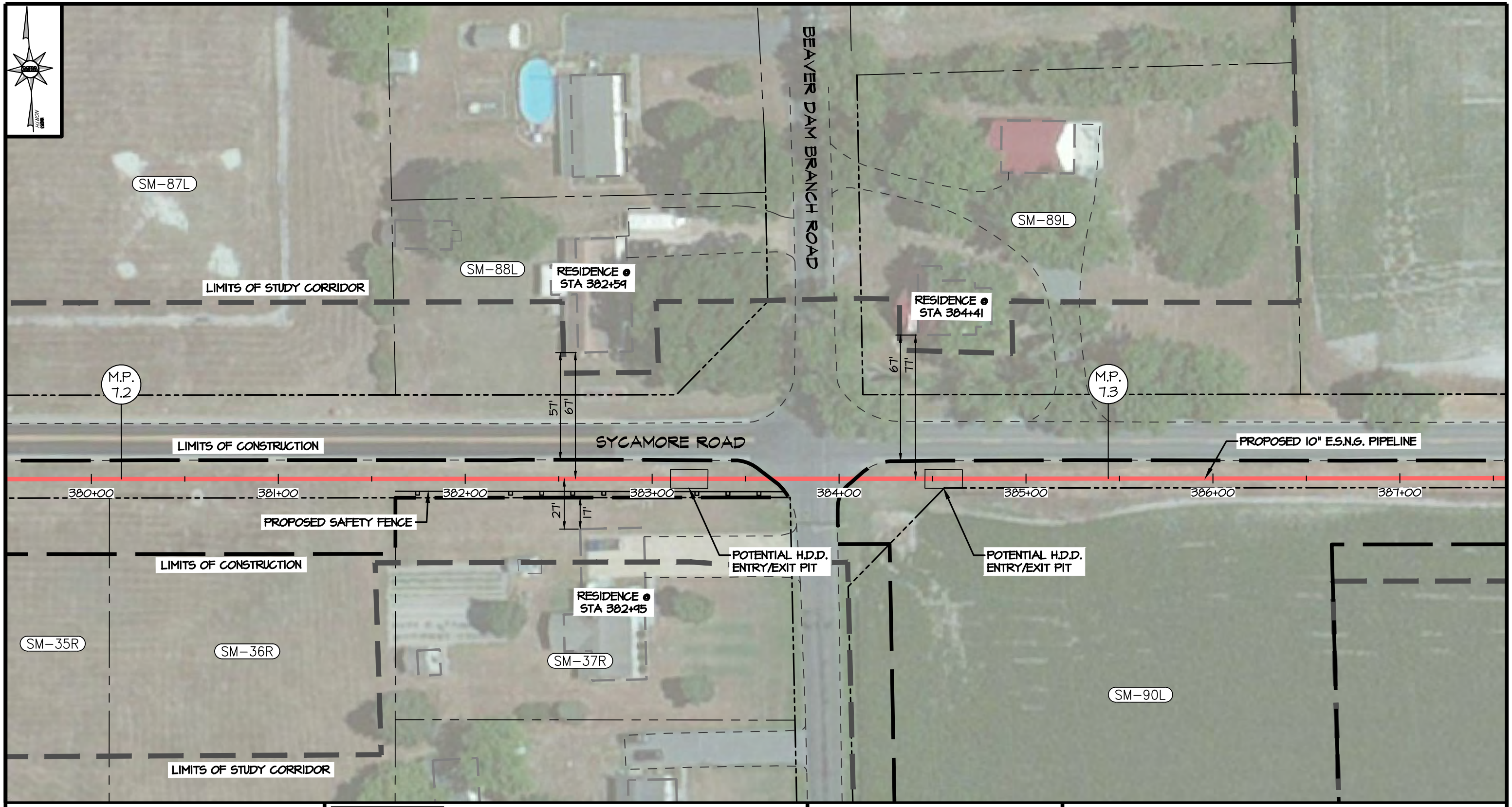

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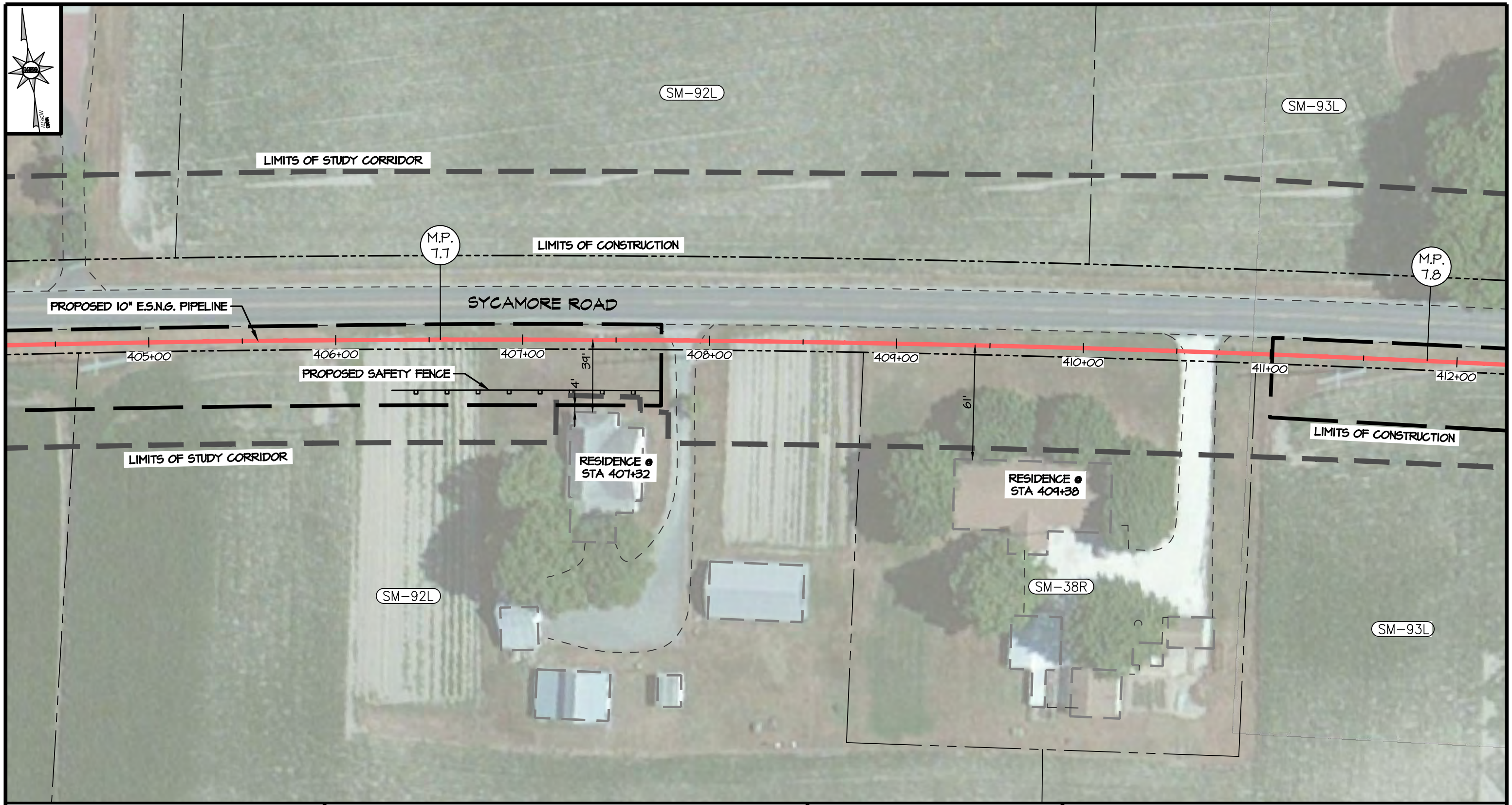

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SUSSEX COUNTY, DELAWARE

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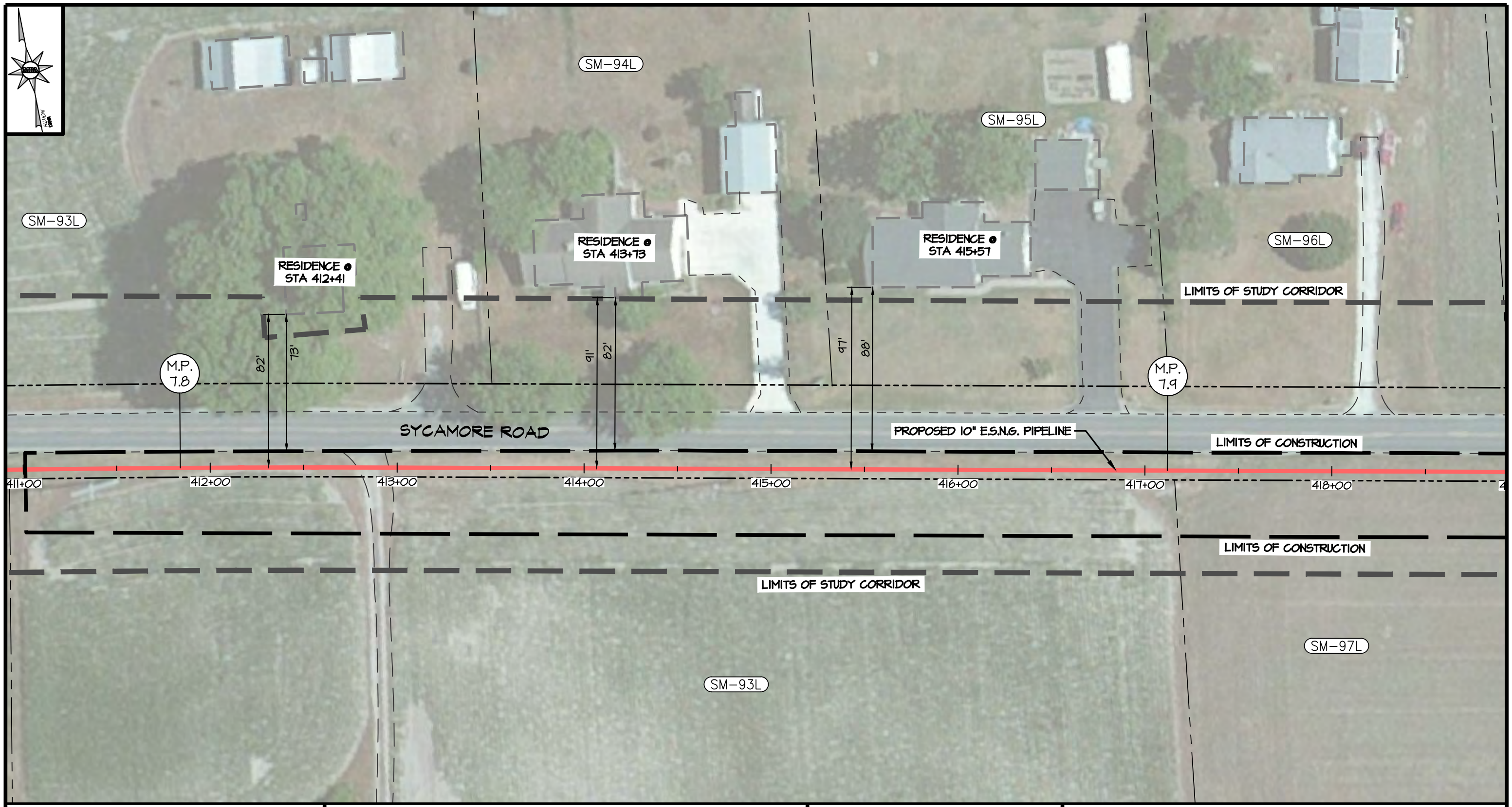

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SUSSEX COUNTY, DELAWARE

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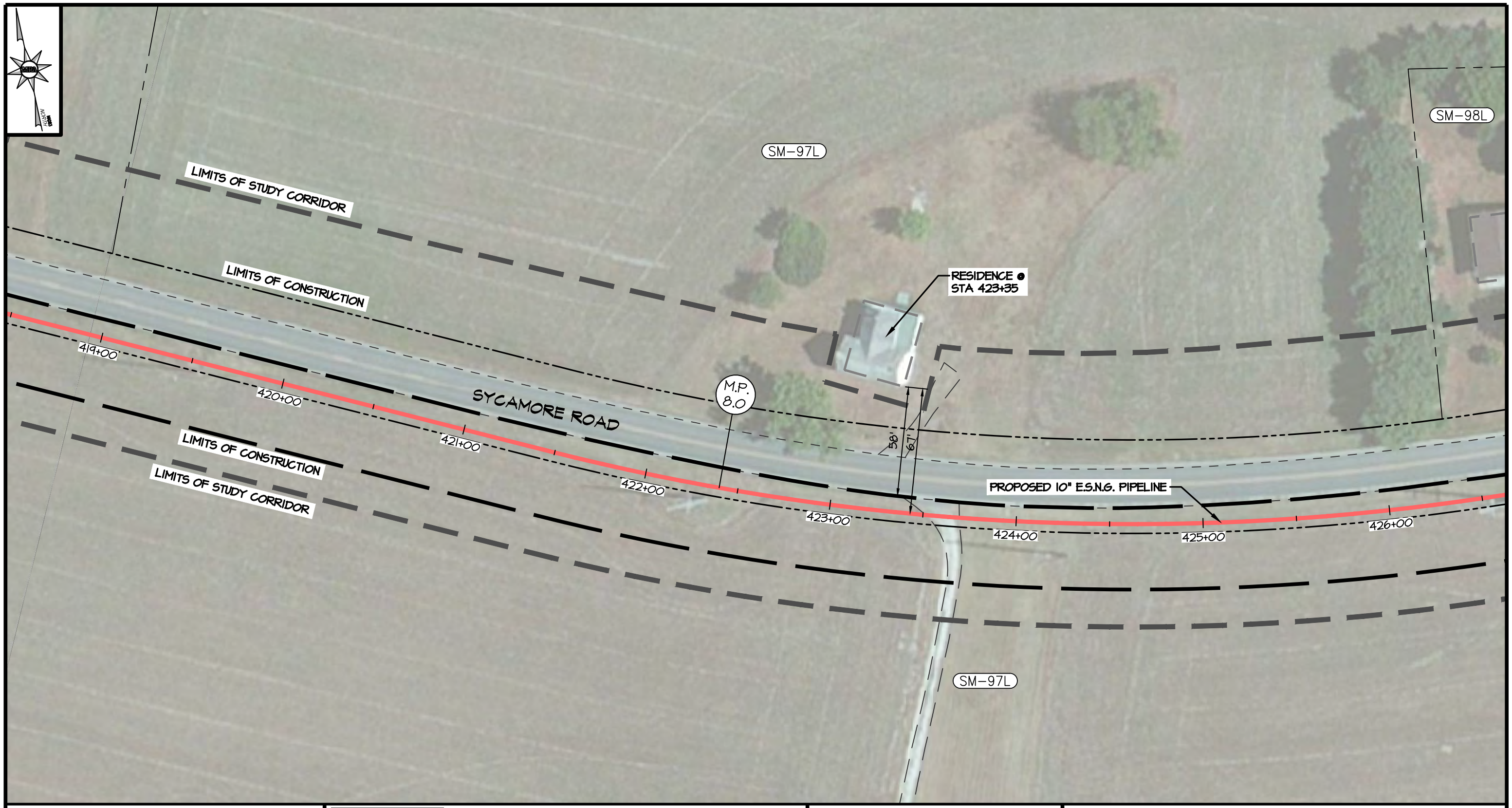

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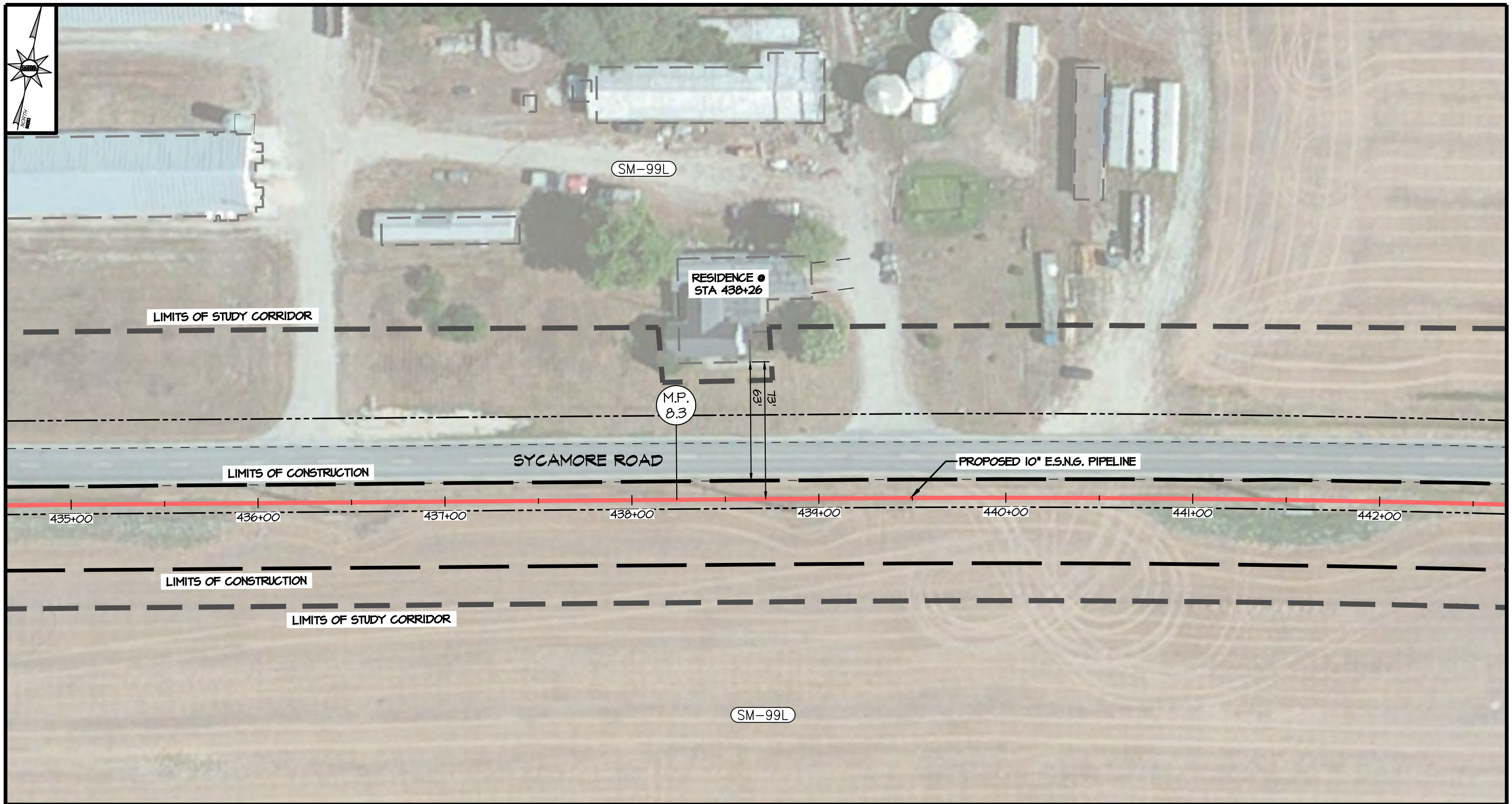

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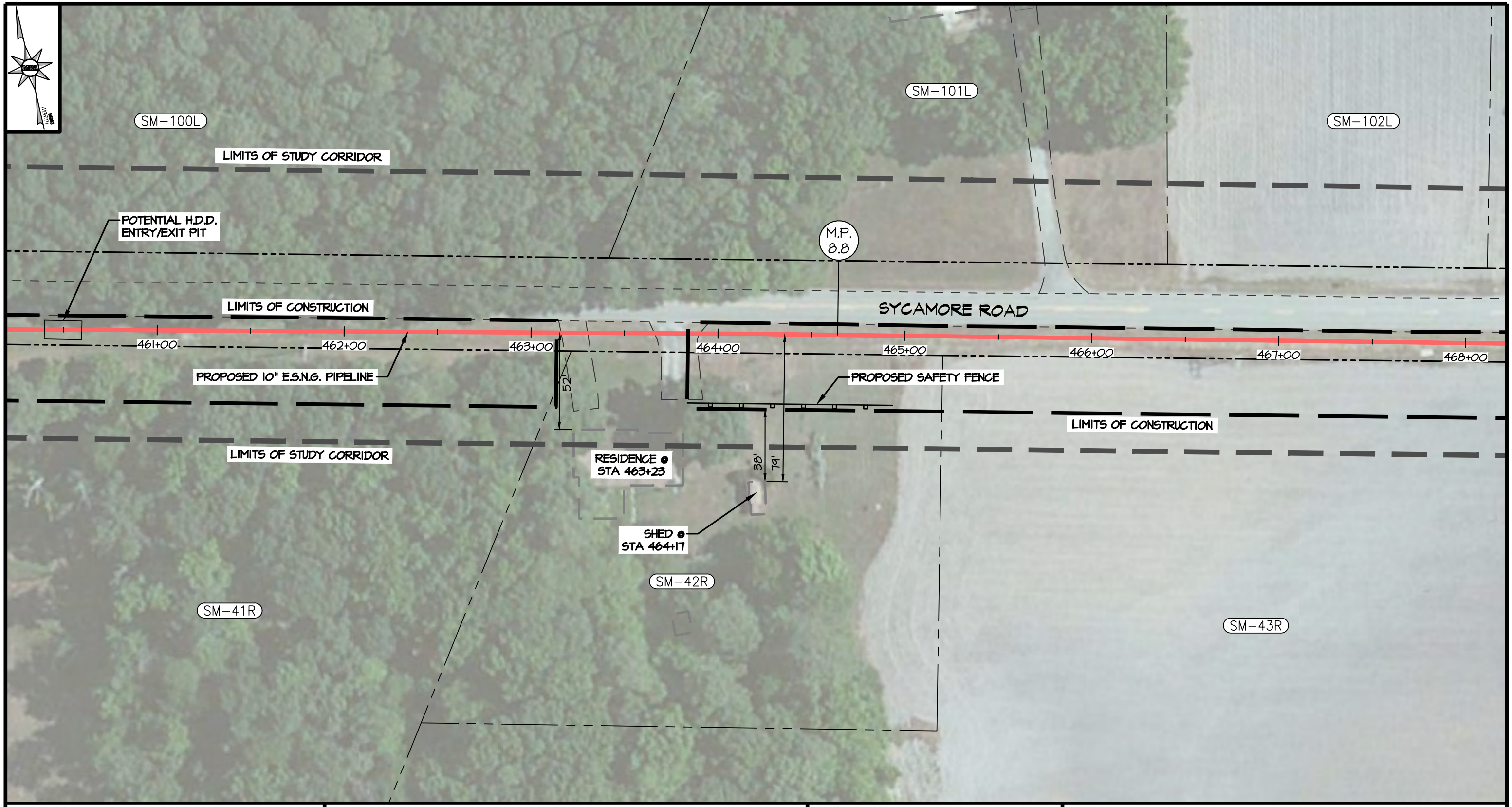

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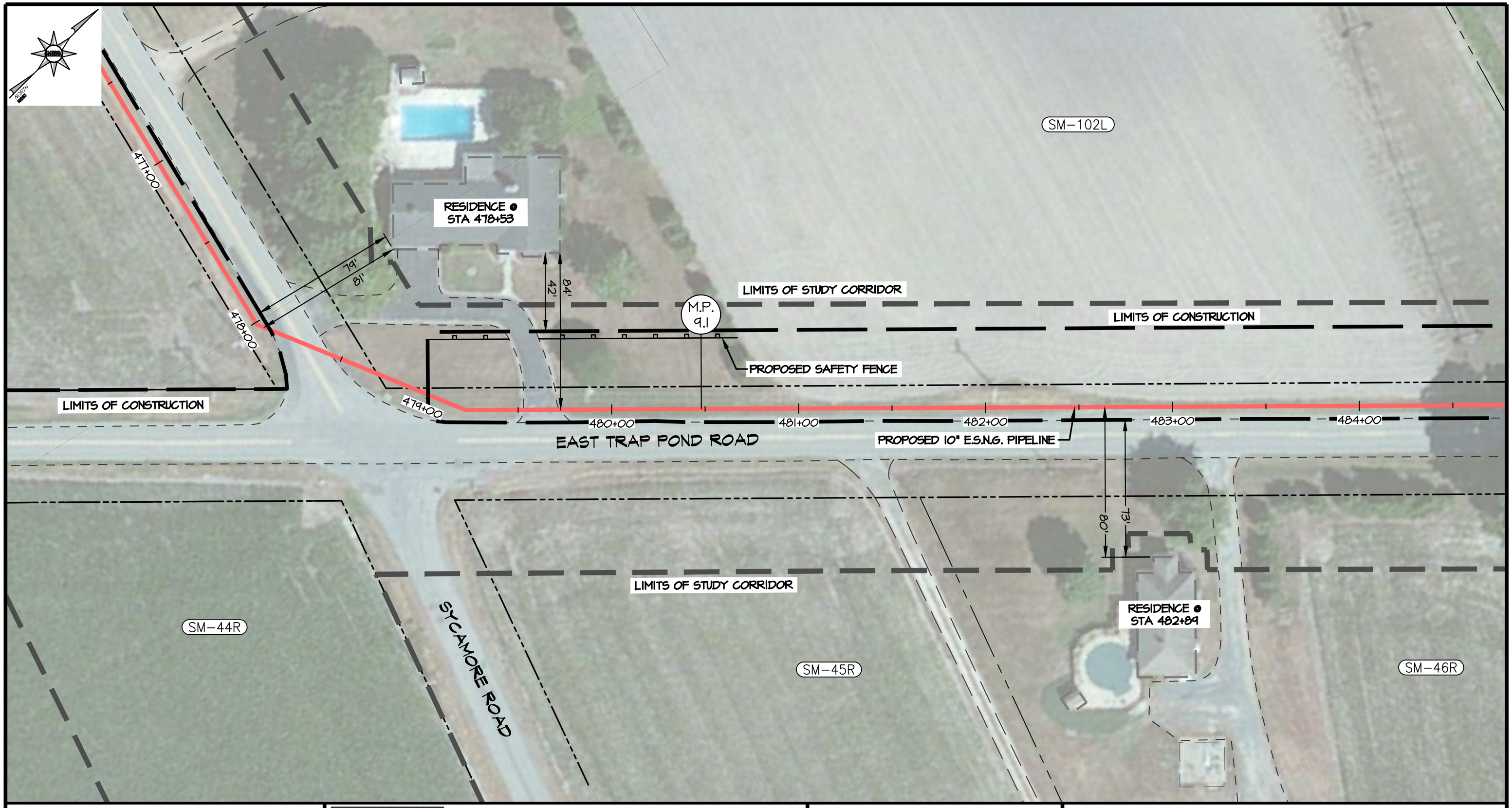

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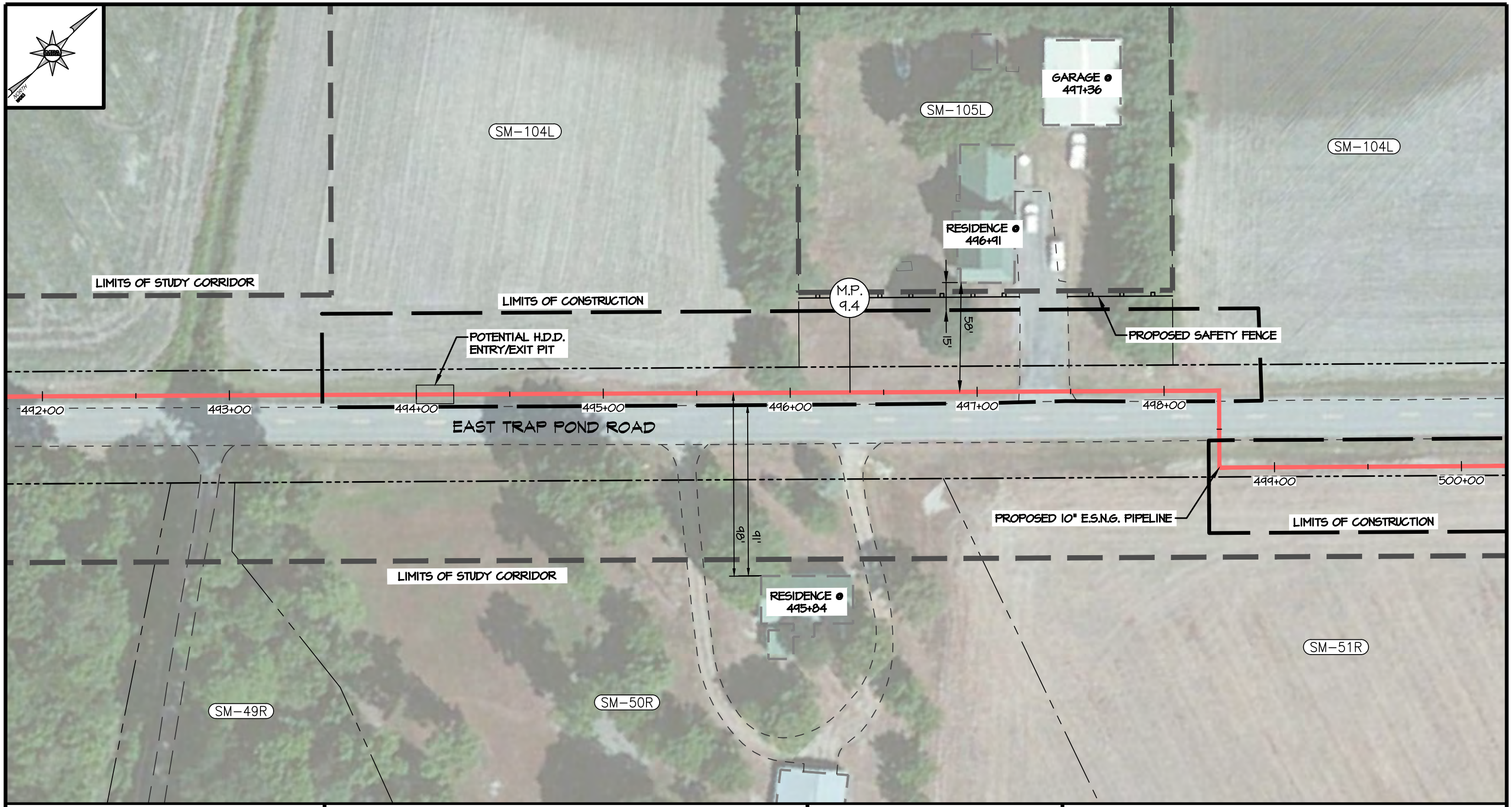

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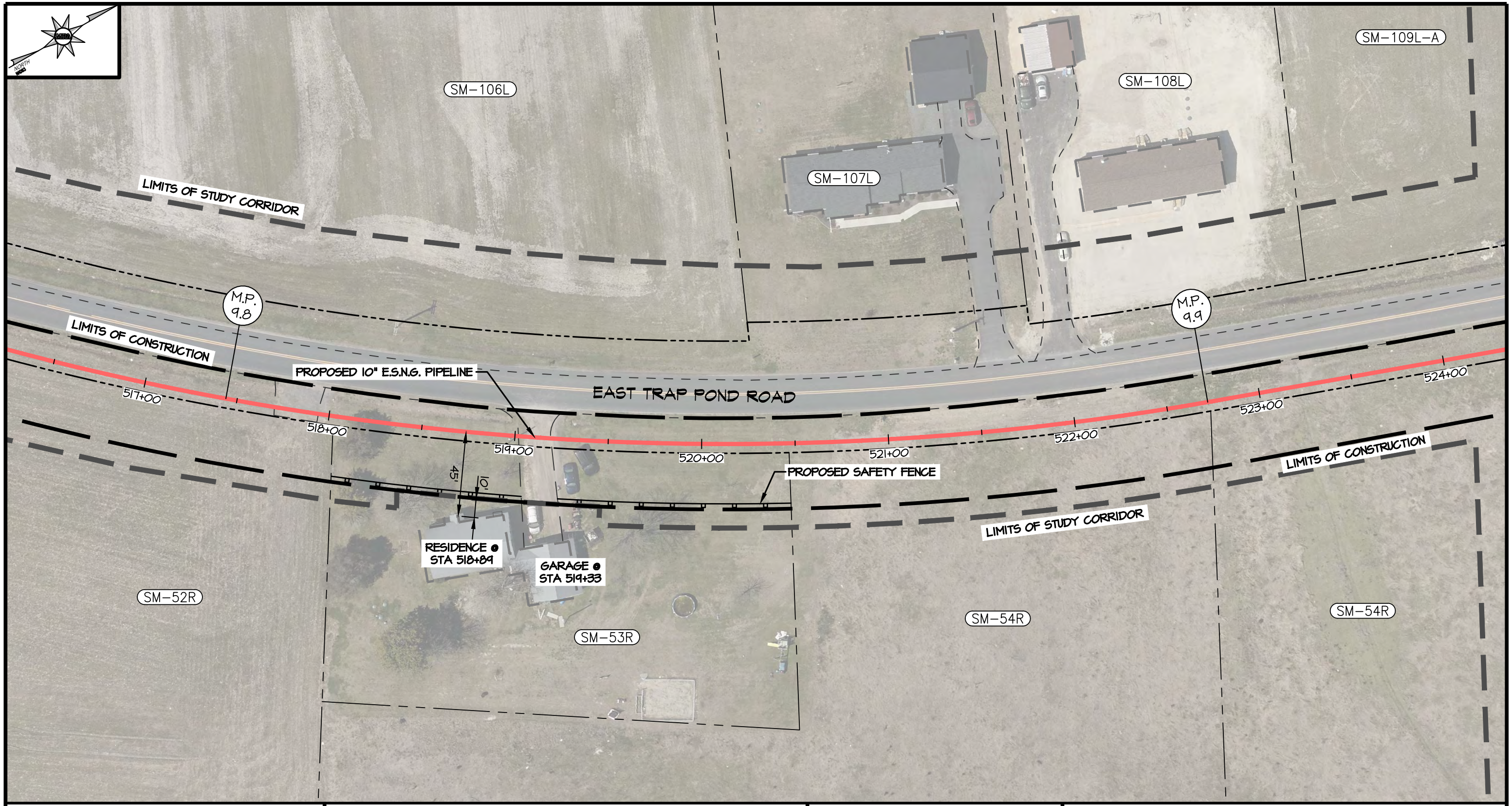
TELEPHONE (302) 734-6710 - FAX (302) 734-6745

SEAFORD-MILLSBORO CONNECTOR
RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19229	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	30 OF 41



REVISIONS		
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MORRIS & RITCHIE ASSOCIATES, INC.
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18 BOULDEN CIRCLE, SUITE: 36, WILMINGTON, DE 19720
TEL: (302) 326-2200 FAX: (302) 326-2399
MRAGTA.COM

50 25 0 25 50 100
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SUSSEX COUNTY, DELAWARE

PROJECT NO:	19229	DATE:	11/18/2016
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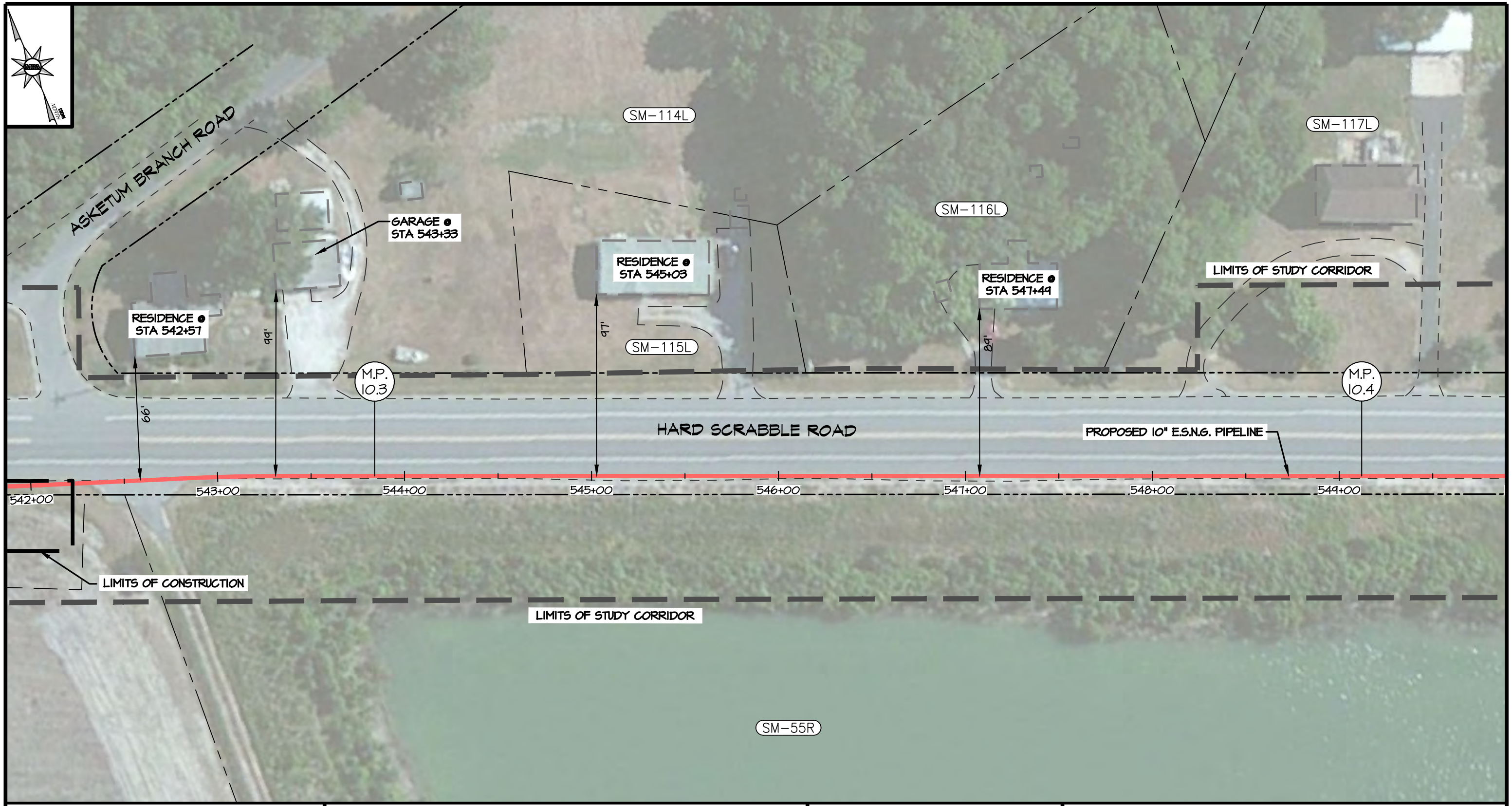

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SEAFORD-MILLSBORO CONNECTOR
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SUSSEX COUNTY, DELAWARE

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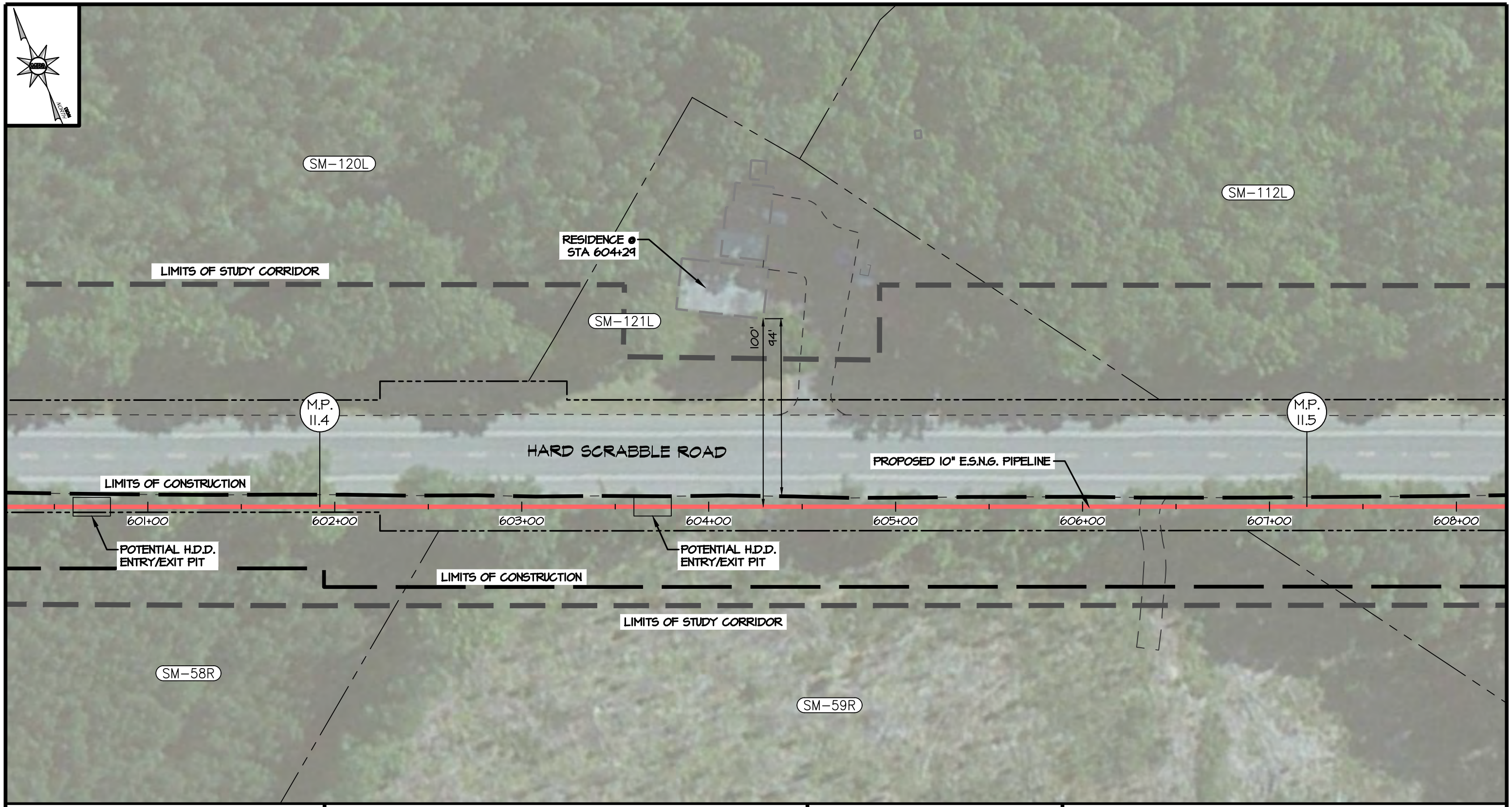

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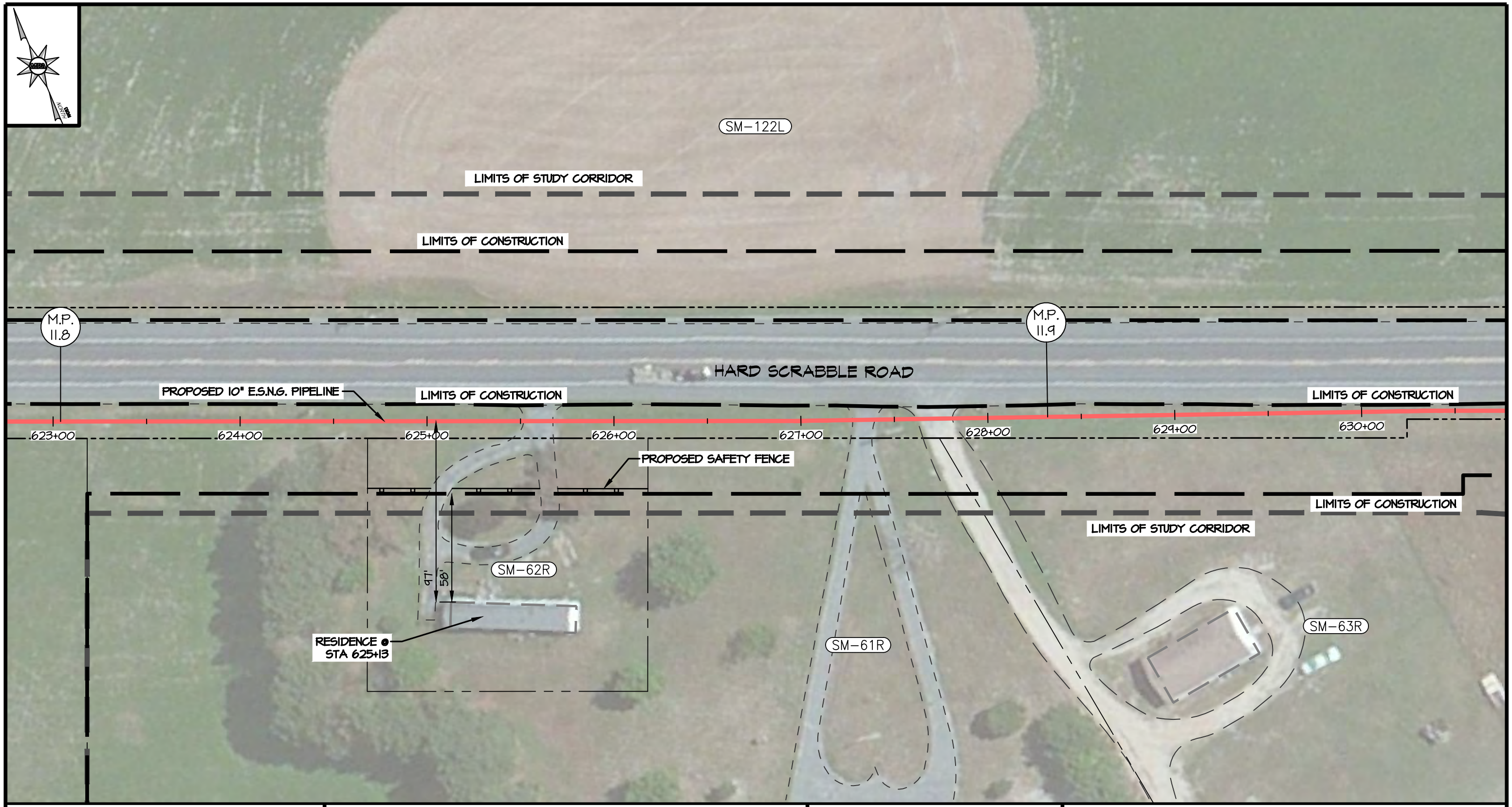

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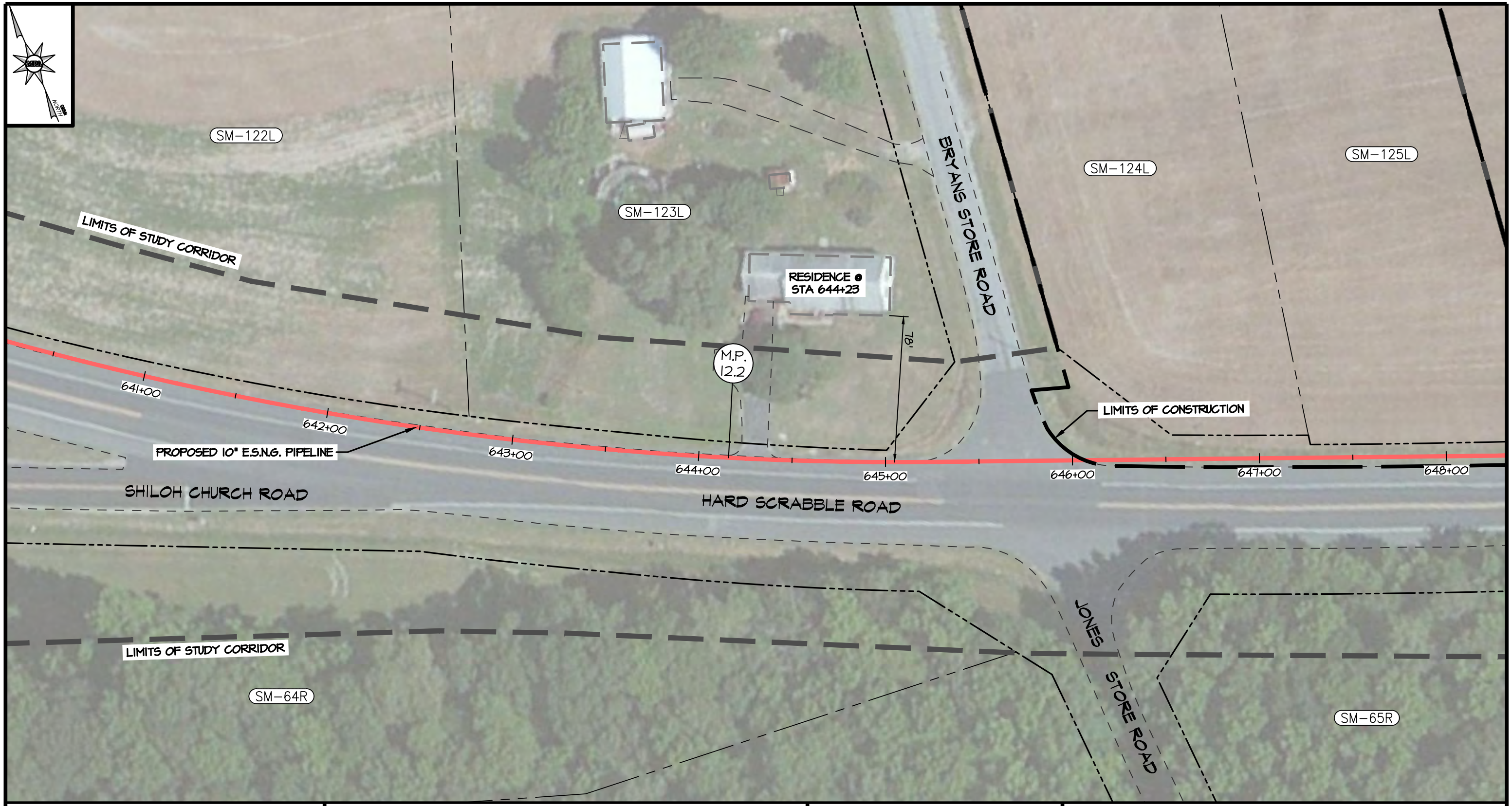

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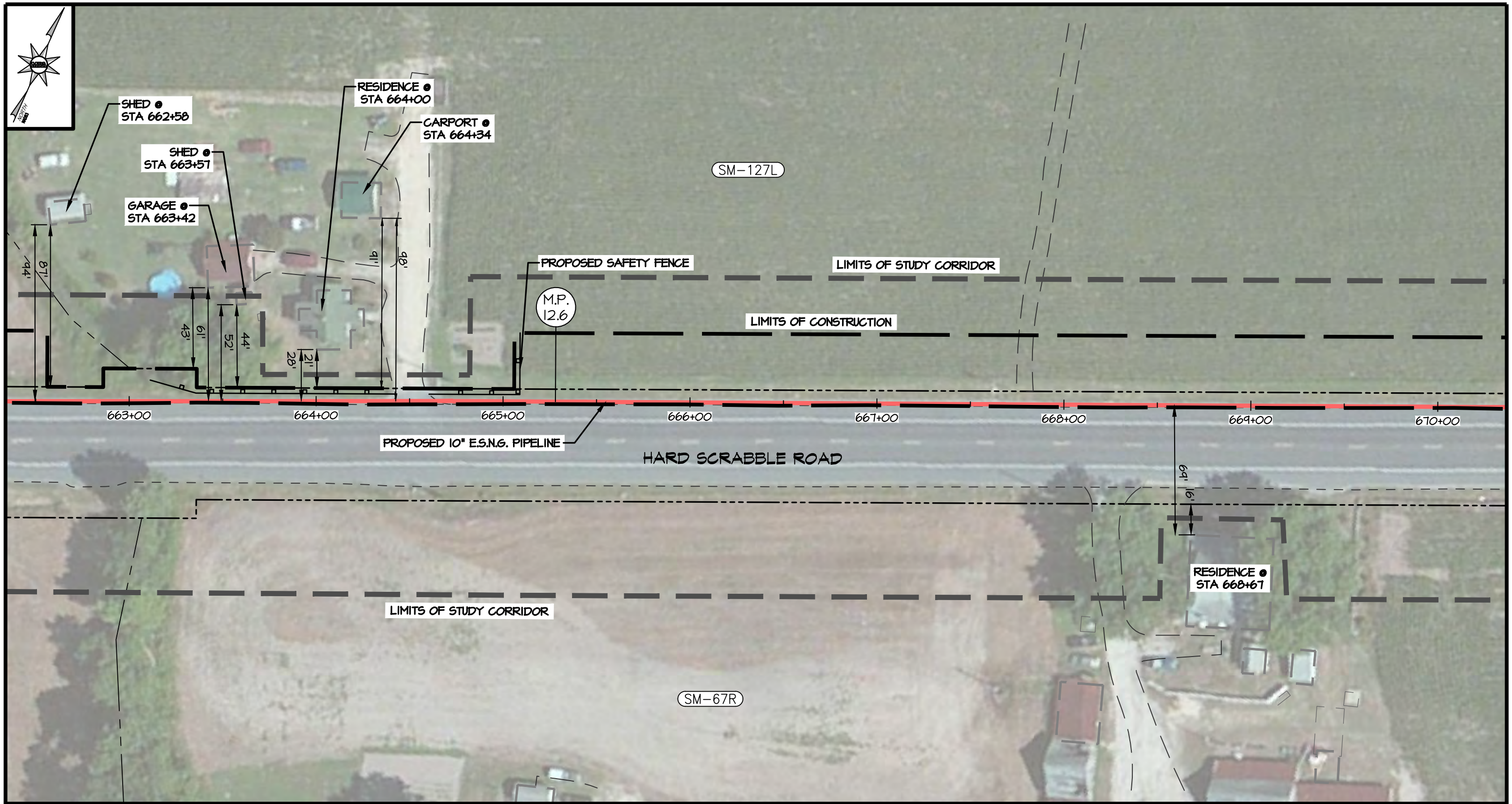

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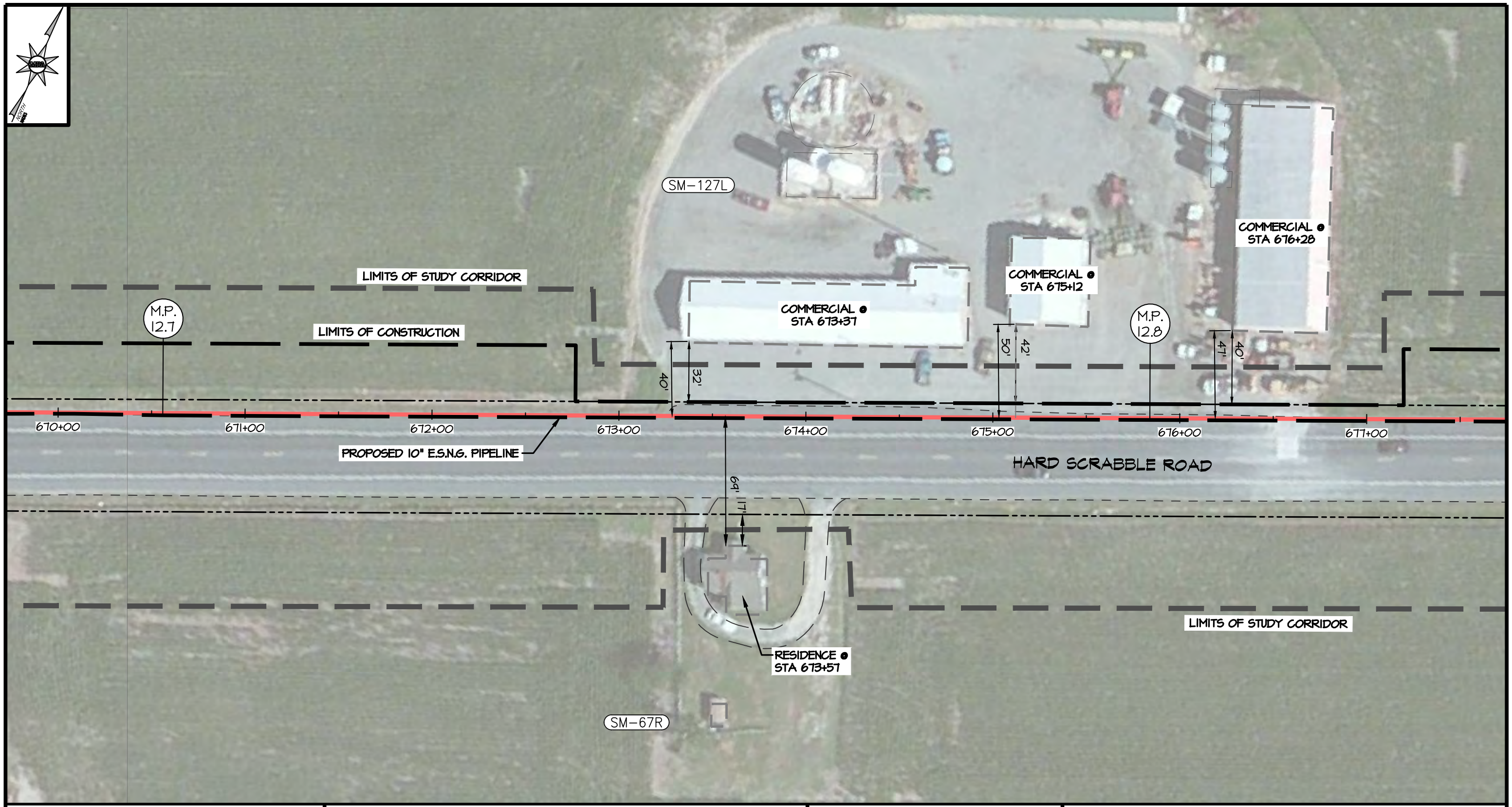

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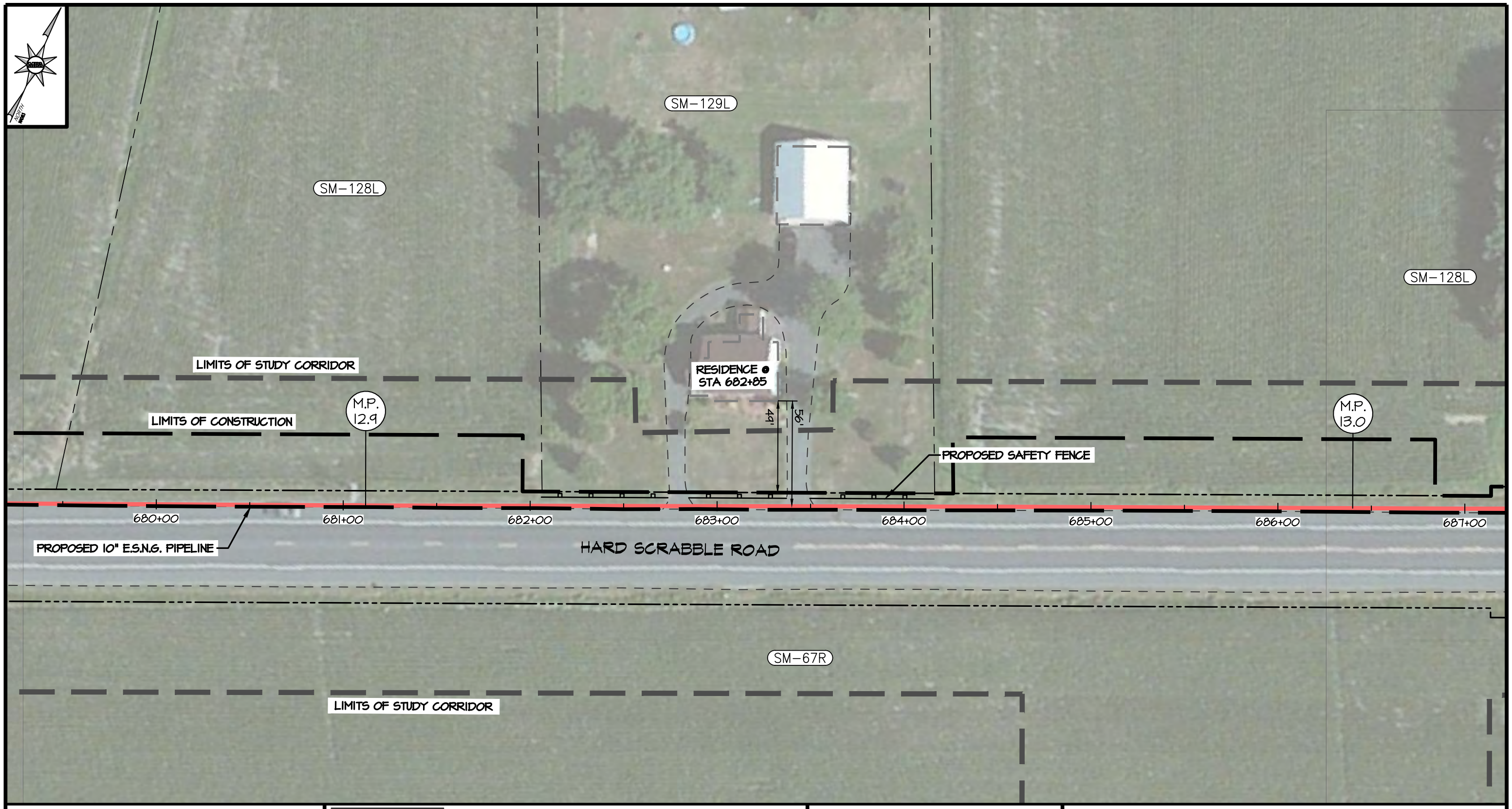

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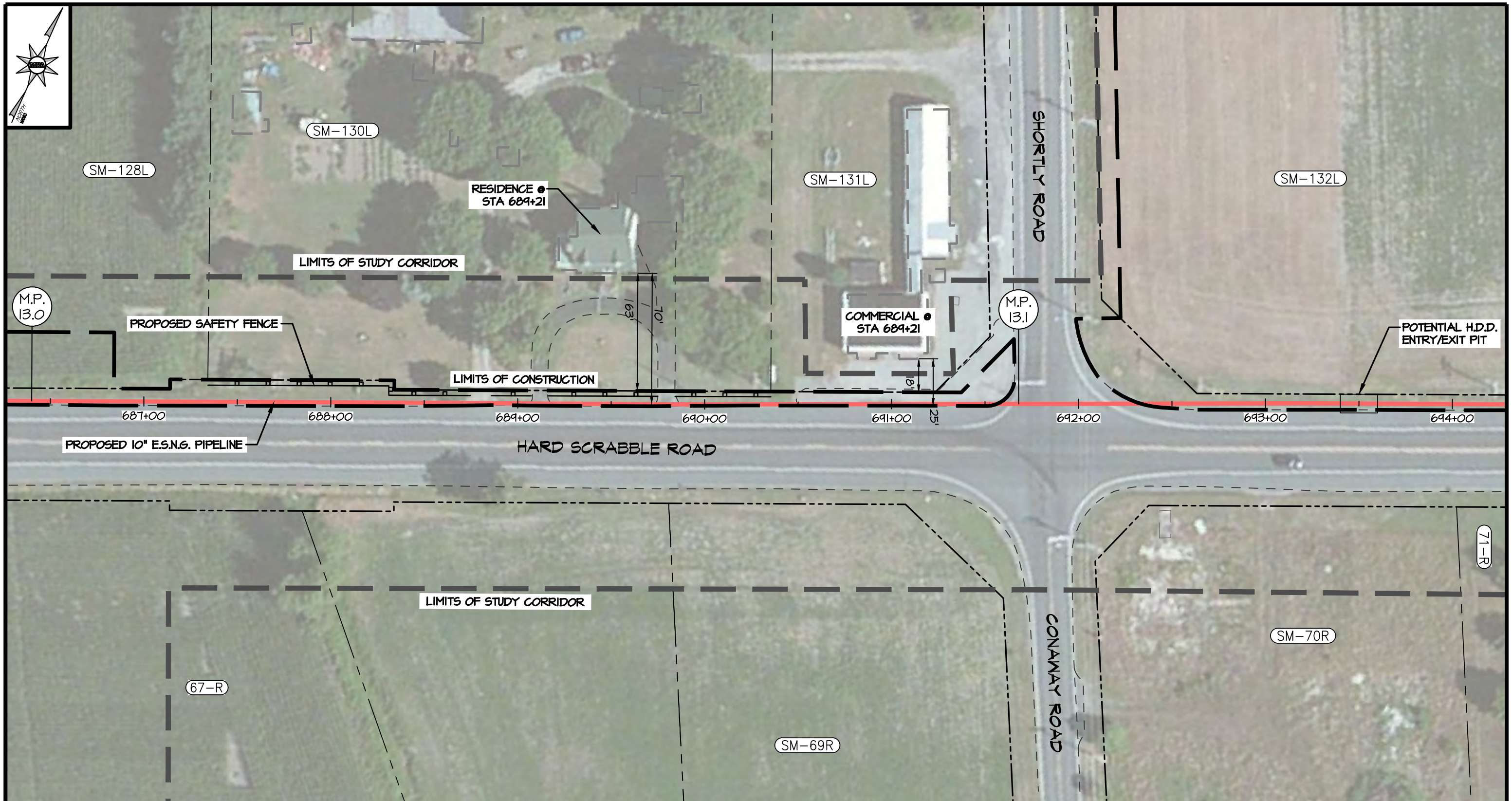

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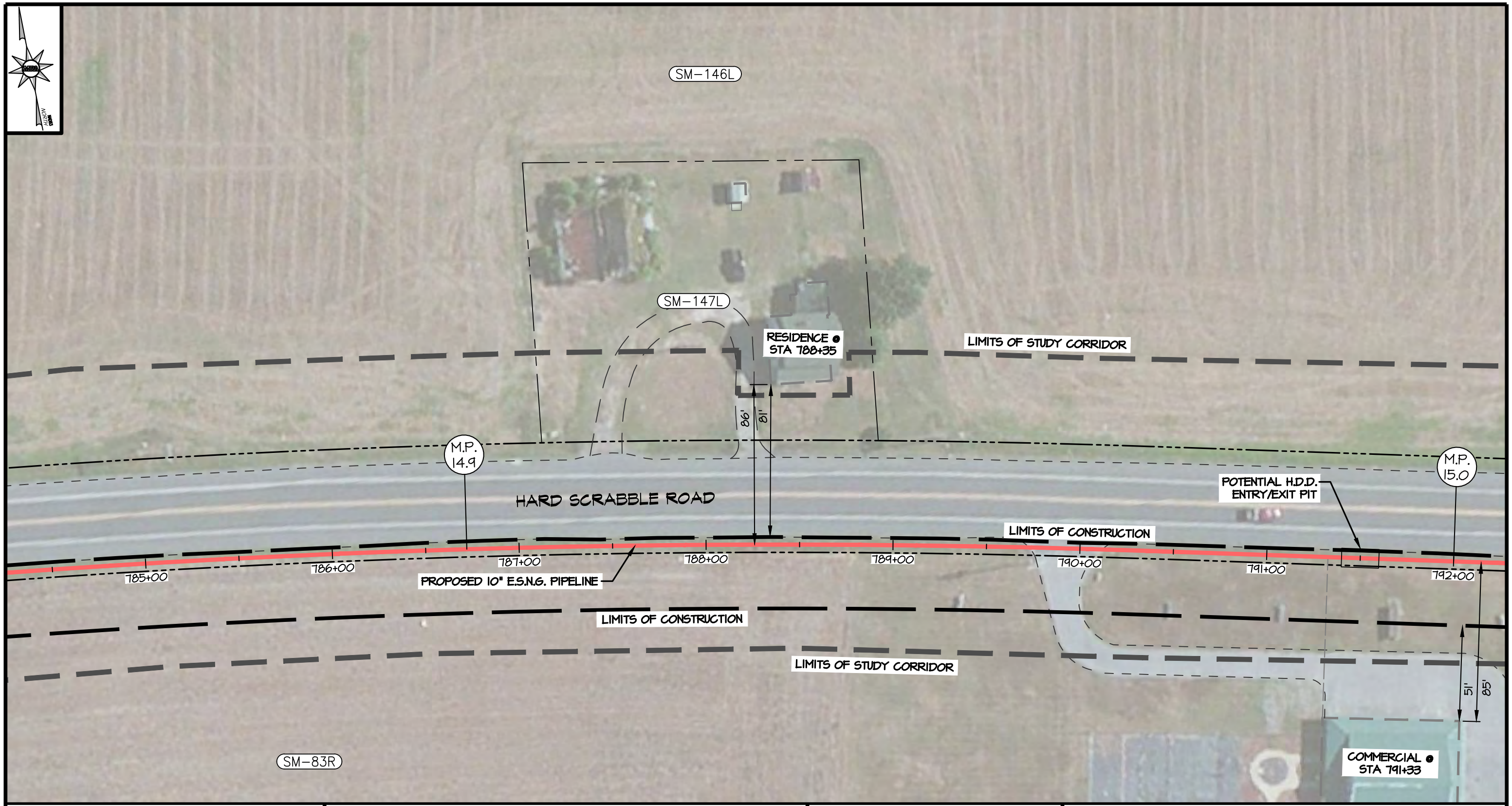

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SUSSEX COUNTY, DELAWARE

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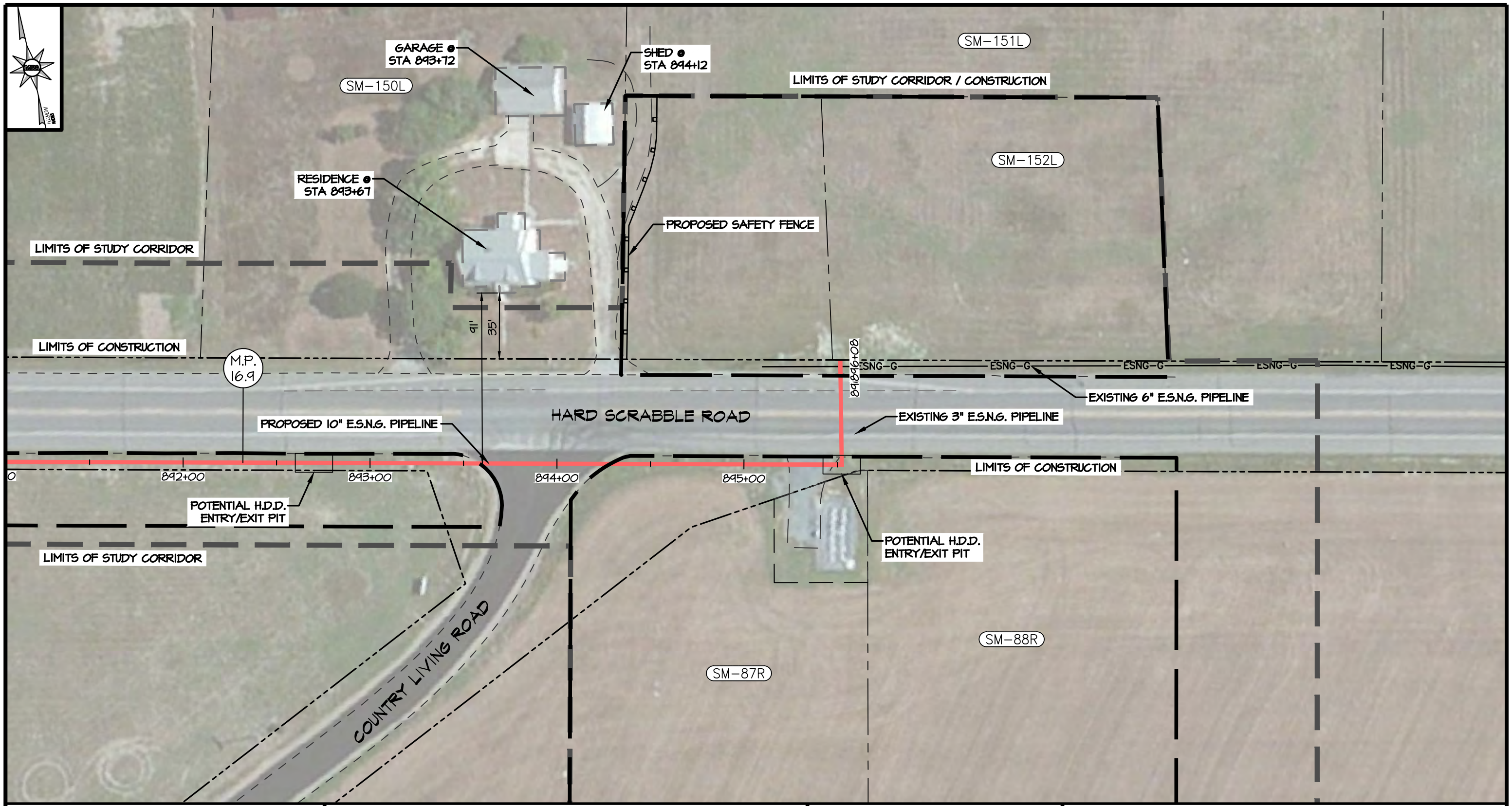

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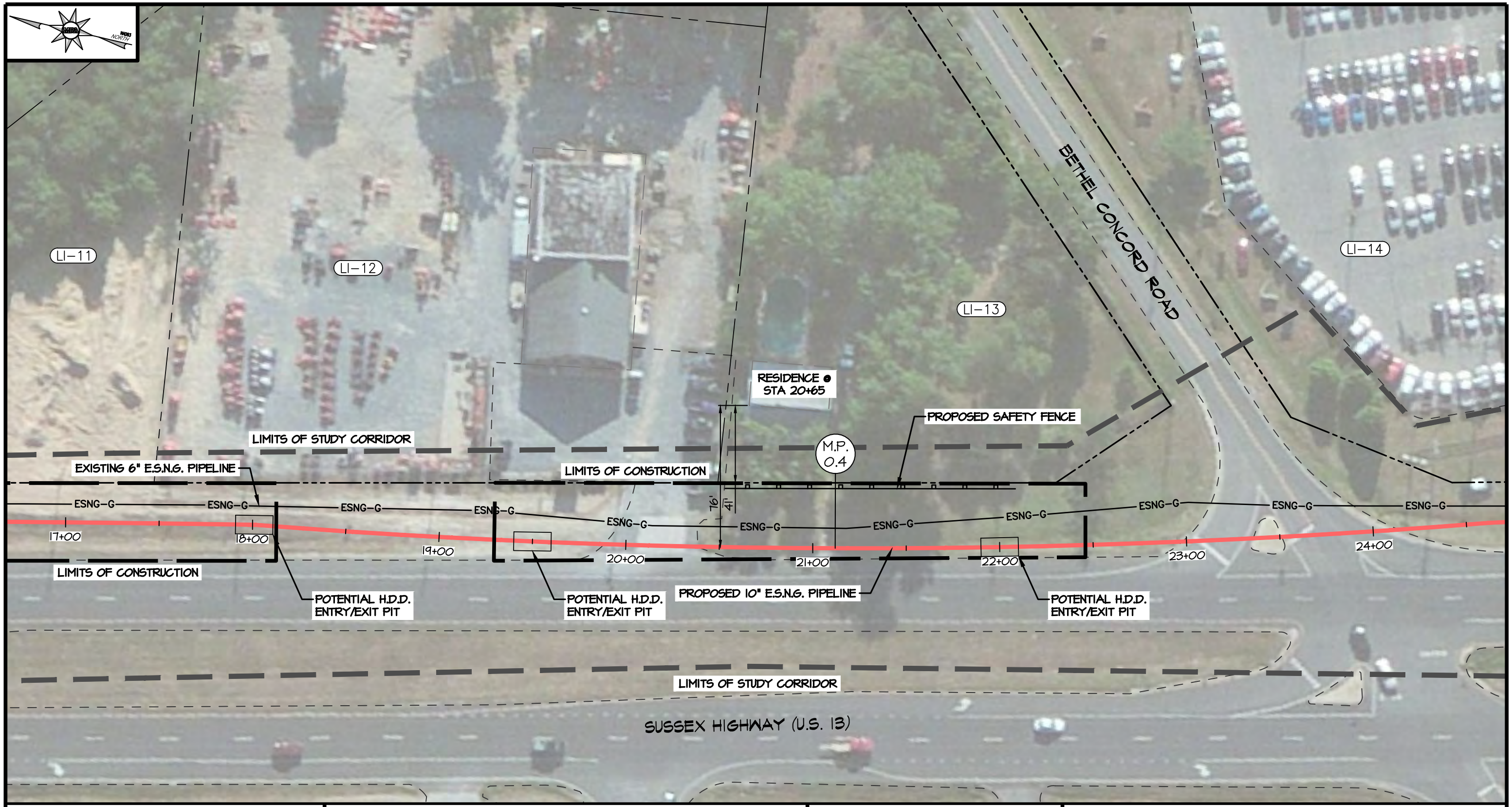

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50 25 0 25 50 100
SCALE: 1" = 50'

LAUREL LOOP
RESIDENTIAL MAP
2017 EXPANSION PROJECT
SUSSEX COUNTY, DELAWARE

PROJECT NO:	19230	DATE:	11/18/2016
DESIGN BY:	JJM/JCM	SCALE:	1" = 50'
CHECKED BY:	CWB	SHEET:	1 OF 1

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